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Potential IFRS adopting entities' output characteristics in Hungary

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International Financial Reporting Standards (IFRS) reporting is becoming increasingly relevant in Hungary, and the existing scientific literature about transition effects in other countries is already rich and diverse. In this paper, we aim to explore the macroeconomic characteristics of the transitions on two robust samples approximating the total population of business entities within the economy and the potential IFRS adopting entities with multiple linear regression models between 2016 and 2019. The results are interpreted in the context of the related IAS/IFRS standards, and the differences are compared to the Hungarian accounting regime. This paper focuses primarily on the ESA 2010-defined output, GDP and NDP impacts.

Keywords: International Financial Reporting Standards, ESA 2010, Output

Global financial reporting standardization started in 1973 when the International Accounting Standards Committee (IASC) issued the first International Accounting Standards (IAS) and their interpretations (SIC). Starting in 2001, the successor International Accounting Standards Board (IASB) issued the International Financial Reporting Standards (IFRS) and their interpretations (IFRIC). In 2002, the European Union adopted the IFRS as the required financial reporting standards for the consolidated financial statements of all European companies whose debt or equity securities trade on a regulated market in Europe.[1]

In Hungary, in addition to the 2002 EU regulation, a separate Act[2] was issued to regulate IFRS reporting for stand-alone financial statements, which are mandatory for certain business entities (e.g., credit institutions and companies whose debt or equity securities trade on a regulated market in Europe) and are optional for other stand-alone entities following IFRS reporting (e.g., for those

[1] https://www.ifrs.org/use-around-the-world/use-of-ifrs-standards-by-jurisdiction/view-jurisdiction/european-union
[2] Act CLXXVIII. on implementing the application of the International Financial Reporting Standards in Hungary for individual reporting purposes and the modification of certain financial laws.

entities whose highest level parent company prepares its consolidated financial statements on the basis of IFRS or for companies falling under external audit obligations).

In 2016, 121 companies prepared their stand-alone financial statement according to IFRS, with a total sales revenue of HUF 5.1 billion, representing 6.68% of the output in Hungary. In 2019, these numbers were 135 IFRS reporting companies with a 7.14% share in the output[3].

The increasing number of IFRS adopters raises the question of whether the application of international reporting standards impacts macroeconomic aggregates. This paper deals with the macroeconomic characteristics of the transitions on two robust samples approximating the total population of business entities within the economy and the potential IFRS adopting entities with multiple linear regression models between 2016 and 2019. The results are interpreted in the context of the related IAS/IFRS standards and differences compared to the Hungarian accounting regime from the perspective of ESA 2010 defined output, GDP and NDP.

1. Literature review

The literature examining the macroeconomic aspects of the IFRS transition focuses mainly on particular macroeconomic variables (e.g., GDP, FDI), market impacts (e.g., cost of capital, liquidity, returns), or institutional consequences (e.g. transparency, legal enforcement, corruption or investor protection). Whereas other research papers have underscored the microeconomic aspects of the IFRS transitions or emphasized the analysis of the stand-alone or consolidated financial statements, in this literature review, the macroeconomic-related articles are highlighted in chronological order to provide a critical overview of existing research findings. This review is far from complete, but enables an orientation within the IFRS research history.

[3] Based on the Hungarian National Tax and Customs Administration (NAV) annual prompt reports GYJ2017 and GYJ2019.

1.1 Papers focusing on macroeconomic variables

In an early research by *Doan et al. (1984)*, the authors built a ten-variable Bayesian vector autoregressive model in which they showed that the variance of GNP is highly predictable by aggregated accounting information (changes in inventories) and stock prices. With a one-year time horizon, both stock prices and changes in inventories were shown to be leading predictors for GNP. However, with a longer time horizon, only stock prices remained as leading predictors. Despite the fact that their predictive model is robust, this research does not address the impact of different accounting regimes, such as local GAAP, IAS or US GAAP, nor the analysis of SNA (System of National Accounts)-related issues (e.g., how GNP is measured technically).

In contrast, *Larson and Kenny (1995)* analyzed 27 developing countries and the statistical relationships between the adoption of IAS reporting, equity market development, and economic growth, using a cross-national sociological research design and partial least squares (PLS) regression. Although they did not identify statistically significant relationships between the adoption of IAS reporting and the economic growth variable, this paper does include the IAS adoption aspect and validates its findings by applying different methods. On the other hand, the analysis only captures high-level macroeconomic aggregates and has a narrow focus on real GDP growth instead of a broader focus on IAS adoption impacts on nominal GDP components.

More recently, *Amiram (2012)* examined 60 countries that adopted and 45 that did not adopt IFRS in terms of Foreign Equity Portfolio investments (FPI) and found a statistically significant positive relation between IFRS adoption and FPI variables. Furthermore, it was discovered that this relation is stronger in countries with low corruption and strong investor protection as well as in countries that have also adopted IFRS reporting. Although this research includes statistically significant conclusions regarding a single macroeconomic variable (FPI) and institutional features, it is limited because it covers only one aspect of the SNA-s complex system.

In a further development, *Konchitchki and Patatoukas (2014)* focused on the prediction of GDP based on aggregated accounting earnings. Based on a regressed time series from 1988 to 2011 (93 observations) of these two variables, a second control regression model was developed by adding contemporaneous GDP growth as a third control variable. According to the empirical results, both models were statistically significant and positively correlated for all periods from one to four quarters (albeit with decreasing coefficients and explanatory power at more distant quarters). Interestingly, if the researchers had used the aggregated accounting earnings only, the explanatory power adjusted R-squared would have reached 59%

within the first set of models. After adding further independent variables (e.g., yield, spread, return, FED-GDP forecast), the adjusted R-squares of the aggregated accounting earnings dropped to 29%. Within this research design, the IAS adoption impacts are not explored, and the small sample size results in a less robust model compared to the one developed in the current paper.

