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# IFRS adoption and value relevance of accounting information in the V4 region

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**ABSTRACT**

The article compares the value relevance of information contained in financial statements, namely earnings, operating cash flows and book value of equity, in the V4 countries (the Czech Republic, Hungary, Poland and Slovakia). Using a dataset of 604 firm-year observations for the period 2005–2017, we identify higher value relevance of accounting information in the Czech and Hungarian capital markets than in Poland. The financial statements of the Slovak listed firms are found not to present value relevant information. The most relevant metric on the Prague and Budapest stock exchanges are earnings. For the Czech Republic and Poland, we find that investors value between-period changes more than absolute amounts for the period. Finally, the Czech and Hungarian markets exhibit a considerable improvement in value relevance of accounting information approximately five years after adopting the IFRS.

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## 1. Introduction

Over the past three decades, Central and Eastern Europe has experienced rapid and revolutionary economic development. The Visegrád Group countries (namely the Czech Republic, Hungary, Poland and Slovakia, further referred to as 'V4') are in this respect extremely interesting. Despite the generally positive economic situation, certain institutions within the V4 remain underdeveloped, struggling with the heritage of a centrally planned economy. Furthermore, the importance of these institutions over time significantly changes. In this regard, their capital markets are well worth mentioning.

For example, the Prague Stock Exchange (established in 1873, further referred to as 'PSE') played an important role in the first decades of independent Czechoslovakia (after 1918), a role that was interrupted during the communist period and restored in 1993. The specific method of privatisation adopted by the Czech government, the so-called coupon privatisation, ranked the PSE among the world's-leading exchanges in

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terms of number of titles traded (Procházka, 2017). Since then, however, a mix of several unfavourable factors (Musílek, 2019) have led to a considerable decrease in the number of companies being listed, with only 20 share titles currently listed on the Prime and Standard markets, putting the market capitalisation of the PSE at 10% of GDP. One of the major declines in the number of listed firms can be attributed to IFRS becoming mandatory since 2005.[1]

The situation is slightly better on the Budapest Stock Exchange, with around 45 listed titles, including several major Hungarian companies. The market capitalisation to GDP is 18%, but Budapest is not able to boost the interest in IPOs in a similar way as the PSE. The least performing capital market is in Slovakia. Despite listing over 50 share titles, liquidity on the Bratislava Stock Exchange remains low, traded companies are generally small and the total market capitalisation of the Slovak firms is only 5% of GDP.

On the other hand, the Warsaw Stock Exchange (further referred to as 'WSE') may be labelled as a success story. Restarting its operations in 1991 with only five firms listed, it has grown into the largest stock exchange of the region, overpassing even the Vienna Stock Exchange. The WSE has two important markets: the main GPW market lists around 430 share titles and the alternative NewConnect market, with less strict requirements, lists almost 400 titles. The market reforms and concentrated, multiyear-long efforts on the part of WSE management has resulted in attracting not only domestic but also foreign issuers, including their IPOs (Dudycz & Brycz, 2017).

Table 1 summarises capital market and macroeconomic data for all V4 countries and offers a comparison with some other countries from the region. Concerning overall economic performance, V4 countries have matched several older EU Member States. For example, the Czech real GDP per capita almost reaches the EU average and surpasses Greece by 50%, Portugal by 20% and Spain by 10%. Hungary, Poland and Slovakia also outperform Greece and are comparable with Portugal. The region is characterised by good overall economic performance, although capital markets play a rather negligible role in facilitating business financing. The main determinant of the economic success is an export-oriented model, with the strong presence of foreign direct investors providing not only necessary financing resources, but also

**Table 1.** Macroeconomic and capital market data.

| | Nom. GDP per capita | Real GDP per capita | Exports on GDP (%) | Foreign turnover (%) | No of listed firms | Market cap to GDP (%) |
|---|---|---|---|---|---|---|
| Czech Republic | 20,120 | 27,797 | 71.0 | 46.2 | 20 | 10.8 |
| Hungary | 14,100 | 22,234 | 79.5 | 48.5 | 45 | 18.0 |
| Poland | 13,650 | 22,639 | 56.2 | 31.3 | 806 | 29.8 |
| Slovakia | 16,860 | 20,946 | 85.4 | 51.4 | 49 | 2.9 |
| Bulgaria | 8,840 | 16,414 | 55.3 | 34.6 | 259 | 25.3 |
| Croatia | 12,400 | 19,233 | 42.0 | 32.5 | 103 | 38.9 |
| Romania | 11,360 | 21,504 | 37.3 | 52.8 | 83 | 10.3 |
| Slovenia | 22,310 | 26,540 | 77.9 | 33.4 | 27 | 15.8 |
| Greece | 15,440 | 18,659 | 32.0 | 17.1 | 176 | 27.0 |
| Turkey | 7,510 | 18,407 | 28.7 | N/A | 371 | 33.0 |

Source: Eurostat Data Explorer and World Bank Financial Development Indicators. Nominal GDP in €; Real GDP constant in €of 2020. Foreign turnover = turnover by subsidiaries under foreign control divided by aggregate turnover of the economy. All data for 2020 except for *Foreign turnover* which is for 2018.

technological know-how and access to global markets. Czech, Hungarian and Slovak subsidiaries controlled by foreign owners have around a 50% share of the total turnover of business enterprises. On the other hand, the Polish economy is less open, but, contrariwise, the capital market is more vital compared to its V4 peers.

This article aims to examine whether differences in the functionality and importance of the V4 capital markets, described above, are also associated with differences in the usefulness of financial reporting from the investor perspective, that is, our paper investigates the value relevance of accounting information contained in published financial statements. In particular, we try to detect whether accounting figures get reflected in the stock prices (and by how much), which accounting metrics are value relevant, and whether there are any variations in the usefulness of these metrics across the V4 region. The V4 countries have been selected for their specific socioeconomic setup (Nölke & Vliegenthart, 2009), characterised by a strong dependence on foreign direct investments, and, with the exception of Poland, a relatively weaker role of capital markets in raising external sources of capital when compared to other developed economies. The variation in reporting incentives (Cormier et al., 2009; Morais & Curto, 2009), due to differences in size and importance of capital markets, can have an impact on the value relevance of accounting information, including the differences in the relevance of earnings and cash flows.

