

Do Macro-economic Crises Determine Accounting Value Relevance?

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ABSTRACT We investigate whether the value relevance of earnings and book values in Turkey significantly changed across periods of financial uncertainty. Our enquiry differs from the mainstream literature that posits a unidirectional association determined by the ‘quality’ of individual firm accounts towards price. We find divergence in accounting value relevance components across the 1997–2012 period. Dominant value relevance shifts from earnings and negative interest rates in hyper-inflation, to the balance sheet after IFRS in 2005. On the other hand, the global financial crisis (GFC) is associated with diminished accounting value relevance for all variables. Policy issues are raised about value relevance consistency, the use of negative (low) interest rates as fiscal policies and the asymmetric application of market based valuations in emerging economies.

Keywords: accounting valuation and financial crisis, Turkish accounting and hyper-inflation, accounting and negative interest rates, IFRS and GFC value relevance

1. Introduction

We investigate whether the value relevance of earnings and book values in Turkey significantly changed across periods of financial uncertainty. Our enquiry differs in directional association from the mainstream literature that posits a uni-directional association from individual firm accounts towards price – essentially, the strength of value relevance is dominated by the quality of firm (country) based accounting. We find inconsistent accounting value relevance across the 1997–2012 period. Dominant value relevance shifts from earnings and negative interest rates in hyper-inflation to the balance sheet after the adoption of international financial reporting standards (IFRS) in 2005. The global financial crisis (GFC) is associated with diminished accounting value relevance.

A research focus on Turkey is of particular interest because it provides a case study of an emerging country that experienced two major economic crises – hyper-inflation in the 1990s followed by the global financial crisis [(GFC) 2008–2009]. The financial impact from both was substantial, but irregular. For example, in the hyper-inflation crisis, consumer price rates approached 100%, along with eroded currency values, stagnant stock prices, reduced confidence and investment, and lower employment. Conversely, negative price impacts occurred in the GFC, with inflation

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significantly lower and stocks falling over 60%. Regardless of opposite price impacts, both ‘financial disruptions’ resulted in similar economic reactions including reduced access to internal and international financial capital markets, bank failures, IMF regulatory intervention, and reduced equity investment by internal and foreign investors (Capital Markets Board of Turkey [CMB], 2011; World Bank, 2010).

Given real economic disruption during financial uncertainty, the channels of information flow that might increase investor awareness and information integration are potentially important. For example, investors’ expectations regarding future performance may become more sensitive to volatility induced by new information arriving in the market (Ross, 1989). However, others report that in uncertain times investors disregard fundamental financial news and instead revert to trading on recent stock return movements – with the non-use blamed on high integration costs or behavioural bias (Ayers, Li, & Yeung, 2011; Blankespoor, deHaan, Wertz, & Zhu, 2017).

Given a primary information role that accounting imparts to investors (Brüggemann, Hitz, & Sellhorn, 2013; Easton & Harris, 1991; Edwards & Bell, 1961), we focus on value relevance. However, the accounting feedback role is contentious. During inflation, according to Board and Walker (1990), the information content of accounting becomes unreliable with overstated earnings and understated net assets. On the other hand, specific to developing economies which suffer from a lack of alternative information intermediaries, Filip and Raffournier (2010) surmise that financial accounting may increase in importance. Similar outcome tensions are registered in GFC research. Bepari (2015) contends that accounting numbers became unreliable because of noisy transitory adjustments, big-bath write-downs, an increase in negative earnings, and discretionary accounting adjustments. But an opposing view by Clinch and Wei (2011), suggests that accounting has greater information and signaling qualities during stock declines when investors may be dominated by behavioural reactions and markets are inefficiently priced (e.g. De Bondt & Thaler, 1985).

Hence, our research question: does the value relevance association between stock prices and published financial accounting reports vary across periods that experience contrasting macro-economic price impacts? Surprisingly, there is little existing research directly relating to this question. Instead, the larger body of research focuses on the directional influence from individual firm characteristics. For example, in the review by Brüggemann et al. (2013) research is categorized by firm compliance and accounting choice (smoothing, accrual estimates), information flow from firm accounting to capital markets (value relevance, before/after IFRS, comparative country studies), and economic consequences from firm accounting (trading liquidity, investment, managerial performance evaluation). There is no specific research mentioned on the impact of macro-economic volatility on accounting value relevance – the listed macro-economic research simply examines whether a change to IFRS adoption increases foreign investment. Moreover, the sparse research concentrates on only one macro-economic disruptive event. For example, stock price downturns related to economic crises (Bepari, 2015; Clinch & Wei, 2011; Davis-Friday & Gordon, 2005), or studies that only focus on hyper-inflation (Barniv, 1999; Board & Walker, 1990; Filip & Raffournier, 2010).