Chen et al. (2014) applied a gravity regression model to examine IFRS conformity impacts on foreign direct investment (FDI) flows and identified a positive correlation between IFRS conformity and FDI flows. After additional control variables were added in order to identify further influencing factors, the researchers discovered that IFRS accounting standards play a significant role within the institutional infrastructure, thus contributing a positive effect on FDI inflows to a country. This research is consistent with the findings of *Amiram (2012)* and it also adds to the literature by including the importance of institutional infrastructure. However, as with the criticism of the Amiram research, this study fails to provide a more comprehensive SNA impact analysis.

Based on a sample of 51 IFRS adopters and 51 IFRS nonadopters, *Zaidi and Huerta (2014)* developed a predictive model of GDP with nine independent variables. This study included IFRS adoption as a dummy variable and employed models using panel data regression techniques as well as several modified OLS and 2SLS models but found no significant statistical relationships between increases in GDP and IFRS adoption. They did, however, identify a statistically significant positive relationship between legal enforcement and IFRS adoption, consistent with the earlier findings of *Larson and Kenny (1995).*

In contrast to the above research, *Özcan (2016)* applied an OLS multiple regression model to develop a predictive model of GDP based on seven independent variables employing a sample of 41 countries that adopted IFRS and 29 countries that had not yet adopted IFRS. Interestingly, in this case, the researcher found a statistically significant and strong positive relationship between IFRS adoption and economic growth. Because these findings contradict the conclusions of *Larson and Kenny (1995)* as well as those of *Zaidi and Huerta (2014)*, the need for further research related to the connection between IAS/IFRS adoption and GDP is indicated.

Based on a sample of 93 companies exhibiting both positive and negative earning changes in order to test the predictive power of changes in accounting earnings for GDP growth, *Gaertner et al. (2017)* replicated and expanded the research of *Konchitchki and Patatoukas (2014)*. Their results showed that only negative changes in aggregate earnings are significantly related to future GDP growth and future GDP growth forecast errors. Furthermore, by excluding special items (accruals, inventory write-offs, provisions for bad and doubtful debts) from the model, they showed that the predictive value between aggregated earnings and

GDP becomes insignificant. Although this research clearly refines the conclusions of *Konchitchki and Patatoukas (2014)*, the fact remains that the IAS/IFRS adoption impact factor is still missing.

In contrast, *Abdalla and Carabias (2021)* used a vector autoregression model to show that aggregated earnings before special items are positively related to GDP growth. Moreover, they found that the aggregate of special items results in synchronized movements across macroeconomic aggregates.

Despite the above extensions of the original research from 2014, remains the question of the relationship between IFRS adoption -as an explanatory variable to build the "linkage" between individual financial statement items (both ordinary and special items)- and macroeconomic aggregates. Based on a sample of Hungarian IFRS adopters, the main objective of the current research paper is to test whether there is a similar "linkage" and to identify those ordinary or special items (and the related IAS/IFRS standards) that are relevant for predicting GDP output.

1.2 Market Impact Focused Research

Compared to previous publications, the following papers emphasize the microeconomic effects of IFRS adoption by excluding variables that are macroeconomic aggregates in nature. Despite this fact, because of the relatively large sample sizes and the underlying robust statistical models, it is possible to generalize the conclusions at the macroeconomic level.

In an early study, *Daske et al. (2008)* selected 3,100 companies from 26 countries and examined the IFRS adoption impact on market liquidity, cost of capital and Tobin's q. They observed a decreasing cost of capital and increasing Tobin's q for those countries where companies have incentives to be transparent and where legal enforcement is strong. These results underscore the central importance of firms' reporting incentives and a country's enforcement regimes for the quality of financial reporting. This study concluded that this impact was more pronounced where IFRS adoption was voluntary, as opposed to mandatory.

In a study focused on selected special items in financial statements, *Aharony et al. (2010)* examined the relevance of goodwill, research and development expenses (R&D), the revaluation of property, plant and equipment (PPE), earnings and the book value of equity for a sample of 2,298 companies from 14 European countries. Where the domestic accounting standards are compatible with IFRS, the research revealed a positive correlation between the examined accounting items and both security prices and security returns. The conclusion of the study was that higher deviations of three domestic GAAP-based accounting items from their

corresponding IFRS counterparts led to greater increases in the incremental value for investors resulting from switching to IFRS in the IFRS mandatory adoption year.

Finally, using an autoregression model of 371,571 firm-quarter data points from 1989 to 2007, *Gallo et al. (2016)* show that aggregate earnings convey policy news and the market reacts negatively to negative policy surprises, which drive the negative aggregate earnings-returns association.

1.3 Institutional Consequences Explored

The following papers are not strictly related to the current paper's research focus. However, as previously shown under the research description of *Amiram (2012), Chen et al. (2014), Zaidi and Huerta (2014)*, an initial macroeconomic aggregate focused research may result in a significant institutional conclusion as a byproduct.

Wu and Zhang (2009) examined whether IFRS adoption is associated with a higher sensitivity of credit ratings to accounting information for 1,917 mandatory and 883 voluntary firms between 1990 and 2007. They concluded that credit ratings are significantly more sensitive for voluntary IFRS adopters and for mandatory IFRS adoption countries with strong legal enforcement.

Horton and Serafeim (2010) examined the quality of analysts' information environment based on 2,235 mandatory, 635 voluntary IFRS adopters and 5,254 nonadopters from 2001 to 2007. They found that increases in the quality of the information environment led to an impact that was stronger in those cases where differences between the preadoption accounting treatment and IFRS were higher.

2. Research questions and design

The aim of this research is to identify the most relevant issues in relation to the expanded application of IFRS reporting in Hungary. With that objective in mind, the first step was to select the significant variables with the highest descriptive power. Subsequently, based on both statistical significance and economic relevance, the number of potential variables was reduced to a reasonable number of variables in order to evaluate the following questions:

- Is the potential IFRS reporting group's contribution to output (i.e., to GDP) significant and material?

- Are there specific financial statement elements (or related standards) relevant for future comprehensive macroeconomic research?
- Are there unique characteristics in the Hungarian economy that must be taken into consideration for IFRS reporting for stand-alone financial statements?
- Are there significant differences between the total population of Hungarian companies and the potential IFRS reporting group in terms of their contribution to output (i.e., GDP)?