Differences in the significance of these accounting metrics can be attributed to various levels of managerial discretion over profits and cash flows (Sloan, 1996) when conveying private signals (Healy & Palepu, 2001), as well as to the varying usefulness of accrual and cash accounting in different decision tasks of the users of financial statements (Hirshleifer et al., 2009). Capital market imperfections and the restricted rationality of users can be an issue as well, resulting in the mispricing of available accounting information (Fairfield et al., 2003). In this sense, the V4 countries offer an intriguing institutional setup for the investigation of the value relevance of accounting numbers.

We contribute to the current stream of literature in two ways. Firstly, we extend the previous evidence of the impacts of IFRS in transition countries by confirming that an increase in accounting quality is not usually straightforward. In our study, value relevance of accounting information starts to significantly improve approximately five years after adopting the IFRS. Secondly, unevenly distributed value relevance across the region indicates that sharing common economic and institutional backgrounds does not guarantee a comparable evolution of the quality of financial reporting.

The article is organised as follows. This introductory part is complemented with a literature review discussing up-to-date developments in the value relevance literature, including the specifics of IFRS adoption. The next section defines the research design, including data description and methodology development. The fourth section presents and discusses the main results of the regression analysis while the final chapter provides conclusions, limitations and suggestions for future research.

## 2. Literature review

In general, value relevance represents a concept addressing the ability of accounting to capture information underlying the market value of a company. An important

aspect restricting the operability of the value relevance concept is that financial statements are, in general, published later than other relevant information sources (Lev, 1989). Furthermore, financial statements are restricted in providing useful information, for example, when compared to earnings announcements or management reports (Brown & Sivakumar, 2003). The predictive value of accounting information weakens over time (Francis & Schipper, 1999; Lev & Zarowin, 1999) in favour of its confirmatory value which is an irreplaceable measure in contracting and stewardship (Ball et al., 2008).

The decreasing strength of the association between accounting earnings and share price identified over time is explained, for example, by the role of change, as reporting standards do not keep pace with innovation and technology development (Lev & Zarowin, 1999). Collins et al. (1997) and Dechow and Ge (2006) attribute lower relevance of earnings to the increasing significance of less relevant, one-time items or a high frequency of losses which have lower informative value than profits, as proved by Hayn (1995). Finally, lower value relevance of reported earnings can be the result of the suboptimal behaviour of investors. Sloan (1996) finds that stock prices react as if investors are fixated on earnings and do not properly distinguish the different information potential of the accrual and cash flow components of current earnings. All these deficiencies result in a shift of the value relevance of accounting information from earnings to the balance sheet values (Collins et al., 1997; Keener, 2011).

Furthermore, the quality of earnings for investors differs across countries, indicating that institutional background is an important determinant of accounting quality (Ali & Hwang, 2000; Leuz et al., 2003). The deficiencies of institutional settings or lack of reporting incentives may even outweigh a higher quality of accounting standards (Christensen et al., 2015). A stronger relationship between the value relevance of earnings and earnings quality is evidenced, therefore, in countries with better investor protection (Cahan et al., 2009; Leuz et al., 2003). The structure of capital markets and the level of book-tax conformity are other relevant factors. As pointed out by Bartov et al. (2001), accounting earnings are superior to cash flow metrics when explaining stock returns in Anglo-Saxon countries, but this superiority is not universal, as less evidence is found in non-Anglo-Saxon countries conditioned by the characteristic of national reporting regimes and attendant institutional factors.

The worldwide adoption of IFRS has increased the dynamics of value relevance literature. IFRS are adopted with the view of harmonising financial reporting by increasing the international comparability of financial statements and, thus, reducing information processing costs. Since IFRS are perceived as high-quality financial reporting standards (Leuz, 2003), there are valid expectations that their adoption should contribute to higher value relevance. However, empirical evidence is mixed, even for developed markets. Barth et al. (2008) identify an increase in value relevance on the sample of voluntary adopters from 21 countries, with the same conclusions by Bartov et al. (2005) for Germany or by Cormier et al. (2009) for France. Aubert and Grudnitski (2011) do not find any incremental increase in value relevance in the sample of 12 EU countries. A possible explanation is offered by Clarkson et al. (2011) who show that value relevance increased after IFRS adoption only in Code law countries, but not in Common law ones, or by Morais and Curto (2009) who emphasise

the characteristics of a country's enforcement regime. Contrary to the evidence of Barth et al. (2008), Kouki (2018) does not detect any increase in value relevance by voluntary adopters, but do find evidence of an increase in the post-adoption period. Ambiguous results are also provided by Devalle et al. (2010) when investigating the impact of IFRS adoption on the value relevance of financial statements on the five largest EU stock exchanges. Finally, different accounting figures respond differently once companies shift from the local GAAP to IFRS (Chalmers et al., 2008; Elbakry et al., 2017).

An ambiguity of results is also present in emerging markets. Rodríguez García et al. (2017) or Mongrut and Winkelried (2019) confirm an improvement in value relevance (and earnings timeliness) in Latin American countries in the post-adoption period. A positive development can also be seen in many other emerging markets, such as Malaysia (Adibah Wan Ismail et al., 2013), India and Indonesia (Srivastava & Muharam, 2022), East Africa (Outa et al., 2017), Bahrain (Mousa & Desoky, 2014), or in the United Arab Emirates (Alali & Foote, 2012). However, the study of Jamal Barzegari Khanagha (2011) indicates a decrease in value relevance of IFRS earnings, but an increase in relevance of cash flows in the United Arab Emirates. An ambiguous impact of IFRS adoption on different accounting metrics is also identified by Alomair et al. (2022) in case of Saudi Arabia or by Krismiaji and Surifah (2020) in Indonesia. Taking a broader perspective of nine countries from the Middle East and North Africa, El-Diftar and Elkalla (2019) find that IFRS adoption had a negative impact on the informativeness of accounting figures. These negative effects are attributed to weak enforcement regimes and other imperfections of emerging markets. Similar conclusions concerning the prevailing lacks in enforcement mechanisms reducing the value relevance of accounting information after IFRS adoption are made by Badu and Appiah (2018) when studying the development of the Ghanaian capital market. The importance of the rule of law is also emphasised by Agyei-Boapeah et al. (2020).