In addition to the joint examination of two macro-economic disruptions, we explore possible mitigating factors in the form of two regulatory accounting changes made to the historic cost based Turkish Uniform Accounting System (TGAAP). At the end of 2003 inflation accounting adjustments were introduced and IFRS was progressively adopted from 2005. Both accounting systems are conceptually argued to provide incremental information to investors – inflation accounting to reflect real value and productivity output (Edwards & Bell, 1961; Sweeney, 1964), and IFRS ‘fair values’ to better reflect firm specific net value (Barth, Landsman, & Lang, 2008; Ding, Jeanjean, & Stolowy, 2009; Dye & Sridhar, 2004). We concentrate on IFRS and report differential impact inside and outside the GFC.

Finally, as well as considering the direct impacts of accounting numbers, we also incorporate inflation, as an exogenous variable fundamentally observable by investors. Inflation has a

potential incremental valuation impact if it is not fully factored into the accounting system. There are direct impacts – if assets and liabilities are not updated they potentially lose value relevance. For earnings, direct impacts are increased revenue inflow and cost factors that flow through from general price increases. Our particular focus is the interaction between real interest rates and inflation. If real interest rates are negative, they do not reflect opportunity cost, and incentives to hold increased debt are enhanced. On the other hand, if interest rates fully adjust to inflation and reflect opportunity costs, then potential gains from holding debt are mitigated. We find negative interest rates provide incremental value relevance during hyper-inflation.

We make several contributions. By recording changes in accounting valuation channels around macro-economic disruptions, we reveal the volatile nature of accounting valuation feedback. In particular, the loss in feedback value relevance from earnings after IFRS, and the less important role balance sheet components display during financial crises. Second, we raise accounting policy issues of whether firms asymmetrically apply valuation adjustments in rising markets, but do not impair to the same extent during severe macro downturns (e.g. the GFC). In short, does the the sanctioning of market adjustments in economies with lower governance levels and thinly traded and volatile markets lead to greater agency (valuation) problems (Ball, 2008; Laux & Leuz, 2009; Plantin, Sapra, & Shin, 2008)? Finally, we extend prior studies that throw light on the impact of inflation (Arsoy & Gucenme, 2009; Barniv, 1999; Filip & Raffournier, 2010; Kirkulak & Balsari, 2009), IFRS adoption (Alali & Foote, 2012; Desoky & Mousa, 2014; Karđın, 2013) and financial disruptions (Huizinga & Laeven, 2012). In particular, the positive impact of negative (low) interest rates and non-market penalization of increased debt, has implications for the valuation of real securities, the over-reliance on and use of debt funding, and potential long term negative economic consequences as interest rates adjust to fundamental levels (Chen, Ma, Song, & Tippett, 2016).

The paper now proceeds as follows. Section 2 provides a research background, establishes research predictions, and section 3 describes the data and outlines the econometric models. Section 4 contains the results, section 5 undertakes further analyses, and section 6 summarizes and concludes the paper.

2. Background and Research Questions

2.1. Macro-Economic Accounting Research

Ball and Brown (1968) initiated a focused and substantial research agenda on the directional association from firm accounting to stock prices,¹ but research regarding how changes in the macro-economic environment affects the signaling qualities of accounts, is comparatively limited. Our task is to build on the conjectures by Lev and Zarowin (1999) and Board and Walker (1990) who surmise that the considerable variation in value relevance across time was due to macro-economic factors. Hence, if accounts assume more or less importance around, and during financial crises, then such knowledge provides strategic input into investor and regulatory decision models. We begin by identifying possible impact from two areas of macro-economic disruption – hyper-inflation and the GFC.

2.1.1. Hyper-Inflation

Inflation reduces the purchasing power of currency. Rising inflation has a harmful economic impact: input prices are higher, consumers on fixed income can purchase fewer goods, revenues and profits decline, investor confidence is reduced, and the economy slows for a time until a steady state is reached. Fisher (1930) reports numerous examples of the harm caused by hyper-inflation in Germany during the 1920s – ranging from the reduction in real firm capital, inefficient

price signaling for production decisions, and the loss in purchasing power from fixed or lagged adjustments to wages. There were also significant debt arbitrage from negative interest rates. It is well documented that holding debt during inflation means the amount eventually repaid does not have the same purchasing power as the amount originally borrowed (Fisher, 1911, p. 57). This impact adversely affects bondholders (more so for long term bondholders), who supply debt funds to the firm (Chen et al., 2016). That is, hyper-inflation induces a significant wealth transfer from bondholders to equity holders and provides an incentive for firms to take on abnormal debt.²