3. Data Description

To compare statistical characteristics and validate the study findings, the research was based on a cross-sectional analysis of two large population datasets from different sources and two different years. The following describes these data sources.

- The dataset from 2016 was provided by Dun & Bradstreet (D&B). It contains more than 400,000 Hungarian entities that disclosed financial statements based on IFRS reporting requirements. For this dataset, more than 166 publicly available financial and nonfinancial variables are disclosed for the reporting entities. After careful filtering these data, based on statistical tests of multicollinearity, predictive significance and descriptive power, 13 variables were identified. These independent variables were used to construct a general multiple linear regression model for the complete population of Hungarian reporting companies and the potential IFRS user subset of Hungarian companies. From this initial dataset, the potential IFRS user subset (hereinafter POTIFRS) was derived based on the Hungarian Accounting Act[4] (hereinafter HAS) and the so-called "IFRS"-Act,[5] which requires Hungarian entities that meet certain criteria to report their stand-alone financial statements based on IFRS. For this set of companies, an entity is included in the potential IFRS user group if:

[4] Act C of 2000. on accounting (hereinafter HAS) prescribes mandatory financial audit by independent external auditor if the two financial criteria described above are met for two consecutive years. The 2016 and 2019 subsets were created with the simplification and assumption that the potential IFRS reporting group was the same for 2015 and 2018.

[5] Act CLXXVIII. on implementing the application of the International Financial Reporting Standards in Hungary for individual reporting purposes and the modification of certain financial laws.

  - the sales revenue is equal to or higher than HUF 300 million and
  - the average number of employees equals or exceeds 50 persons for two consecutive years.

Internet Appendix Table 1.1 includes the descriptive statistics of the full dataset, and Appendix Table 2.1 provides the potential IFRS user subset. Because this research focuses on the impact of gross output (i.e., GDP), the aggregated sales revenue of the reporting entities provides a necessary control check on the completeness of the data as well as a foundation for understanding the concentration characteristics of the variables. An analysis of the aggregated sales revenue shows the following results:

  - The total sum of sales revenue in 2016 for the 427 836[6] entities was HUF 74,028,709 million (mean: HUF 173 million; standard deviation: HUF 5,454 million), whereas the number of potential IFRS reporting entities is 5,101 and these realized a total sales revenue of HUF 44,358,959 million (mean: HUF 8,696 million; standard deviation: HUF 48,762 million). This means that in 2016, 1.29% of the examined population contributed 59.92% to the aggregated sales revenue.
  - For comparison, the Hungarian Central Statistical Office (HCSO) reported HUF 75,734,443 million Gross output (hereinafter Output), including product fees and subsidies for 2016.

- The second dataset from 2019 includes 308 separate fields used for corporate income tax reporting for 335,850 reporting entities. This reporting is anonymous and it is provided by the Hungarian National Tax and Customs Administration (NAV). This dataset conforms with the potential IFRS user subset criteria used in the 2016 dataset described above. Descriptive statistics for this dataset are shown in Internet Appendix Tables 3.1 and 4.1. An analysis of the aggregated sales revenue shows the following results:
  - The total sales revenue in 2019 was HUF 94,657,180 million (mean: HUF 282 million; standard deviation: HUF 7,416 million).
  - The number of potential IFRS reporting entities was 5,220, which reported a total HUF of 58,213,428 million (mean: HUF 11,152 million; standard deviation: HUF 57,599 million). The high degree of concentration still remains since 1.55% of the examined population generates 61.5% of the aggregated sales revenue in 2019.

[6] From this group, 338,195 entities had actual sales revenue information for 2016.

For comparison, the magnitude of the aggregated sales revenue reported by the Hungarian Central Statistical Office (KSH) was HUF 93,629,658 million output (including product fees and subsidies) for 2019.[7]

4. OLS multiple linear regression models for 2016

The first model includes 13 independent variables regressed on the aggregated sales revenue for the entire dataset of 427,836 cases. All analyses were performed with IBM's SPSS Statistics 27, and the summary statistics for the model are shown in Table 1.

Table 1

Model summary for the full dataset of 2016

Model	R	R Square	Adjusted R Square	Sid. Error of the Esimaie	R Square Change	F Change	clf1	df2	Sig. F Change
1	0.993[a)]	0.986	0.986	635376.0681	0.986	2392400.845	13	427,822	0.000

a) Predictors: (Constant), G.Accruals, VI.Revaluation reserve, E.Provisions, I.Intangible assets, II.Receivables, II. Long-term liabilities, A.EBIT, IV.Cash&cash equivalents, V.Personal type expenses, VII. Other expenses, IV.Material type expenses, III.Short-term liabilities, VI.Depreciation&Amortization

As reported in the model summary, the F value is 2,392,400.845, and the model is significant at the 5% level.

The descriptive power of the model is 98.6% based on the adjusted R Square, which means that the 13 independent variables selected for the model explain 98.6% of the variances of the dependent variable sales revenue.

Having examined the global properties of the model, it is necessary to evaluate the coefficients for each of the independent variables to test for significance. Table 2 gives the results of the statistical properties for each of the independent variables.

As Table 2 shows, all independent variables included in the model are statistically significant. In all 13 cases, the null hypothesis that the coefficients are equal to zero can be rejected.

Regarding collinearity, the values for the VIF statistic are all below the critical value of 10, and the tolerance values are not lower than 0.1, which means that there

[7] Although the aggregated sales are used as a proxy for output, there are several methodological differences between the two aggregates (e.g., changes in inventories is part of the output at the macroeconomic level and classified on a separate line for microeconomic accounting purposes in the income statement, while product fees might be included in sales revenue under HAS, but must be eliminated for ESA 2010 output calculation purposes).

is no critical collinearity between the variables. Obviously, since the database contains financial statement subtotals produced from a financial accounting perspective, it is unrealistic to expect fully independent variables.