Regarding the value relevance literature in the V4 region, an early study of Jindřichovská (2001) finds a significant relationship between accounting earnings and stock prices on the Czech capital market over the period 1993–1998. A later period, 1994–2001, is investigated by Hellström (2006) who identifies a steady improvement in value relevance thanks to the developments of the institutional environment. Dobija and Klimczak (2010) investigate the development of value relevance on the Polish capital market, finding evidence of relevance which, however, does not increase over the examined period of 1997–2008. Stavárek and Pražák (2018) assess the value relevance of selected financial statements ratios in all V4 capital markets, finding that profitability and debt ratios are mostly associated with stock prices. However, using a different methodology and comparing the PSE and WSE, Ligocká (2018) is unable to find any association between financial ratios and stock prices. Finally, a low level of association of selected financial ratios with stock prices in the V4 group is also detected by Aliu et al. (2021).

With respect to (a) the limited and mixed evidence on the value relevance of accounting information in the V4 region; (b) the mixed evidence of the impacts of IFRS adoption on value relevance in general; (c) the differences in the importance

of capital markets across the V4 countries, we are interested in finding answers to the following research questions:

RQ1: Are financial statements of the V4 firms' values relevant in the period after IFRS adoption and, if so, are there any differences in each country's value relevance?

RQ2: Assuming that financial statements are value relevant, which accounting metrics contribute to this relevance the most?

## 3. Research design

### 3.1. Data

We employ data for companies included in the main index of each stock exchange, namely the PX index on the Prague Stock Exchange; the WIG 30 on the Warsaw Stock Exchange, the SE index on the Budapest Stock Exchange, and the SAX index on the Bratislava Stock Exchange. The observations are collected for the period 2005–2017. We start the investigation in the year when IFRS became mandatory for the preparation of consolidated financial statements of publicly listed firms in the European Union. The time series ends in 2017 to eliminate any potential impact of the end of monetary expansion by the Czech National Bank (resting on the fixing of the exchange rate of CZK at the level of CZK 27/EUR) on the figures of the 2018 reporting period, as well as to eliminate uncertainties surrounding the outbreak of COVID-19 on the 2019 financial statements.

### 3.2. Methodology

The key idea of value relevance research is that the market value of a company (represented by its share price) is a function of various accounting variables, formally represented by Equation (1), where MV represents the market value (capitalisation) of *company i* at given *time t*; *FS* is information presented in financial statements; OF is the vector of other factors affecting the given share price and ε is the error term.

$$\mathrm{MV}_{i,t} = f(\mathrm{FS},\ \mathrm{OF}) + \varepsilon_{i,t} \tag{1}$$

Accounting literature distinguishes between absolute (share price) models and relative (share return) models. The price models, as expressed by Equation (2), are built on the theory of Ohlson (1995) and share price is empirically tested against a selected financial statement variable, FSV, which is traditionally represented by earnings, equity or cash flows. Since the investors who already hold the given stock are more interested in the return on their investment, both the explained and explanatory variables are put into the relative form, as shown in Equation (3). The dependent variable is defined as share return (Easton & Harris, 1991), with dividends usually included in the calculation (Alford et al., 1993). The independent variable of interest (measured per share) is deflated by the opening share price (or by total assets).

$$P_{i,t} = \ \alpha + \beta_1 * \ \mathrm{FSV}_{i,t} + \varepsilon_{i,t} \tag{2}$$

$$\frac{P_{i,t}-P_{i,t-1}+\mathrm{DIV}_{i,t}}{P_{i,t-1}} = \alpha+\beta_1*\frac{\mathrm{FSV}_{i,t}}{P_{i,t-1}}+\varepsilon_{i,t} \quad (3)$$

Both absolute and relative models have particular advantages and disadvantages, discussed in detail, for example, by Beisland (2009) or Filip and Raffournier (2010). The first group of models estimates more precisely the regression coefficients; however, they are exposed to the problem of spurious correlation stemming from the concurrent impact of company size on the absolute amounts of market capitalisation and equity or earnings, overestimating, thus, the coefficient of determination. When controlling for size in relative models, the coefficient of determination is not affected, but individual regression coefficients may be biased since actual earnings contain both expected and unexpected profits and share returns are comprised of anticipated and surprising components. Deflating both the explained and explanatory variables by the beginning-of-the-year share price may be an issue as well (Dobija & Klimczak, 2010).

In our article, we employ the returns model, where the share return $R_{i,t}$ of $i$-company in $t$-period is defined as $\frac{P_{i,t}-P_{i,t-1}+\mathrm{DIV}_{i,t}}{P_{i,t-1}}$ and includes any dividends declared. The selection of the returns model, including dividends, is affected by two factors. Firstly, the PSE, especially, is characterised by the presence of shares suitable for a relatively long investment horizon in which dividends may matter significantly. The second factor interacts with the first one: we have identified considerable variations in dividend policies applied by the sample firms. The firms traded on the PSE mostly follow the policy of frequent and relatively high-dividend pay-outs. Of the 99 observations in our sample, Czech firms failed to declare a dividend in only 14 cases. In absolute terms, around 70% of their profits were distributed. On the other hand, profits were more likely to be retained in Hungary, with only 50% of profits being paid out, and, in 87 out of 162 cases, the owners did not receive any dividend. Following Easton and Harris (1991), when calculating share returns, we use the actual returns without attempting to disentangle the firm-specific returns from the market-wide performance.

Concerning the form of the explanatory variable, two approaches are common. Firstly, the regression equation only contains an explanatory variable in its basic form and returns are explained by the levels of earnings (Warfield & Wild, 1992). Secondly, the between-period difference is added, so that the levels of and changes in earnings explain the returns (Easton & Harris, 1991). The first approach is also adapted, for example, by Dechow (1994), although the latter one is used more frequently, for example, by Alford et al. (1993), Ali and Hwang (2000) or Hellström (2006) and Filip and Raffournier (2010) in the case of Central and Eastern European countries. Dobija and Klimczak (2010) apply both approaches to the Polish market, a simple regression without the differential component for unexpected returns and earnings, and an extended version with the earnings differential for the classic returns model. Finally, Cahan et al. (2009) regress returns only on earnings differential. In our article, we follow two methods. The basic regression including only the level of the variable; the extended model including the level of a variable as well as its year-on-year change. We use three metrics as explanatory variables in our value relevance modelling, namely earnings, cash flows from operations, and book value of equity.