Inflation also distorts the value relevance of financial accounts when based on outdated transactions (Edwards & Bell, 1961; Fisher, 1930; Sweeney, 1964). For example, profits are naturally overstated because revenues increase as inflation flows through into increased prices but expenses are understated by depreciation and other expenses derived from unadjusted costs and asset values (Sweeney, 1964, p. 25). According to Board and Walker (1990), Barniv (1999), and Filip and Raffournier (2010), overstated earnings and understated net assets renders the information content of accounting unreliable. U. S. studies reinforce this notion by showing that inflation adjusted accounts have incremental explanatory power for stock prices over and above historical costs (e.g. Bilderssee & Ronen, 1987 [US]; Sami, Curatola, & Trapnell, 1989 [US]), but other international research shows only marginal value relevance (e.g. Brayshaw & Miro, 1985 [UK]; Matolcsy, 1984 [Australia]; McDonald & Morris, 1984 [US]). These somewhat mild results are generally attributed to moderate levels of inflation and the short duration of the inflation period.

However, several emerging countries have experienced long lasting hyper-inflation, and given the potential for prolonged economic impact, this provides an incentive to examine the inflationary effects on firm wealth within these countries. As an example, Turkish consumer price inflation (CPI) rates were continually above 40% for nearly twenty years, from the mid-1980s to 2003, and were perceived as producing heavily distorted financial statements of little informative or reliable value (Arsoy & Gucenme, 2009).³ Hence, our first research question addresses accounting valuation during hyper-inflation:

RQ1: Is accounting value relevant during the Turkish hyper-inflation and, if so, what are the significant component drivers for stock prices?

2.1.2. The Global Financial Crisis

On a worldwide basis, the 2008–2009 GFC created the largest economic disruption since the 1930s Great Depression. By any measure of macro-economic activity (e.g. employment, gross domestic product, the collapse of financial institutions, government bailout of banks, and severe downturns in stock markets), the GFC ranks uncomfortably close to the Great Depression (Adebambo, Brockman, & Yan, 2015). At the firm and individual micro level, the GFC produced numerous uncertainties and economic consequences including: increased bid-ask spreads, higher price volatility, hesitancy to trade because of reduced liquidity, increased risk aversion, and over-reaction to recent bad news (Barber & Odean, 2011; Bordalo, Gennaioli, & Shleifer, 2012). Flannery, Kwan, and Nimalendran (2013) even suggest that managers took advantage of the situation to manipulate accounts which then reduced confidence in the quality of financial accounts. On this point, we note that during the GFC the firms in our sample experienced mean stock prices falls of 36%, but with average earnings per share falling by a higher 56% (see comparative figures in Table 2 panel C).

Clinch and Wei (2011) examined the value relevance of earnings in the years around the GFC and reported differential country wide impacts. In the U.S., value relevance became stronger, in China the relationship became weaker during the extreme negative periods, but in Australia no

change was observed. In contrast, Bepari (2015) found an increase in earnings value relevance and a decrease in balance sheet value relevance during the Australian GFC. Other research in the Asian crisis of 1997–1998 was associated with significant declines in accounting value relevance (Graham, King, & Bailes, 2000; Ho, Liu, & Sohn, 2001) and, similarly, Davis-Friday and Gordon (2005) report a decline in earnings value relevance during the Mexican 1995 peso devaluation. These mixed predictions underscore the second and third research questions:

RQ2: Is accounting value relevant during the Turkish GFC and, if so, what are the significant drivers for stock prices?

RQ3: Is the value relevance of accounting significantly different between the Turkish hyper-inflation and GFC periods?

3. Data and Models

3.1. Data

We make use of a balanced panel of quarterly accounting financials of surviving IMKB (Borsa Istanbul) companies over the period 1997–2012. In 1997 there were 258 listed companies. From these companies, final December year end accounting periods were retained, with companies subject to regulatory control (banking, insurance, leasing, and factoring) excluded. We also exclude companies placed on the IMKB Watchlist and/or companies whose share trading was temporarily suspended by the IMKB during financial statement announcement dates.⁴ Finally, for each variable outlier observations outside the range of plus or minus three standard deviations from the mean were excluded.