Table 2

Coefficient table for the full dataset of 2016

Model	Unstan-dardized	Coeffi-cients Std. Error	Coeffi-cients Beta	t	Sig.	Colli-nearity Tolerance	Statistics VIF
(Constant)	4,309.642	973.102		4.429	<0.001		
IV. Material type expenses	0.967	0.000	0.772	2 297.096	0.000	0.281	3.564
V. Personal type expenses	0.643	0.003	0.052	195.850	0.000	0.443	2.260
VI. Depreciation & Amortization	1,153	0.004	0.101	289.147	0.000	0.262	3.814
VII. Other expenses	0.601	0.001	0.139	508.435	0.000	0.422	2.369
A. EBIT	1.417	0.004	0.101	401.898	0.000	0.504	1.985
I. Intangible assets	0.089	0.001	0.016	67.561	0.000	0.572	1.749
II. Receivables	0.043	0.001	0.021	62.245	0.000	0.292	3.427
IV. Cash&cash equivalents	0.153	0.002	0.017	77.583	0.000	0.639	1.564
VI. Revaluation reserve	0.134	0.003	0.008	42.932	0.000	0.983	1.017
E. Provisions	0.195	0.002	0.023	92.660	0.000	0.517	1.933
II. Long-term liabilities	–0.048	0.001	–0.019	–91.211	0.000	0.730	1.370
III. Short-term liabilities	–11	0.001	–0.007	–19.886	<0.001	0.291	3.434
G. Accruals	–0.412	0.001	–116	–417.044	0.000	0.411	2.435

a) Dependent variable: Sales revenue.

Within the 2016 dataset, the second model is limited to those 5,101 entities that have published their stand-alone financial statements according to IFRS (hereinafter POTIFRS). The summary statistics for this model are shown in Table 3.

Table 3

Model summary for the POTIFRS dataset of 2016

Model	R	R Square	Adjusted R Square	Sid. Error of the Esimaie	R Square Change	F Change	dlf1	df2	Sig. F Change
1	0.994[a)]	0.988	0.988	5449454.046	0.988	31020.580	13	5087	0.000

a) Predictors: (Constant), G.Accruals, VI.Revaluation reserve, E.Provisions, I.Intangible assets, II.Receivables, II. Long-term liabilities, A.EBIT, IV.Cash&cash equivalents, V.Personal type expenses, VII. Other expenses, IV.Material type expenses, III.Short-term liabilities, VI.Depreciation&Amortization.

As reported in the model summary, the F value is 31,020.580, and the model is significant at the 5% level.

As with the model developed using the full dataset, the descriptive power of the model is strong. The adjusted R square is 98.8%, which means that the 13 independent variables selected for the model explain 98.8% of the variance of the dependent variable sales revenue reported in the POTIFRS dataset.

Table 4

Coefficient table for the POTIFRS dataset of 2016

Model	Unstan-dardized	Coeffi-cients Std. Error	Coeffi-cients Beta	t	Sig.	Colli-nearity Tolerance	Statistics VIF
(Constant)	543341.823	80226.397		6.773	<0.001		
IV. Material type expenses	0.965	0.004	0.769	250.449	0.000	0.260	3.853
V. Personal type expenses	0.505	0.031	0.041	16.123	<0.001	0.385	2.601
VI. Depreciation & Amortization	0.717	0.047	0.064	15.407	<0.001	0.143	6.991
VII. Other expenses	0.692	0.012	0.106	59.694	0.000	0.776	1.288
A. EBIT	1.338	0.033	0.095	41.051	0.000	0.453	2.209
I. Intangible assets	0.353	0.023	0.049	15.579	<0.001	0.247	4.056
II. Receivables	0.080	0.009	0.039	8.424	<0.001	0.114	8.790
lV. Cash&cash equivalents	0.173	0.018	0.019	9.553	<0.001	0.636	1.573
VI. Revaluation reserve	0.191	0.034	0.009	5.700	<0.001	0.968	1.033
E. Provisions	0.284	0.021	0.034	13.691	<0.001	0.396	2.527
II. Long-term liabilities	–0.044	0.005	–0.017	–9.123	<0.001	0.707	1.415
III. Short-term liabilities	–0.062	0.009	–0.033	–6.689	<0.001	0.104	9.645
G. Accruals	–0.230	0.014	–0.032	–16.706	<0.001	0.648	1.543

a) Dependent variable: Sales revenue.

Having examined the global properties of the model, it is necessary to evaluate the coefficients for each of the independent variables in order to test for significance. Table 4 gives the results of the statistical properties for each of the independent variables.

Within Table 4, it is evident that all independent variables included in the model are statistically significant at the 5% significance level. In all 13 cases, the null hypothesis that the coefficients are equal to zero can be rejected.

Regarding collinearity, the values of the VIF statistic for each of the 13 independent variables are below the critical value of 10 and above the tolerance value of 0.1, although in the case of short-term liabilities, the VIF statistic is close to the threshold with a value of 9.645 with 0.104 tolerance. However, in order to maintain consistency with the full dataset, all variables are kept in the model since both the VIF statistic and tolerance value are within the threshold for each variable.

5. OLS multiple linear regression models for 2019

The third model includes the same 13 independent variables regressed on the aggregated sales revenue for all 335,850 cases included in the second dataset. The summary statistics for this model are shown in Table 5.

Table 5

Model summary for the full dataset of 2019

Model	R	R Square	Adjusted R Square	Sid. Error of the Esimaie	R Square Change	F Change	dlf1	df2	Sig. F Change
1	0.996[a)]	0.991	0.991	692493.435	0.991	2937785.753	13	335836	0.000

a) Predictors: (Constant), G.Accruals, VI.Revaluation reserve, E.Provisions, I.Intangible assets, II.Receivables, II. Long-term liabilities, A.EBIT, IV.Cash&cash equivalents, V.Personal type expenses, VII. Other expenses, IV.Material type expenses, III.Short-term liabilities, VI.Depreciation&Amortization.

As reported in the model summary, the F value is 2,937,785.753, and the model is significant at the 5% level.

The descriptive power of the model is strong, as the adjusted R square is 99.1%, which indicates that the 13 independent variables selected for the model explain 99.1% of the variances of the dependent variable sales revenue for the cases in the second dataset.