As with all previous studies on value relevance, we measure the degree of association by the adjusted coefficient of determination (adjusted $R^2$). For each model, we compute the pooled OLS model, the fixed effects model with individual effects and the random effects model. Then, we run a series of tests to detect the most suitable model. We perform the Chow test and Wooldridge test for unobserved effects in panel models to inspect the poolability, the *F*-test and Breusch-Pagan LM test to control for the existence of fixed or random effects, and the Hausman test to select between fixed and random effects if both are superior to the pooled model. The second group of tests is run to avoid any misinterpretation of heteroscedasticity, cross-dependence and/or serial correlation. If any such issue is detected, the heteroscedasticity-consistent covariance matrix is calculated, following the procedure described by Millo (2017) and implemented in the R package 'plm' (Croissant & Millo, 2008). When autocorrelation is detected, the Prais-Winsten Estimator for AR(1) serial correlation is employed.

## 4. Results

### 4.1. Descriptive statistics

Table 2 presents the descriptive statistics of the sample, separately for each stock exchange. Both accounting data (from consolidated financial statements) and share price data were retrieved from the Refinitiv Eikon with Datastream database. The sample consists of 604 firm-year observations. In general, all the markets experience positive profits over the investigated period, with the largest average profits generated by the Czech firms. The superior average absolute volume of profits by the Czech firms results from the composition of the index which includes the largest Czech firms, including major financial institutions. The highest share returns are also reached on the Prague Stock Exchange (11.7% of the average annual return), outperforming the WIG30 (9.7%) and the remaining two markets (with returns of around 4% each).

Table 3 presents the results of the correlation analysis, which includes returns and three explanatory variables (both in the level- and period-difference form) for each country separately. The absolute amount of earnings, operating cash flows and book value of equity per share are positively and significantly correlated with share returns in the Czech Republic and Hungary. On the other hand, no association between share returns and the levels of explanatory variables is found in Poland and Slovakia. However, the changes in earnings and book value of equity are positively related to the share returns on the Polish market. The period-change in the book value of equity is also significantly correlated with share returns on the PSE (although negatively). For Hungary, share returns are significantly correlated with the annual changes in earnings and changes in operating cash flows, but not with changes in the book value of equity.

### 4.2. Regression analysis

Following the previous stream of literature, we test the value relevance of earnings (per share) and book value of equity (per share). As profits can be subject to earnings

**Table 2.** Descriptive statistics.

| **CZE ($n = 99$)** | Mean | Std. dev. | Min. | Median | Max. |
|---|---|---|---|---|---|
| Revenue | 3,183,061 | 3,501,734 | 121,971 | 1,370,542 | 11,966,044 |
| Net income | 351,246 | 536,120 | −1,382,638 | 219,576 | 1,955,126 |
| Total assets | 35,553,430 | 64,351,877 | 235,847 | 3,715,763 | 220,659,433 |
| Equity | 3,607,030 | 3,974,715 | 77,479 | 2,314,646 | 13,871,914 |
| Share return | 14.5% | 54.0% | −83.6% | 11.7% | 440.1% |
| EPS | 5.6 | 11.2 | −5.4 | 2.1 | 48.3 |
| BVPS | 29.8 | 35.4 | 1.0 | 17.8 | 133.9 |
| CFOPS | 9.1 | 20.0 | −49.5 | 3.4 | 117.6 |
| **HUN ($n = 162$)** | **Mean** | **Std. dev.** | **Min.** | **Median** | **Max.** |
| Revenue | 1,818,681 | 3,941,571 | −5,754 | 61,390 | 19,269,915 |
| Net income | 96,618 | 247,233 | −843,549 | 2,285 | 1,250,717 |
| Total assets | 7,311,080 | 16,277,498 | 0 | 113,883 | 75,696,000 |
| Equity | 2,209,336 | 6,672,624 | −15,923 | 47,624 | 63,789,000 |
| Share return | 55.2% | 308.7% | −74.1% | 4.2% | 3241.2% |
| EPS | 0.3 | 0.7 | −1.2 | 0.1 | 3.5 |
| BVPS | 39.4 | 207.6 | −0.9 | 1.9 | 2 218.3 |
| CFOPS | 4.5 | 19.7 | −19.4 | 0.4 | 145.1 |
| **POL ($n = 277$)** | **Mean** | **Std. dev.** | **Min.** | **Median** | **Max.** |
| Revenue | 3,084,830 | 4,518,879 | 295 | 1,659,936 | 28,769,966 |
| Net income | 238,520 | 379,208 | −1,389,358 | 131,942 | 2,711,539 |
| Total assets | 10,713,053 | 13,236,512 | 4,796 | 6,306,308 | 76,025,159 |
| Equity | 2,517,186 | 2,395,965 | −222,942 | 1,810,044 | 10,807,299 |
| Share return | 19.9% | 65.0% | −79.5% | 9.7% | 656.8% |
| EPS | 2.7 | 8.0 | −6.0 | 0.7 | 62.6 |
| BVPS | 17.8 | 37.1 | −3.2 | 8.2 | 319.2 |
| CFOPS | 3.4 | 13.9 | −78.8 | 0.8 | 114.6 |
| **SVK ($n = 66$)** | **Mean** | **Std. dev.** | **Min.** | **Median** | **Max.** |
| Revenue | 845,365 | 1,480,090 | 11 | 102,825 | 4,732,741 |
| Net income | 43,083 | 77,440 | −75,756 | 4,802 | 251,677 |
| Total assets | 2,688,057 | 4,352,657 | 36,941 | 404,804 | 14,970,876 |
| Equity | 549,173 | 638,000 | −41,911 | 190,285 | 1,693,259 |
| Share return | 7.4% | 36.4% | −75.0% | 4.1% | 144.3% |
| EPS | 2.2 | 6.2 | −16.1 | 0.2 | 13.6 |
| BVPS | 33.4 | 40.9 | −26.8 | 12.9 | 125.8 |
| CFOPS | −3.0 | 28.8 | −192.3 | 0.0 | 48.2 |