In selecting companies and calendar period we undertook several iterations in order to impose a balance in the trade off between a full coverage of hyper-inflation years and the number of surviving firms. Using year data before 1997 progressively reduces our sample of surviving non-regulated companies to well below 100 and if we start our analysis in 1990, surviving firms fall below 50. Selecting a later initial time (e.g. from 2000) progressively increases the sample size but curtails the significance of the inflation analysis. The final sample (commencing 1997), consists of 113 companies and 33% of total market value, spread evenly between industrial and service industries. Firm numbers and sector membership are reported in Table 1.

Table 1. Sample and industrial distribution of companies.

Sectors	Number of Companies	%
Non-Metallic Mineral Products	19	16,81
Chemicals, Petroleum, Rubber and Plastic Products	16	14,16
Fabricated Metal Products, Machinery and Equipment	15	13,27
Food, Beverage and Tobacco	12	10,62
Textile, Wearing Apparel and Leather	12	10,62
Basic Metal	10	8,85
Wood, Paper and Printing	9	7,96
Services	8	7,08
Holding and Investment	6	5,31
Technology	3	2,65
Construction and Public Works	2	1,77
Real Estate	1	0,88
Total	113	100.00

Note: The sample consists of 113 companies listed on the Borsa Istanbul who survived over the period 1997–2012. The final sample with sector membership is listed below.

Table 2. Descriptive statistics.

Panel A: full sample descriptive statistics						
	Mean	Median	Std.	Min.	Max.	
PRICE	13.486	5.300	24.896	0.580	167.500	
RET	0.059	0.024	0.377	-0.778	1.667	
BIST100	29547	22999	21807	1441	78166	
EPS	0.536	0.169	1.463	-2.213	8.475	
BV	6.536	3.486	9.991	-0.121	62.327	
TA	13.013	7.631	15.454	0.882	86.570	
TL	6.281	3.645	7.166	0.049	35.245	
INTE	31.566	18.750	24.245	5.750	78.670	
INFL	30.673	10.415	29.402	4.350	99.350	
EPS_PT	0.029	0.030	0.155	-0.694	0.630	
Δ EPS_PT	0.007	0.009	0.156	-0.498	0.889	

Panel B: descriptive statistics of hyper-inflation decomposition						
	During hyper-inflation (1997Q1 – 2003Q4)		Post hyper-inflation (2004Q1 – 2012Q4)		T-test for difference (Post – During)	
	Mean	Median	Mean	Median	Mean	Median
PRICE	14.478	7.400	12.715	3.960	-1.763***	-3.440***
RET	0.073	0.040	0.050	0.017	-0.023**	-0.023
BIST100	9147	9817	45413	44490	36266***	34673***
EPS	0.676	0.276	0.428	0.118	-0.248***	-0.159***
BV	5.541	3.569	7.310	3.412	1.769***	-0.157**
TA	12.918	8.764	13.087	6.585	0.170	-2.179***
TL	7.145	5.072	5.609	2.771	-1.536***	-2.301***
INTE	55.797	58.665	12.720	13.750	-43.077***	-44.915***
INFL	59.274	64.080	8.428	8.615	-50.846***	-55.465***
EPS_PT	0.034	0.033	0.025	0.027	-0.009**	-0.007***
Δ EPS_PT	0.013	0.011	0.002	0.009	-0.011***	-0.002

Panel C: Descriptive Statistics of GFC Decomposition

	Pre-GFC (1997Q1 – 2007Q4)		GFC (2008Q1 – 2009Q4)		Post-GFC (2010Q1 – 2012Q4)		T-test for Difference (Pre – During)		T-test for Difference (Post – During)	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
PRICE	13.439	6.100	8.638	3.040	16.892	4.370	4.801***	3.060***	8.254***	1.330***
RET	0.059	0.022	0.087	0.060	0.041	0.018	-0.028*	-0.038***	-0.046***	-0.042***
BIST100	18927	12411	37247	38744	63351	63242	-18320***	-26333***	26104***	24498***
EPS	0.602	0.205	0.262	0.055	0.478	0.139	0.340***	0.150***	0.216***	0.084***
BV	6.359	3.558	6.531	3.335	7.190	3.310	-0.172	0.223	0.659	-0.025
TA	13.071	7.907	12.277	6.454	13.292	7.155	0.794	1.453***	1.015	0.701*
TL	6.472	4.061	5.626	2.712	6.017	2.850	0.846***	1.349***	0.391	0.138
INTE	41.888	43.000	12.770	14.295	6.250	6.250	29.118***	28.705***	-6.520***	-8.045***
INFL	40.916	37.570	8.356	8.590	7.991	8.715	32.56***	28.98***	-0.365***	0.125
EPS_PT	0.033	0.031	-0.001	0.018	0.031	0.029	0.034***	0.013***	0.032***	0.011**
ΔEPS_PT	0.011	0.011	-0.008	0.006	0.002	0.008	0.019***	0.005***	0.010**	0.002