Having examined the global properties of the model, it is necessary to evaluate the coefficients for each of the independent variables in order to test for significance. Table 6 gives the results of the statistical properties for each of the independent variables.

As Table 6 shows, all of the included variables are statistically significant. In all 13 cases, the null hypothesis that the coefficients are equal to zero can be rejected.

Table 6

Coefficient table for the full dataset of 2019

Model	Unstan-dardized	Coeffi-cients Std. Error	Coeffi-cients Beta	t	Sig.	Colli-nearity Tolerance	Statistics VIF
(Constant)	–1385.612	1198.047		–1.157	0.247		
IV. Material type expenses	1.009	0.000	0.857	3127.503	0.000	0.346	2.893
V. Personal type expenses	0.597	0.003	0.049	209.666	0.000	0.476	2.103
VI. Depreciation & Amortization	0.772	0.004	0.055	185.361	0.000	0.294	3.402
VII. Other expenses	0.603	0.001	0.103	599.320	0.000	0.881	1.135
A. EBIT	1.111	0.003	0.068	338.251	0.000	0.649	1.540
I. Intangible assets	0.022	0.001	0.003	16.896	<0.001	0.906	1.103
II. Receivables	0.033	0.001	0.010	49.476	0.000	0.594	1.685
lV. Cash&cash equivalents	0.023	0.002	0.003	12.036	<0.001	0.574	1.744
VI. Revaluation reserve	0.039	0.003	0.002	14.036	<0.001	0.980	1.021
E. Provisions	0.149	0.001	0.027	161.527	0.000	0.957	1.045
II. Long-term liabilities	–0.033	0.000	–0.053	–247.278	0000	0.565	1 769
III. Short-term liabilities	0.006	0.001	0.003	11.392	<0.001	0.499	2.003
G. Accruals	–0.085	0.001	–0.012	–66.172	0.000	0.829	1.207

a) Dependent variable: Sales revenue.

Finally, the fourth model is constructed using the 5,220 POTIFRS entities from 2019:

Table 7

Model summary for the POTIFRS dataset of 2019

Model	R	R Square	Adjusted R Square	Sid. Error of the Esimaie	R Square Change	F Change	dlf1	df2	Sig. F Change
1	0.996[a)]	0.992	0.992	5007041.824	0.992	52726.711	13	5206	0.000

a) Predictors: (Constant), G.Accruals, VI.Revaluation reserve, E.Provisions, I.Intangible assets, II.Receivables, II. Long-term liabilities, A.EBIT, IV.Cash&cash equivalents, V.Personal type expenses, VII. Other expenses, IV.Material type expenses, III.Short-term liabilities, VI.Depreciation&Amortization.

As reported in the model summary, the F value is 52,726.711, and the model is significant at the 5% level.

The descriptive power of the model is strong, as the adjusted R squares is 99.2%, which indicates that the 13 independent variables selected for the model explain 99.2% of the variances of the dependent variable sales revenue for the POTIFRS cases in the second dataset.

Having examined the global properties of the model, it is necessary to evaluate the coefficients for each of the independent variables to test for significance. Table 8 gives the results of the statistical properties for each of the independent variables.

Table 8

Coefficient table for the POTIFRS dataset of 2019

Model	Unstan-dardized	Coeffi-cients Std. Error	Coeffi-cients Beta	t	Sig.	Colli-nearity Tolerance	Statistics VIF
(Constant)	164022.387	73948.350		2.218	0.027		
IV. Material type expenses	1.004	0.003	0.852	364.301	0.000	0.265	3.774
V. Personal type expenses	0.632	0.022	0.051	28.266	<0.001	0.442	2.263
VI. Depreciation & Amortization	0.793	0.033	0.058	23.920	<0.001	0.250	4.006
VII. Other expenses	0.638	0.008	0.109	83.609	0.000	0.857	1.167
A. EBIT	1.048	0.031	0.058	34.005	<0.001	0.502	1.992
I. Intangible assets	0.044	0.012	0.005	3.552	<0.001	0.818	1.223
II. Receivables	0.120	0.008	0.031	15.481	<0.001	0.362	2.761
lV. Cash&cash equivalents	0.056	0.021	0.004	2.631	0.009	0.659	1.518
VI. Revaluation reserve	0.124	0.032	0.005	3.893	<0.001	0.939	1.064
E. Provisions	0.158	0.007	0.028	22.514	<0.001	0.953	1.050
II. Long-term liabilities	–0.036	0.001	0.056	–32.821	<0.001	0.503	1.988
III. Short-term liabilities	–0.090	0.009	–0.020	–10.368	<0.001	0.387	2.584
G. Accruals	–0.130	0.012	–0.015	–10.852	<0.001	0.739	1.354

a) Dependent variable: Sales revenue.

As Table 8 shows, all of the included variables are statistically significant. In all 13 cases, the null hypothesis that coefficients are equal to zero can be rejected.

Regarding collinearity, the values of the VIF statistic for each of the 13 independent variables are below the critical value of 10 and above the tolerance value of 0.1, meaning that no critical collinearity exists between the variables in this model.

6. Analysis of the results from an economic (IFRS reporting) perspective

After multiple iterations on the initial datasets, the following regression model can be formulated:

Aggregated sales revenue (~Output) = $ß_0$ + $ß_1$ Material type expenses +$ß_2$ Personal type expenses + $ß_3$ Depreciation & Amortization +$ß_4$ Other expenses + $ß_5$ EBIT +$ß_6$ Intangible assets + $ß_7$ Receivables +$ß_8$ Cash & cash equivalents + $ß_9$ Revaluation reserves + $ß_{10}$ Provisions + $ß_{11}$ Long-term liabilities + $ß_{12}$ Short-term liabilities + $ß_{13}$ Accruals + u

The analysis will focus primarily on the direction of the changes between the full dataset's population and the POTIFRS sample for 2016 and 2019, which means that the models will not be used for prediction. Consequently, the constant $ß_0$ is not relevant for further analysis. Another implication of this approach is that the analysis will be less sensitive to statistical properties, which might cause biased estimations (e.g., heteroscedasticity)[8] of the dependent variable.