Source: Own calculations based on Refinitiv Eikon with Datastream data. Revenue, Net income, Total assets, Equity in EUR thousand; Earnings & Book Value, and Operating Cash Flows per share in EUR. Amounts converted to EUR using 'period-end FX rates' directly from the Refinitiv Eikon database.

management, we additionally include operating cash flows (per share). For each explanatory variable, we regress returns against the level of the variable in the basic model and the level of the variable, as well as the change-for-the-period in the extended model. These three pairs of 'single' regressions are complemented by two equations encompassing all three metrics. To summarise, we calculate eight regression models for each country.

$$R_{i,t} = \alpha + \beta_1 * \text{EPS}_{i,t} + \varepsilon_{i,t} \quad \text{(Model 1A)}$$

$$R_{i,t} = \alpha + \beta_1 * \text{EPS}_{i,t} + \beta_2 * \Delta\text{EPS}_{i,t} + \varepsilon_{i,t} \quad \text{(Model 1B)}$$

$$R_{i,t} = \alpha + \beta_1 * \text{CFOPS}_{i,t} + \varepsilon_{i,t} \quad \text{(Model 2A)}$$

$$R_{i,t} = \alpha + \beta_1 * \text{CFOPS}_{i,t} + \beta_2 * \Delta\text{CFOPS}_{i,t} + \varepsilon_{i,t} \quad \text{(Model 2B)}$$

**Table 3.** Correlation matrices.

| CZE | Return | EPS | ΔEPS | CFOPS | ΔCFOPS | BVPS | ΔBVPS |
|---|---|---|---|---|---|---|---|
| Return | 1.00 | 0.32** | 0.09 | 0.27** | −0.05 | 0.22* | −0.36*** |
| EPS | | 1.00 | 0.06 | 0.52*** | 0.12 | 0.30** | 0.24* |
| ΔEPS | | | 1.00 | 0.09 | 0.44*** | 0.15 | 0.39*** |
| CFOPS | | | | 1.00 | 0.40*** | 0.55*** | 0.05 |
| ΔCFOPS | | | | | 1.00 | 0.08 | 0.59*** |
| BVPS | | | | | | 1.00 | 0.07 |
| ΔBVPS | | | | | | | 1.00 |
| **HUN** | **Return** | **EPS** | **ΔEPS** | **CFOPS** | **ΔCFOPS** | **BVPS** | **ΔBVPS** |
| Return | 1.00 | 0.32*** | 0.31*** | 0.35*** | 0.37*** | 0.32*** | 0.06 |
| EPS | | 1.00 | 0.85*** | 0.00 | 0.04 | 0.00 | 0.01 |
| ΔEPS | | | 1.00 | −0.02 | 0.01 | −0.02 | 0.01 |
| CFOPS | | | | 1.00 | 0.10 | 0.85** | −0.26*** |
| ΔCFOPS | | | | | 1.00 | 0.26*** | 0.06 |
| BVPS | | | | | | 1.00 | 0.15 |
| ΔBVPS | | | | | | | 1.00 |
| **POL** | **Return** | **EPS** | **ΔEPS** | **CFOPS** | **ΔCFOPS** | **BVPS** | **ΔBVPS** |
| Return | 1.00 | 0.10 | 0.16** | −0.01 | −0.02 | 0.02 | 0.32** |
| EPS | | 1.00 | 0.62*** | 0.06 | 0.01 | 0.07 | 0.66*** |
| ΔEPS | | | 1.00 | 0.09 | −0.01 | 0.10 | 0.50*** |
| CFOPS | | | | 1.00 | 0.38*** | 0.68*** | 0.19*** |
| ΔCFOPS | | | | | 1.00 | 0.04 | 0.08 |
| BVPS | | | | | | 1.00 | 0.29*** |
| ΔBVPS | | | | | | | 1.00 |
| **SVK** | **Return** | **EPS** | **ΔEPS** | **CFOPS** | **ΔCFOPS** | **BVPS** | **ΔBVPS** |
| Return | 1.00 | 0.06 | −0.10 | 0.19 | 0.11 | 0.11 | −0.07 |
| EPS | | 1.00 | 0.39** | −0.28* | −0.66*** | 0.33** | 0.67*** |
| ΔEPS | | | 1.00 | −0.26* | −0.56*** | 0.09 | 0.34** |
| CFOPS | | | | 1.00 | 0.49*** | −0.08 | −0.75*** |
| ΔCFOPS | | | | | 1.00 | −0.21 | −0.68*** |
| BVPS | | | | | | 1.00 | −0.09 |
| ΔBVPS | | | | | | | 1.00 |

*$p$-value $< 0.05$; **$p$-value $< 0.01$; ***$p$-value $< 0.001$.
Source: Own calculations.

$$R_{i,t} = \alpha + \beta_1 * \text{BVPS}_{i,t} + \varepsilon_{i,t} \quad \text{(Model 3A)}$$

$$R_{i,t} = \alpha + \beta_1 * \text{BVPS}_{i,t} + \beta_2 * \Delta\text{BVPS}_{i,t} + \varepsilon_{i,t} \quad \text{(Model 3B)}$$

$$R_{i,t} = \alpha + \beta_1 * \text{EPS}_{i,t} + \beta_2 * \text{CFOPS}_{i,t} + \beta_3 * \text{BVPS}_{i,t} + \varepsilon_{i,t} \quad \text{(Model 4A)}$$

$$R_{i,t} = \alpha + \beta_1 * \text{EPS}_{i,t} + \beta_2 * \Delta\text{EPS}_{i,t} + \beta_3 * \text{CFOPS}_{i,t} + \beta_4 * \Delta\text{CFOPS}_{i,t} + \beta_5 * \text{BVPS}_{i,t} + \beta_6 * \Delta\text{BVPS}_{i,t} + \varepsilon_{i,t} \quad \text{(Model 4B)}$$