Note: Panel A reports descriptive statistics for the quarterly sample data over the period 1997–2012. PRICE is the stock price at the earnings announcement day of the quarterly financial statement, RET is quarterly stock return. BIST100 is the closing quarterly market stock price index, EPS is quarterly earnings, BV is quarterly net book value, TA is quarterly total assets, and TL is quarterly total liabilities. All accounting variables are expressed in new Turkish Lira (millions) and standardized by the quarterly average number of shares outstanding. INTE is the Turkish Central Bank benchmark quarterly deposit interest rate, INFL is the quarterly inflation rate, and EPS_PT is the earnings adjusted by the stock price in the last quarter, and ΔEPS_PT is the difference in the current and prior quarter EPS_PT. Panel B reports descriptive statistics of the hyper-inflation and post hyper-inflation subsamples, and results of difference tests of variables. Panel C reports descriptive statistics of the pre-GFC, GFC and post-GFC subsamples, and results of difference tests of variables. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$ indicate significance levels of t -test differences.

In 2005, the unit of exchange was changed to New Turkish Lira (NTL), which is equivalent to 10^{-6} times (old) Turkish Lira, and therefore to make it comparable, this data was divided by 10^6 . Further, prices were adjusted to exclude the effects of stock splits, dividend payments and share and bonus issues, and then normalized by dividing through by the average number of shares outstanding during the related quarter. We also hand-collected the actual date of public release of the financial statements and matched with the next closing price day to allow for a potential lag in the stock price adjustment.⁵ Finally, data were divided into two crisis sub-periods: 1997Q1–2003Q4 with hyper-inflation defined (per IAS29) if the cumulative inflation rate for the past three years exceeds 100%. The second crisis period is 2008Q1–2009Q4 for the GFC when the Borsa Istanbul (BIST) 100 Index (at one point) fell by 65%.

Descriptive statistics for the entire period, the hyper-inflation, post hyper-inflation and the pre, during and post GFC periods are contained in Table 2. Across the entire period (panel A) the most notable feature is the high standard deviations (and range differences) relative to means for most variables, especially for the quarterly inflation rates (INFL), quarterly interest rates (INTE), stock prices (PRICE), and the BIST 100. This is reinforced by the highly significant t-statistics in panel B for the hyper-inflation and post differences, and panel C for the differences between the GFC pre, post and during periods. Key takeaways are the significant reductions in interest rates and inflation post hyper-inflation, and the reduction in liability holdings. For example, panel B shows that average inflation (interest) rates fall from 59.3% (55.8%) to 8.4% (12.7%), and average debt fall by 21.5%. In addition, real interest rates were negative during the hyper-inflation, reversed to positive during post hyper-inflation, but then regressed back to negative after the GFC. Correlation coefficients are reported in Table 3. For price, in general, they show higher positive correlation with assets (0.71), and lower for liabilities (0.46) and EPS (0.56).

3.2. Research Design

Two distinct models have emerged in the empirical assessment of accounting value relevance. Easton and Harris (1991) developed the stock returns-earnings model and the Ohlson (1995) model relates price levels to both earnings and net book value. We primarily rely on price level models (per Francis & Schipper, 1999; Ohlson, 1995) and apply the stock return model as a robust check.

The first model (1) basically examines the price association on a per share basis using earnings (EPS) and net book value (BV). Equation (2) extends (1) by decomposing net book values into total assets (TA) and total liabilities (TL). Equation (3) adds a dummy variable to test value association (on an individual basis), first across hyper-inflation and second during the GFC. Finally, equation (4) evaluates both crises simultaneously. In all panel regression equations, firm and year fixed effects are applied to control for omitted variable bias. Year fixed effects account for variation over time not attributable to the included explanatory variables; and firm fixed effects capture unique within-firm variation that controls: (i) biased firm selection, and (ii) time-invariant differences across firms. Finally, we follow Petersen (2009) by applying clustering standard errors at the firm-level. The following equations are used for estimating the results reported under models 1–5 (M1–M5) in Table 4.

$$PRICE_{j,t} = \alpha_0 + \alpha_1 EPS_{j,t} + \alpha_2 BV_{j,t} + \sum Year_Dummy + \sum Firm_Dummy + \varepsilon_{j,t} \quad (1)$$

$$PRICE_{j,t} = \beta_0 + \beta_1 EPS_{j,t} + \beta_2 TA_{j,t} + \beta_3 TL_{j,t} + \sum Year_Dummy + \sum Firm_Dummy + \varepsilon_{j,t} \quad (2)$$