Since the regression contains both income statement line items (flow type variables) and balance sheet line items (stock type variable), the analysis will focus primarily on the relationship of these variables[9] to the ESA 2010-based output and GDP/NDP calculations. These relationships might be direct (e.g., depreciation impacts NDP directly) or indirect (e.g., the revaluation reserve for the surplus asset side depreciation has an impact according to the IAS16 Property, plant and equipment standard).

7. Material type expenses variable

In 2016, a HUF 1,000 increase in material type expenses was associated with a HUF 967 increase in the aggregated sales revenue (~output) for the total population in the first dataset and a slightly lower HUF 965 increase in the aggregated sales revenue (~output) for the potential IFRS user group. Compared

[8] These properties will be discussed in more detail in the section limitations and further research possibilities.

[9] This paper will not explore causality, so any interpretation should avoid the conclusion that a particular variable in these regressions "caused" the changes in the output, GDP or GNI. Instead, the focus is on the most relevant issues (and the exact financial statement line items) which are emerging in the context of IFRS adoptions and how the reporting at the company level and for the national accounts are linked.

to this, in 2019, the related increase was HUF 1,009 for the total population in the second dataset and HUF 1,004 for the POTIFRS group.

This implies that for both 2016 and 2019, the potential IFRS user group's material type expense output utilization efficiency was slightly lower than that of the total population. However, from 2016 to 2019, both groups increased material expense efficiency in relation to both gross output and the material type expense intensity within the gross output contributing factors.

From an IFRS reporting perspective, these results, as well as the standardized coefficients for the variables in each group for every reporting year support the need for further detailed research on the calculation method for the material type expenses in relation to the gross output (i.e., GDP):

- Changes in inventories of finished goods and work in progress (STKÁV): ESA 2010 defines Output (P.1) as *"the total of products created during the accounting period, which (a) includes the goods and services which one local kind-of-activity units (KAU) provides to a different local kind-of-activity unit (KAU) belonging to the same institutional unit and (b) the goods produced by a local kind-of activity unit (KAU) that remain* in *inventories at the end of the period in which they are produced, whatever their subsequent use*."[10]

  According to HAS, for entities publishing simplified annual financial statements using the "by nature" format for the income statement, these data are available directly from the corresponding income statement line. However, for entities reporting under IFRS, the "by function" format tends to be used for income statement presentation, and the changes in inventories of finished goods and WIP are not necessarily stated separately. To solve this problem, the Hungarian Central Statistical Office (KSH) introduced nr. 2239 of the annual performance statistic report making mandatory for IFRS users to disclose the changes in inventories and other financial data according to the income statement "by nature" approach. This means that if a potential IFRS user prepares the income statement using the "by function" approach, it still has to collect and structure data according to the "by nature" approach as well.
- Furthermore, as highlighted by *Madarasiné and Szőllősiné (2018)*, there is an issue related to the reporting of mediated services, since according to IFRS, these items decrease sales revenue, whereas according to HAS, they are classified as material-type expenses. On the ESA 2010 national accounts level, this would mean that if companies with a high degree of mediated

[10] REGULATION (EU) No 549/2013 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 21 May 2013 on the European system of national and regional accounts in the European Union paragraph 3.14 (a)-(b).

services increasingly adopt IFRS, both the output (P.1) and intermediate consumption (P.2) would decrease, but the GDP and NDP would ceteris paribus remain the same.

8. Personal type expenses variable

In the case of personal type expenses, the picture is rather mixed since in 2016, an increase of HUF 1,000 of this variable was associated with a HUF 643 increase in aggregated sales revenue (~output) for the total population in the first dataset but exhibited a 21.46% lower increase of HUF 505 in aggregated sales revenue (~output) for the POTIFRS group. In contrast, the associated increases in 2019 were HUF 597 for the total population and HUF 632 for the POTIFRS group.

These results indicate that the personal type expense output efficiency and relevancy increased for the POTIFRS group from 2016 to 2019 and was higher compared to the second dataset's population as well.

Two main standards are related to this variable: IAS 19 Employee benefits and IFRS 2 share-based payment. The differences between HAS and IFRS reporting also have an impact on the distributive transactions under ESA 2010 (D.1 Compensation of employees), but that is outside of the scope of this paper. However, for the purpose of a comprehensive macroeconomic examination, these differences should be considered, especially with respect to the long-term and termination benefit impacts.

9. Depreciation & Amortization, Intangible Assets and Revaluation Reserve variables

On the surface, these variables are not interrelated. However, as we will see according to the IAS 16 Property, plant and equipment and IAS 38 Intangible assets standards, there are several interesting issues in relation to the GDP calculation.

In the case of the Depreciation & Amortization variable, a HUF 1,000 increase was associated with a HUF 1,153 increase in the aggregated sales revenue for the

first dataset's full population, but only a HUF 717 increase in the case of the POTIFRS group in 2016.

For 2019, the increases are HUF 772 and HUF 793. This shows that for the total population dataset, the depreciation and amortization output efficiency decreased, while for the POTIFRS group, it increased between 2016 and 2019.

The data further reveal that the Hungarian economy's output was consuming both tangible and intangible assets more intensively than human resources in both reporting years and this trend became more pronounced for the POTIFRS group in 2019, which is quite thought-provoking.

The changes in the revaluation reserve variable reveal the differences that it shows for the two datasets. For both 2016 and 2019, the POTIFRS group utilized revaluation reserves with higher efficiency compared to the full population dataset (in 2016, it was 42.53% higher, whereas in 2019, this utilization spread increased to 45.88% in favor of the POTIFRS group). However, it must be highlighted that this increase is mainly due to the material drop in the full population dataset of the revaluation reserve utilization from 2016 (HUF 134 output compared to the HUF 1,000 revaluation reserve) to 2019 (only HUF 39 output compared to the HUF 1,000 revaluation reserve).

At this point, the revaluation model of IAS 16 Property, plant and equipment needs to be briefly explained, since both the procedure and the valuation technique are different compared to the HAS approach.