As indicated in the methodology section, we prefer the returns models over the price models due to the significant variance in dividend distribution policies across the V4 capital markets. Table 4 presents the regression results. In the case of the Czech Republic, the adjusted $R^2$ varies from 4.4% (Model 3A – BVPS only) to 38.8% (Model 4B – including all three metrics in both the absolute (level) form and the between-period differences). Earnings are, by a narrow margin, more value relevant

**Table 4.** Regression results.

| CZE | Model 1A | Model 1B | Model 2A | Model 2B | Model 3A | Model 3B | Model 4A | Model 4B |
|---|---|---|---|---|---|---|---|---|
| Constant | 0.087 | 0.085 | 0.029 | 0.001 | −0.020 | −0.059 | −0.021 | −0.046 |
| | (0.064) | (0.065) | (0.074) | (0.075) | (0.095) | (0.088) | (0.092) | (0.078) |
| EPS | 0.905** | 0.891** | | | | | 0.679* | 1.390*** |
| | (0.267) | (0.269) | | | | | (0.309) | (0.284) |
| ΔEPS | | 0.207 | | | | | | 0.540* |
| | | (0.249) | | | | | | (0.239) |
| CFOPS | | | 0.525** | 0.644** | | | 0.184 | −0.330 |
| | | | (0.177) | (0.191) | | | (0.232) | (0.245) |
| ΔCFOPS | | | | −0.323 | | | | 0.563* |
| | | | | (0.201) | | | | (0.244) |
| BVPS | | | | | 0.189* | 0.208** | 0.094 | 0.142 |
| | | | | | (0.081) | (0.076) | (0.093) | (0.082) |
| ΔBVPS | | | | | | −0.379*** | | −0.749*** |
| | | | | | | (0.094) | | (0.118) |
| *F*-test | 11.46** | 6.06** | 8.87** | 5.76** | 5.52* | 11.22*** | 4.99** | 11.37*** |
| $R^2_{adjusted}$ | 9.6% | 9.4% | 7.4% | 8.9% | 4.4% | 17.3% | 10.9% | 38.8% |
| **HUN** | **Model 1A** | **Model 1B** | **Model 2A** | **Model 2B** | **Model 3A** | **Model 3B** | **Model 4A** | **Model 4B#** |
| Constant | 0.446* | 0.407* | 0.357 | 0.349 | 0.354 | 0.357 | 0.253 | |
| | (0.190) | (0.188) | (0.272) | (0.253) | (0.277) | (0.278) | (0.190) | |
| EPS | 3.261*** | 2.221* | | | | | 2.929*** | |
| | (0.500) | (0.973) | | | | | (0.478) | |
| ΔEPS | | 1.296 | | | | | | |
| | | (0.968) | | | | | | |
| CFOPS | | | 0.039*** | 0.035*** | | | 0.031* | |
| | | | (0.008) | (0.008) | | | (0.015) | |
| ΔCFOPS | | | | 0.085*** | | | | |
| | | | | (0.018) | | | | |
| BVPS | | | | | 0.005*** | 0.005*** | 0.001 | |
| | | | | | (0.001) | (0.001) | (0.002) | |
| ΔBVPS | | | | | | 0.001 | | |
| | | | | | | (0.001) | | |
| *F*-test | 42.39*** | 23.53*** | 22.07*** | 24.19*** | 19.29*** | 9.60*** | 21.48*** | |
| $R^2_{adjusted}$ | 20.5% | 21.9% | 11.6% | 22.4% | 10.2% | 9.6% | 27.6% | |

#The model is not estimated due to the multicollinearity issue caused by the strong correlation between CFOPS and BVPS (the correlation coefficient 0.85 – see Table 1 – leads to a VIF coefficient around 10).

| POL | Model 1A | Model 1B | Model 2A | Model 2B | Model 3A | Model 3B | Model 4A | Model 4B |
|---|---|---|---|---|---|---|---|---|
| Constant | 0.180** | 0.211*** | 0.195*** | 0.196*** | 0.200** | 0.178** | 0.182** | 0.258*** |
| | (0.055) | (0.057) | (0.056) | (0.056) | (0.060) | (0.056) | (0.063) | (0.060) |
| EPS | 0.322 | −0.305 | | | | | 0.318 | −1.616*** |
| | (0.326) | (0.414) | | | | | (0.328) | (0.467) |
| ΔEPS | | 0.846* | | | | | | 0.541 |
| | | (0.356) | | | | | | (0.349) |
| CFOPS | | | 0.026 | 0.013 | | | 0.042 | 0.079 |
| | | | (0.145) | (0.157) | | | (0.199) | (0.214) |
| ΔCFOPS | | | | 0.031 | | | | −0.118* |
| | | | | (0.136) | | | | (0.137) |
| BVPS | | | | | −0.001 | −0.044 | −0.001 | −0.073 |
| | | | | | (0.034) | (0.035) | (0.047) | (0.048) |
| ΔBVPS | | | | | | 1.083*** | | 1.622*** |
| | | | | | | (0.218) | | (0.295) |
| *F*-test | 1.01 | 3.31* | 0.06 | 0.06 | 0.03 | 12.41*** | 0.35 | 6.24*** |
| $R^2_{adjusted}$ | 0.1% | 1.6% | 0.0% | 0.0% | 0.0% | 7.6% | 0.0% | 10.2% |
| **SVK** | **Model 1A** | **Model 1B** | **Model 2A** | **Model 2B** | **Model 3A** | **Model 3B** | **Model 4A** | **Model 4B** |
| Constant | 0.076 | 0.079 | 0.087 | 0.086 | 0.071 | 0.073 | 0.089 | 0.086 |
| | (0.046) | (0.046) | (0.046) | (0.047) | (0.046) | (0.046) | (0.047) | (0.048) |
| EPS | 0.035 | 0.067 | | | | | 0.054 | −0.040 |
| | (0.072) | (0.077) | | | | | (0.078) | (0.160) |
| ΔEPS | | −0.055 | | | | | | −0.007 |
| | | (0.053) | | | | | | (0.060) |

(*continued*)