Table 3. Correlation matrix.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) PRICE	1.000										
(2) RET	0.171***	1.000									
(3) BIST100	0.022	0.031***	1.000								
(4) EPS	0.556***	0.194***	-0.044***	1.000							
(5) BV	0.719***	0.025**	0.061***	0.537***	1.000						
(6) TA	0.710***	0.059***	0.002	0.525***	0.911***	1.000					
(7) TL	0.455***	0.062***	-0.080***	0.305***	0.514***	0.809***	1.000				
(8) INTE	0.017*	0.092***	-0.767***	0.087***	-0.035**	0.032*	0.077***	1.0000			
(9) INFL	0.074***	0.034***	-0.761***	0.114***	-0.081***	0.004	0.114***	0.905***	1.000		
(10) EPS_PT	0.079***	0.210***	0.011	0.522***	0.094***	0.085***	0.022*	0.059***	0.058***	1.000	
(11) ΔEPS_PT	0.006***	0.197***	-0.003	0.336***	-0.017	0.010	0.008	0.044***	0.044***	0.507***	1.000

Note: Table 3 reports the correlation for the quarterly sample data over the period from 1997 to 2012. PRICE is the stock price at the earnings announcement day of the quarterly financial statement, RET is quarterly stock return. BIST100 is the closing quarterly market stock price index, EPS is quarterly earnings, BV is quarterly net book value, TA is quarterly total assets, and TL is quarterly total liabilities. All accounting variables above are expressed in new Turkish Lira (millions) and standardized by the quarterly average number of shares outstanding. INTE is the Turkish Central Bank benchmark quarterly deposit interest rate, INFL is the quarterly inflation rate, and EPS_PT is the earnings adjusted by the stock price in the last quarter, and ΔEPS_PT is the difference in the current and prior quarter EPS_PT. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$ indicate significance levels.

$$\begin{aligned} \text{PRICE}_{j,t} = & \theta_0 + \theta_1 \text{EPS}_{j,t} + \theta_2 \text{EPS}_{j,t} \times D_{j,t,c} + \theta_3 \text{TA}_{j,t} + \theta_4 \text{TA}_{j,t} \times D_{j,t,c} + \theta_5 \text{TL}_{j,t} \\ & + \theta_6 \text{TL}_{j,t} \times D_{j,t,c} + \sum \text{Year.Dummy} + \sum \text{Firm.Dummy} + \varepsilon_{j,t} \end{aligned} \quad (3)$$

$$\begin{aligned} \text{PRICE}_{j,t} = & \theta_0 + \theta_1 \text{EPS}_{j,t} + \theta_2 \text{EPS}_{j,t} \times D_{j,t,\text{hinf}} + \theta_3 \text{EPS}_{j,t} \times D_{j,t,\text{gfc}} + \theta_4 \text{TA}_{j,t} \\ & + \theta_5 \text{TA}_{j,t} \times D_{j,t,\text{hinf}} + \theta_6 \text{TA}_{j,t} \times D_{j,t,\text{gfc}} + \theta_7 \text{TL}_{j,t} + \theta_8 \text{TL}_{j,t} \times D_{j,t,\text{hinf}} + \theta_9 \text{TL}_{j,t} \times D_{j,t,\text{gfc}} \\ & + \sum \text{Year.Dummy} + \sum \text{Firm.Dummy} + \varepsilon_{j,t} \end{aligned} \quad (4)$$

Where base coefficients represent the time period absent hyper-inflation and absent the Turkish GFC. j indicates the j th firm, t indicates the t th quarter of the year, $\text{PRICE}_{j,t}$ is closing share price at the quarterly earnings announcement day, $\text{EPS}_{j,t}$ is quarterly net earnings per share, $\text{BV}_{j,t}$ is quarterly net book value per share, $\text{TA}_{j,t}$ is quarterly total assets per share, $\text{TL}_{j,t}$ is quarterly total liabilities per share, and $D_{j,t,c}$ are interaction time dummy variables where c represents either the hyper-inflation ($D_{j,t,\text{hinf}}$) or the GFC ($D_{j,t,\text{gfc}}$). As further tests, we also similarly estimate return models (results reported under M6-M9 in Table 5) using equations (5), (6) and (7) as follows:

$$\text{RET}_{j,t} = \alpha_0 + \alpha_1 \text{EPS}_{j,t} + \alpha_2 \Delta \text{EPS}_{j,t} + \sum \text{Year.Dummy} + \sum \text{Firm.Dummy} + \varepsilon_{j,t} \quad (5)$$

$$\begin{aligned} \text{RET}_{j,t} = & \beta_0 + \beta_1 \text{EPS}_{j,t} + \beta_2 \text{EPS}_{j,t} \times D_{j,t,c} + \beta_3 \Delta \text{EPS}_{j,t} + \beta_4 \Delta \text{EPS}_{j,t} \times D_{j,t,c} \\ & + \sum \text{Year.Dummy} + \sum \text{Firm.Dummy} + \varepsilon_{j,t} \end{aligned} \quad (6)$$

$$\begin{aligned} \text{RET}_{j,t} = & \theta_0 + \theta_1 \text{EPS}_{j,t} + \theta_2 \text{EPS}_{j,t} \times D_{j,t,\text{hinf}} + \theta_3 \text{EPS}_{j,t} \times D_{j,t,\text{gfc}} + \theta_4 \Delta \text{EPS}_{j,t} + \theta_5 \Delta \text{EPS}_{j,t} \\ & \times D_{j,t,\text{hinf}} + \theta_6 \Delta \text{EPS}_{j,t} \times D_{j,t,\text{gfc}} + \sum \text{Year.Dummy} + \sum \text{Firm.Dummy} + \varepsilon_{j,t} \end{aligned} \quad (7)$$

where $\text{RET}_{j,t}$ is quarterly stock return with explanatory variables and year and firm dummies as previously defined, and EPS and ΔEPS are quarterly earnings per share and change in quarterly earnings per share deflated by the stock price at prior quarter, respectively.

4. Results

4.1. Value Relevance in Financial Crises

Our research questions focus on determining primary accounting valuation channels, and ultimately whether the association between firm accounting variables and stock prices changes across hyper-inflation and the GFC. Prior research provides inconsistent results and hence expectations are indefinite. Table 4 reports regression results. Model 1 is a basic price regression model containing earnings and net book values per share (EPS, BV). Model 2 simply decomposes BV into total assets (TA) and total liabilities (TL) which then provides the base for our conditional price models. All two models show accounting variables, on average, are value relevant in the predicted sign across the whole data period.

Table 4. Price association around hyper-inflation and the global financial crisis.

	(M1) PRICE	(M2) PRICE	(M3) PRICE	(M4) PRICE	(M5) PRICE
EPS	3.157*** (6.51)	2.690*** (5.37)	1.810* (1.80)	2.612*** (5.00)	1.631 (1.58)
EPS × HINF			1.649 (1.39)		1.803* (1.78)
EPS × GFC				-1.085 (-0.90)	-0.121 (-0.11)
BV	1.455*** (8.61)				
TA		1.335*** (6.75)	1.499*** (9.17)	1.404*** (6.75)	1.599*** (9.31)
TA × HINF			-0.546* (-1.86)		-0.652** (-2.18)
TA × GFC				-0.481*** (-2.87)	-0.652*** (-3.68)
TL		-1.076*** (-2.68)	-1.479*** (-4.05)	-1.129*** (-2.69)	-1.563*** (-4.14)
TL × HINF			1.087** (2.51)		1.186*** (2.73)
TL × GFC				0.423* (1.83)	0.765*** (3.56)
Intercept	4.711*** (3.58)	5.066*** (4.02)	4.323*** (3.43)	4.667*** (3.79)	4.359*** (3.44)
Year & Firm FE	Yes	Yes	Yes	Yes	Yes
<i>F</i> -test(<i>p</i> -value) of $H_0 = 0$:					
EPS + EPS × HINF			30.01*** (0.001)	-	30.49*** (0.001)
EPS + EPS × GFC				1.33 (0.252)	1.23 (0.270)
TA + TA × HINF			7.34*** (0.001)		7.48*** (0.001)
TA + TA × GFC				18.01*** (0.000)	22.34* (0.000)
TL + TL × HINF			0.49 (0.485)		0.47 (0.497)
TL + TL × GFC				3.21* (0.076)	5.02** (0.027)
<i>N</i>	7,232	7,232	7,232	7,232	7,232
adj. <i>R</i> ²	0.670	0.680	0.685	0.687	0.693