When implementing the revaluation model under IAS16, the corresponding asset(s) are revalued to fair value, and the related depreciation is charged based on the revalued amount, whereas in the case of HAS, the assets continue to be depreciated with the "old" depreciation charge.

Obviously, the IFRS procedure results in a higher depreciation cost for the period, which might flow into the production costs for work-in progress, semi-finished or finished goods as well. This latter might directly impact intermediate consumption (P.2), whereas higher indirect depreciation expenses will be charged to the consumption of fixed capital (P.51c), thus decreasing the net domestic product (NDP) at the macroeconomic level.

In the case of intangible assets, in 2016, the beta coefficient of the POTIFRS group shows a higher contribution to the aggregated sales compared to the total population. In 2019, this relationship was maintained but at a lower magnitude.

Several differences need to be considered between the IAS 38 Intangible assets standard and the HAS regulation because they might impact both the timing and the amount of amortization charged for a particular period.

According to the HAS regulation, start-up and restructuring costs are allowed to be capitalized and amortized (over a maximum of 5 years)[11], whereas IAS 38 categorically prohibits this[12] procedure. Regarding R&D costs, the HAS regulation only allows development costs to be capitalized, while IAS38 prescribes 6 criteria[13] that must be met for development costs to be capitalized.

Regarding the amortization method, IAS 38 differentiates between definite and infinite useful life intangible assets and states that no amortization is allowed for the latter. This kind of differentiation is unknown under HAS.

Furthermore, IAS 38 prescribes that the amortization method should reflect the pattern of benefits and, if the pattern cannot be determined reliably, they are to be amortized using the straight-line method.[14] HAS does not prescribe a certain approach. It does, however, allow for certain noncapitalized costs to be considered when determining the method and pattern of amortization over the useful life of intangible assets.[15]

10. Other expenses and provision variables

Other expenses and provisions are to be discussed together because of the HAS context.

According to HAS regulation, provisions are to be shown in the income statement as other expenses, whereas the IAS 37 Provisions, Contingent Liabilities and Contingent Assets standard does not prescribe which expense line should be charged.

A typical example is the provision for warranty claims, which is handled differently by both accounting systems. As mentioned above, under HAS, this is charged to other expenses, whereas under IFRS, the related expense might be classified under COGS, which from a macroeconomic (ESA 2010) perspective falls under output (P.1) and thus would be calculated as part of GDP. However, ESA 2010 does not have a provision category in the same sense as HAS or IAS37, so in the latter case, these amounts must be eliminated from COGS in the macroeconomics statistics disclosures.

[11] Act C of 2000. on accounting paragraph 25. (3) and 52 (4).
[12] IAS 38.48 and IAS 38.69.
[13] Separation of research and development phases, technological feasibility, probable future benefits, intent and ability to use or sell the asset, resources to complete the intangible asset, and ability to measure cost.
[14] IAS 38.97.
[15] Act C of 2000. on accounting paragraph 52. (3).

The same applies to the provisions for asset restoration costs under IFRS. After recognition of the provision at the discounted value of the restoration cost as part of the asset, the related additional depreciation must be eliminated for ESA 2010 statistical reporting purposes.

The provision coefficients in the model show that provisioning has a slightly higher relevancy in the case of the POTIFRS group than in the total population dataset for both 2016 and 2019. However, for both categories, its relevance and contribution magnitude dropped in 2019 (in the case of the POTIFRS group from a HUF 284 contribution in 2016 to only a HUF 158 contribution in 2019 in the dependent variable for each HUF 1,000 provision).

Under the other expense category, the local business tax might be examined briefly, as according to IFRS, the classification of this tax is diverse and depends on the cost structure of the business entity. In the case of a wholesale company, the local tax might act as an income tax. However, in the case of a consulting agency, it might be calculated solely based on the sales revenue and thus acts as a sales tax. Under HAS, the local business tax is charged under other expenses.

Since in both cases the local business tax is excluded from the sales revenue and the intermediary consumption elements, it does not affect the GDP calculation directly. In both cases, it is immaterial: the total local business tax incomes of municipalities were only 0.842% of the output in 2019.[16]

11. Receivables and Cash & cash equivalents variables

An examination of the receivables coefficients shows that receivables balances in the POTIFRS group are associated with higher aggregated sales than in the dataset of the total population in both 2016 and 2019. In addition, the relevancy of receivables slightly increased from 2016 to 2019 for both groups but with a higher rate in the POTIFRS group.

In terms of the output and GDP calculation, the most relevant question regarding this variable is the topic of provisioning for bad and doubtful debts.

According to HAS, provisions for bad and doubtful debts should be accounted for as other expenses (with a related decrease in the corresponding receivables balances), but it does not offer a prescription for business entities regarding what principles should be followed when determining the amount of the provision for bad and doubtful debts.

[16] Source: *State Audit Office of Hungary (2021)*.

In the case of IFRS, the IFRS 9 Financial Instruments standard prescribes the application of a robust 3-stage Expected Credit Loss (ECL) model where the expected probability of defaults, loss given defaults and exposures at default needs to be identified when determining the amount of provision.[17] Under IFRS, this amount can be charged to COGS as well. However, as previously discussed under the provision topic, these amounts are not accepted within the macroeconomic statistics (ESA 2010) and thus must be eliminated from COGS within the statistics disclosures.

Cash and cash equivalents and the related HAS-IFRS differences are not relevant from the output, GDP or NDP calculation perspective. However, the differences between the HAS and IAS 7 Statement of Cash Flows standards are a completely separate research area and will not be examined here.

12. Long-term liabilities, Short-term liabilities and Accruals variables

In the case of liabilities, for both groups in 2016 and 2019, the increasing balance of liabilities was associated with a slight decrease in the aggregated sales contribution. The POTIFRS group is more sensitive to short-term liabilities and accruals compared to the total population dataset. The only exception is the short-term liability in the full population of 2016, where the unstandardized beta coefficient is positive. However, for this case, the impact is low (6 HUF of output related to HUF 1,000 short-term liability change).