**Table 4.** Continued.

| POL | Model 1A | Model 1B | Model 2A | Model 2B | Model 3A | Model 3B | Model 4A | Model 4B |
|---|---|---|---|---|---|---|---|---|
| CFOPS | | | 0.044 | 0.042 | | | 0.052 | 0.101 |
| | | | (0.029) | (0.033) | | | (0.030) | (0.062) |
| ΔCFOPS | | | | 0.003 | | | | 0.035 |
| | | | | (0.026) | | | | (0.033) |
| BVPS | | | | | 0.012 | 0.011 | 0.011 | 0.029 |
| | | | | | (0.015) | (0.015) | (0.015) | (0.022) |
| ΔBVPS | | | | | | −0.010 | | 0.081 |
| | | | | | | (0.021) | | (0.068) |
| *F*-test | 0.24 | 0.67 | 2.36 | 1.17 | 0.69 | 0.46 | 1.25 | 1.03 |
| $R^2_{adjusted}$ | 0.0% | 0.0% | 2.1% | 0.5% | 0.0% | 0.0% | 1.2% | 0.3% |
| **All countries** | **Model 1A** | **Model 1B** | **Model 2A** | **Model 2B** | **Model 3A** | **Model 3B** | **Model 4A** | **Model 4B** |
| Constant | 0.513*** | 0.504*** | 0.354** | 0.347** | 0.354** | 0.355** | 0.303* | 0.349** |
| | (0.129) | (0.129) | (0.127) | (0.120) | (0.129) | (0.129) | (0.124) | (0.110) |
| EPS | 1.209*** | 1.001*** | | | | | 1.210*** | 1.006*** |
| | (0.205) | (0.247) | | | | | (0.193) | (0.207) |
| ΔEPS | | 0.281 | | | | | | 0.395* |
| | | (0.201) | | | | | | (0.168) |
| CFOPS | | | 0.040** | 0.036*** | | | 0.032*** | 0.123*** |
| | | | (0.005) | (0.004) | | | (0.009) | (0.012) |
| ΔCFOPS | | | | 0.086*** | | | | 0.113*** |
| | | | | (0.010) | | | | (0.010) |
| BVPS | | | | | 0.005*** | 0.005*** | 0.001 | −0.011*** |
| | | | | | (0.001) | (0.001) | (0.001) | (0.002) |
| ΔBVPS | | | | | | 0.001 | | 0.007*** |
| | | | | | | (0.001) | | (0.001) |
| CZE dummy | −0.448* | −0.429* | −0.221 | −0.215 | −0.218 | −0.219 | −0.250 | −0.296 |
| | (0.208) | (0.209) | (0.203) | (0.191) | (0.205) | (0.205) | (0.197) | (0.176) |
| POL dummy | −0.386* | −0.367* | −0.161 | −0.155 | −0.160 | −0.161 | −0.182 | −0.223 |
| | (0.162) | (0.162) | (0.158) | (0.149) | (0.160) | (0.160) | (0.154) | (0.137) |
| SVK dummy | −0.372 | −0.377 | −0.266 | −0.268 | −0.278 | −0.279 | −0.154 | −0.198 |
| | (0.242) | (0.242) | (0.236) | (0.222) | (0.238) | (0.238) | (0.229) | (0.204) |
| *F*-test | 10.32*** | 8.66*** | 20.16*** | 33.60*** | 17.36*** | 13.87*** | 21.18*** | 35.58*** |
| $R^2_{adjusted}$ | 5.8% | 6.0% | 11.3% | 21.33% | 9.8% | 9.7% | 16.8% | 34.1% |

*$p$-value $<$ 0.05; **$p$-value $<$ 0.01; ***$p$-value $<$ 0.001.
Source: Own calculations.

than cash flows, and this is valid both for the basic and extended model. Book value of equity has lower value relevance than the remaining two metrics if treated only in the absolute form. However, once the period change is included, equity outperforms earnings and cash flows when explaining the association of accounting numbers with share returns. In the separate models, all three metrics have a statistically significant positive effect on share returns. In the combined Models 4A and 4B, EPS retains its statistically significant relation with returns, but CFOPS and BVPS do not. However, all three between-period differences are statistically significant. Such results may suggest that investors are less interested in the absolute amount of closing balances and period-flows; they would rather inspect the dynamics more closely, that is, changes compared to the previous period(s).

Previous studies of Jindřichovská (2001) and Hellström (2006) on the Czech market inspected before the adoption of IFRS found the value relevance of earnings under the Czech GAAP ranging from 0% to approximately 40% of the adjusted $R^2$ depending on the model specification. The lower value relevance in the IFRS period investigated by our study can be attributed to the different methodology applied. In contrast to previous studies, we are more interested in long-term effects and measure

value relevance over the entire study period which is longer and, therefore, more prone to bias due to external shocks. To directly compare the results, we also calculated regression subsample models for individual years as in the aforementioned studies. Our results show low-value relevance in the period 2006–2009 (2% on average annually), followed by a steep increase starting from 2010 (values from 38% to 78%), then interrupted in 2014 and 2017 (with almost no value relevance of earnings). These two years mark the beginning and end of the Czech National Bank's monetary interventions to fix the exchange rate. A less striking, but still considerable improvement over time has also been identified for other specifications of the regression models. Our empirical data confirm the findings of several other studies revealing that the early phase of IFRS adoption is associated with a decrease in accounting quality, mainly in the Code law countries with a weak enforcement regime (Clarkson et al., 2011; Devalle et al., 2010; Morais & Curto, 2009). Finally, the increase in value relevance, at the end of the 2009-financial crisis, is in line with the conclusions of the disclosure compliance studies which provide evidence of the recent improvement in the quality of general financial reporting on the Czech capital market (Procházka, 2017).

Moving to the second country, the Hungarian capital market records the highest value relevance in the V4 region. Earnings and operating cash flows boast approximately more than two time more value relevance compared to the Prague Stock Exchange; the value relevance of the book value of equity is comparable (higher adjusted $R^2$ in the basic Model 3A, lower $R^2$ in Model 3B). The superiority of earnings in explaining share returns is also confirmed by the outcomes of the combined Model 4A, in which earnings are statistically significant with $p$-value $< 0.001$, operating cash flows are statistically significant with $p$-value $< 0.05$, but equity is not found to be significant. Unlike the other countries in our paper, Model 4B cannot be calculated for Hungary due to the multicollinearity problem (the correlation coefficient of CFOPS and BVPS is 0.85 – see Table 3 – and it leads to values of VIF around 10).