In the case of liabilities, the most exciting research direction is not what can be seen in the coefficient tables but instead what is not seen:

HAS recognizes leases only if the contract is a financial lease. In contrast, the IFRS 16 Leases standard applies a 5-step decision-tree model to decide whether the contract is, or contains, a lease. If a lease is indicated, then the discounted future lease payments must be recognized as a lease liability, and an asset must be recognized as a right-of-use asset. This asset is then depreciated over the lease term, with the lease liability being decreased by the amount of the lease payments and increased by the amount of the interest charged on the outstanding amount.

From an ESA 2010 reporting perspective, depreciation might be relevant. If the leased asset contributes directly to business activity, then the depreciation charge

[17] IFRS 9 allows for the application of a simplified approach (e.g., an aging-matrix) to determine the provision for bad and doubtful debts.

will be classified as a direct cost (production overhead, which might be part of WIP, semifinished or finished good production costs) and thus it might flow into the value of the intermediate consumption (P.2). The indirect asset depreciation is expensed in the income statement and it is part of the Consumption of fixed capital (P.51c), which has the effect of decreasing the Net Domestic Product (NDP) on a macroeconomic level, unless it is eliminated for statistical purposes.

13. Summary and conclusions

The aim of this research was to identify on an empirical basis the most relevant issues related to the expansion of IFRS reporting to the national account level and to identify the links between company reporting and disclosures in national accounts.

The research revealed that in the case of both examined years the potential IFRS reporting group's contribution to the output is material: in 2016, 1.29% of the examined population contributed 59.92% to the output, and in 2019, 1.55% of the examined population generated 61.5% of the output, indicating that further research in this field is warranted.

Considering the complexity of ESA 2010 and IAS/IFRS standards, a thorough and comprehensive analysis of the IFRS expansion's macroeconomic impacts might take years of research and the involvement of both professional statisticians proficient in ESA 2010 and accounting specialists dealing with HAS and IFRS.

After a careful examination of the literature related to this topic, it is evident that currently sufficient empirical research exploring this area at international or national level does not exist. To support existing research, the first step is to identify those financial statement items that are particularly relevant for further research.

Based on the regression models developed in this paper from two robust datasets, it was possible to identify 13 financial variables (financial statement items) consistently most relevant across the datasets. Collectively, these variables explained over 98% of the total variance of the dependent variable in each year and in each group. In addition, the paper further analyzed each of these variables from the perspective of their links to company reporting and disclosures in national accounts.

The research revealed that the Hungarian economy was highly concentrated in terms of the output achieved in 2016 and 2019 and it relied more heavily on material-type inputs and the consumption of tangible and intangible assets than on human resources. Furthermore, the special items included in the account other expenses were shown to play an important role in the contribution to the output.

Regarding the owners' equity line items, only the revaluation reserve was significant within the regression models, with all other equity items (e.g., issued capital, retained earnings, tied-up reserves, capital reserves) being insignificant in both years. On the other hand, all liability variables remained significant and showed a negative[18] correlation with the output. This is consistent with the fact that the Hungarian economy is still heavily debt financed and it is relatively poor in terms of equity and reserves.

The research did not identify significant differences between the total population dataset and the potential IFRS reporting population dataset with respect to material type expenses, which increased slightly for both groups from 2016 to 2019. On the other hand, for this time period, the utilization of depreciation and amortization showed a decrease for the total population dataset and an increase in the utilization of human resources in the case of the potential IFRS group dataset, which was the opposite of the case of the total population dataset from 2016 to 2019.

With respect to the balance sheet, the potential IFRS reporting group's intangible asset utilization and provisioning was higher in both years than the full dataset's population, and the liabilities had a higher relevancy in this latter group as well, meaning that the potential IFRS reporting group has different macroeconomic characteristics compared to the full population.

14. Limitations and further research possibilities

Regarding the regression models developed in this paper, an unbiased OLS requirement for coefficient estimation is that related variables must be normally distributed. Within this paper, this criterion is not met.[19] However, normality for coefficient t tests is emphasized for smaller sample sizes. Since the first dataset contains 427,836 (total population 689,450[20]) and the second 335,850 (total population 666,616[21]) observations, a large portion of the total population is covered. On the other hand, as mentioned, the coefficients are not used for the

[18] Except the short-term liabilities in 2019 within the full dataset (full sample).

[19] SPSS 27 was able to perform the Kolmogorov-Smirnov test on the POTIFRS sample for both years, the test run to error on the whole samples. Neither variables follow normal distribution so we reject the null hypothesis for the Kolmogorov–Smirnov test please refer to Internet Appendix Table 2.2 and Table 4.2.

[20] Central Statistical Office: Registered business organizations including companies, nonprofit and government organizations in 2016 https://www.ksh.hu/docs/hun/xftp/idoszaki/gazd/2019/index.html

[21] Central Statistical Office: Registered business organizations including companies, nonprofit and government organizations in 2019 https://www.ksh.hu/docs/hun/xftp/idoszaki/gazd/2019/index.html

estimation of the dependent variable but are used instead to identify relationships between the full dataset's population and the potential IFRS adopters.

Another unbiased OLS requirement is homoscedasticity. In the case of large sample sizes and aggregated datasets, heteroscedasticity occurs frequently. After examining the regressed standardized residuals on the standardized predicted values, it can be seen that the model is heteroscedastic. Possible solutions might be a data transformation or to use a logarithmic scale. However, this would come with the cost of losing the relatively simple interpretability and practical use of the model outcomes. Again, since the models are not used for estimation or prediction of the dependent variable and because of the large sample size utilized, the economic conclusions of the models are a useful first step to generate thoughts and to lead to further research in the field.

The research covers only two years with cross-sectional data. An ideal solution would be a panel regression with 10+ years. Unfortunately, access to aggregated data in proper format is limited.

Finally, this research indicates that further analysis of omitted variables has the potential of uncovering additional reporting variables. In particular, the impact on inventories according to IAS 2 in relation to the output, GDP and GNI and the examination of other HAS off-balance items such as leases and deferred taxes are of special interest.

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