The remaining two stock exchanges exhibit low-value relevance of accounting information. In the case of Slovakia, the adjusted $R^2$ reaches its maximum of 2.1% in Model 2A (basic operating cash flows), but the association is still not statistically significant. The low-value relevance can be explained by the general underdeveloped capital market in Slovakia, resulting in a small number of titles being actively traded. Such an environment can hardly produce a viable demand for relevant financial information to be communicated to existing or potential investors. On the other hand, lower value relevance on the Warsaw Stock Exchange may be partly surprising, as the Polish capital market dominates the region in terms of size and importance. The 'best' results are obtained for Model 3B, the extended model of book value of equity, with the adjusted $R^2$ of 7.6%, and Model 4B, covering all variables with the adjusted $R^2$ of 10.2%. Low relevance of earnings is also confirmed when subsamples for annual regressions are computed. Our findings thus correspond to the results of Dobija and Klimczak (2010) in their modelling of actual share returns. Similar to the situation in the Czech Republic, the period differences have higher explanatory power than the actual figures for the year. Finally, the inconsistent results for earnings in Models 1A, 1B, 4A and 4B lead to the conclusion that alternative scenarios capturing the value relevance of earnings ought to be developed. One approach – unexpected

earnings related to unexpected share returns – is employed by the mentioned study of Dobija and Klimczak (2010); an alternative approach is to investigate the market reaction to earnings announcements and their divergence from market forecasts. However, these approaches will suffer from a low number of share titles traded on the V4 stock exchanges (except for Poland), as well as from insufficient analysts' coverage of the region. The last section of Table 4 presents pooled results for all four countries (with Hungary as the base case). Negative coefficients reported for all country dummies indicate that the value relevance of accounting information on the Budapest Stock Exchange is higher compared to its remaining V4 peers. However, the differences are statistically significant only for the earnings and changes in the earnings (i.e., Models 1A and 1B).

## 5. Conclusions

This article tests the value relevance of accounting information on the stock exchanges of four countries forming the so-called Visegrád Group. Empirical data for the period 2005–2017 reveal that accounting numbers (proxied by earnings, operating cash flows and book value of equity) are not capable of explaining the share returns on the Slovak capital market at all. In the case of Poland, financial reporting is of more usefulness for investors compared to Slovakia, but it is still considerably less than in Hungary or the Czech Republic. In contrast to previous cross-country studies (Aliu et al., 2021; Ligocká, 2018; Stavárek & Pražák, 2018), our data show that there are noteworthy differences in value relevance across the V4 capital markets in the post-IFRS adoption period. Regarding the second research question, we identify both similar and different determinants of value relevance. Earnings are the single most relevant metric on both the Prague Stock Exchange and the Budapest Stock Exchange. Furthermore, the extent of association of share returns and earnings on the Hungarian market is comparable to the extent of the associations of returns with operating cash flows, which is not the case for the Czech Republic. Finally, the Czech capital market values the between-period changes using all three accounting metrics more than their absolute amounts for the period. This is also the case, albeit to a less intensive degree, of the Warsaw Stock Exchange, but not of Hungary.

We contribute to the recent literature by addressing the impact of IFRS adoption on the value relevance of financial statements by providing empirical evidence from the four countries of the V4 region which have undergone a rapid transformation since 1989. Despite its undeniable achievements, the region continues to struggle with the vestiges of a centrally planned economy and underdeveloped institutions, which may affect the functioning of capital markets as well as the usefulness of financial reporting. Empirical data in our paper demonstrate that sharing a similar economic and institutional background does not result in the same informativeness of financial statements and their usefulness for investors. Value relevance on the Czech and Hungarian markets is comparable to that identified in prior studies from other developed markets. On the other hand, value relevance in Poland is partially lower than in the aforementioned peer countries, despite the WSE being the regional leader in terms of capital market size. Significant improvements on the Prague and Budapest

stock exchanges have been observed approximately five years after the adoption of IFRS. The relatively long period of examination in our paper thus underlines the conclusions from related research before the IFRS era in that improving accounting quality is a dynamic process and, in many economies, it takes considerable time to reach the benefits of accounting harmonisation.

Our results also have several limitations. Firstly, we do not test for market efficiency; at least a weak form of efficiency is required to perform the value relevance studies. However, several previous studies proved the presence of a weak, and even a semi-strong, version of efficiency on the Czech, Hungarian and Polish market and we have implicitly adapted their findings. The inefficiency of the Slovak capital market can serve as an explanation of the zero value relevance of financial reporting. A small number of firms available for the sample can be another factor limiting the robustness of the results and its transferability to other regions. Furthermore, our regression models include neither macroeconomic variables, nor company-specific characteristics. For example, Aliu et al. (2021) incorporate macroeconomic indicators, but their inclusion does not yield superior outcomes. Similarly, we do not believe that the omission of company-specific factors has biased our results.

As our results uncover certain inconsistencies, potential future research should search for more granular accounting data and their impact on share prices or share returns. For example, Dobija and Klimczak (2010) try to regress only unexpected earnings on unexpected share returns, getting higher value relevance on the Polish capital market. The investigation of a market reaction to the market surprise (i.e., the difference between earnings forecasted by the analysts and preliminary earnings announced in press conferences) or a market reaction to the management surprise (i.e., the difference between preliminary earnings announced and final earnings reported) can be an alternative option to examine the value relevance of financial statements. However, such approaches will, in all probability, struggle from a low number of share titles traded on the V4 stock exchanges (except for Poland) as well as from insufficient coverage of the region by financial analysts.

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## Notes

1. IFRS adoption had an impact on the content of financial statements, accounting policy and general concepts of accounting of the listed firms. Furthermore, the increased demand for transparency also affected changes in the enforcement regime. Finally, local regulators also undertook accounting reforms when local GAAPs (applicable for unlisted firms) were harmonised (to a certain degree) with IFRS. However, the countries of the CEE region

have had different experiences with real outcomes, based on their respective starting conditions (Albu & Albu, 2012; Grabinski et al., 2014; Žárová & Mejzlík, 2009).

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