Note: Table 4 reports year and firm fixed effects regression results using stock prices as dependent variables for the period 1997Q1–2012Q4. Two important macroeconomic periods are examined, hyper-inflation (HINF) and the global financial crisis (GFC). HINF is an indicator variable equal to 1 if it is during the period from 1997Q1 to 2003Q4, otherwise 0. GFC is an indicator variable equal to 1 if it is during the period from 2008Q1 to 2009Q4, otherwise 0. PRICE is the closing stock price at the announcement day of the quarterly financial statement, EPS is quarterly earnings per share, BV is net book value per share, TA is quarterly total assets per share, and TL is quarterly total liabilities per share. EPS × HINF, EPS × GFC, TA × HINF, TA × GFC, TL × HINF and TL × GFC are interaction terms. *t*-statistics in parentheses are based on the standard error corrected for heteroscedasticity and clustered at firm-level. The *F*-test ($H_0 = 0$) tests whether EPS + EPS × HINF, EPS + EPS × GFC, TA + TA × HINF, TA + TA × GFC, TL + TL × HINF, and TL + TL × GFC are significantly different from zero. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$ indicate significance levels.

Models 3 and 4 individually add hyper-inflation and GFC interactions to test for significant price association difference during each financial crisis. In individual equations, the earnings interaction coefficients insignificant and opposite in sign – the interaction coefficient on the

Table 5. Return association around hyper-inflation and the global financial crisis.

	(M6) RET	(M7) RET	(M8) RET	(M9) RET
EPS_PT	0.502*** (7.42)	0.159*** (2.64)	0.628*** (8.22)	0.364*** (4.10)
EPS_PT × HINF		0.557*** (6.40)		0.354*** (3.43)
EPS_PT × GFC			-0.687*** (-6.95)	-0.436*** (-3.72)
ΔEPS_PT	0.102*** (2.65)	-0.003 (-0.05)	0.108** (2.46)	0.023 (0.30)
ΔEPS_PT × HINF		0.136* (1.68)		0.110 (1.05)
ΔEPS_PT × GFC			-0.217*** (-2.74)	-0.124 (-1.22)
Intercept	0.019 (0.83)	0.003 (0.13)	0.009 (0.40)	0.002 (0.10)
Year & Firm FE	Yes	Yes	Yes	Yes
<i>F</i> -test(<i>p</i> -value) of $H_0 = 0$:				
EPS_PT + EPS_PT × HINF		67.30*** (0.000)		66.43*** (0.000)
EPS_PT + EPS_PT × GFC			0.55 (0.458)	0.86 (0.356)
ΔEPS_PT + ΔEPS_PT × HINF		4.78** (0.031)		4.62** (0.034)
ΔEPS_PT + ΔEPS_PT × GFC			2.35 (0.128)	2.08 (0.152)
<i>N</i>	7,119	7,119	7,119	7,119
adj. <i>R</i> ²	0.130	0.140	0.135	0.141

Note: Table 5 reports year and firm fixed effects regression results using quarterly stock return as dependent variables for the period 1997Q1–2012Q4. HINF is equal to 1 if it is during the period from 1997Q1 – 2003Q4, otherwise 0, and GFC is an indicator variable equal to 1 if it is during the period from 2008Q1–2009Q4, otherwise 0. RET is quarterly stock return, EPS_PT is quarterly earnings per share adjusted by the stock price in the previous quarter, ΔEPS_PT is the difference of the current and prior quarter earnings per share adjusted by the stock price in the previous quarter. EPS_PT × HINF, EPS_PT × GFC, ΔEPS_PT × HINF and ΔEPS_PT × GFC are interaction terms. *t*-statistics in parentheses are based on the standard error corrected for heteroscedasticity and clustered at firm-level. The *F*-test ($H_0 = 0$) tests whether the combined coefficients are significantly different from zero. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$ indicate significance levels.

hyper-inflation period (1997–2003) is positive and the GFC interaction (2008–2009) is negative. The *F*-tests on the combined coefficients, show a positive and significant EPS during hyper-inflation, but no explanatory power during the GFC. Model 5 reports interactions on both hyper-inflation and the GFC periods and show a significant positive increase in EPS explanatory power during hyper-inflation, supported by a significant *F*-test. In short, earnings increased in explanatory power during hyper-inflation ($F = 30.49$; 0.001) and became insignificant during the GFC ($F = 1.23$; 0.27).

Balance sheet components significantly declined during both crises. For all models (M3, M4, M5) the *t*-statistics on the interaction terms for total assets (TA) are negative and for total liabilities (TL) the interaction terms are positive. Whilst there is a decline in overall explanatory power, *F*-statistics reveal that TA still retains (diminished) explanatory power in both crises, and in the GFC, TL retains a lower explanatory power. However, during the hyper-inflation, TL provides no contribution to value relevance ($F = 0.49$ and 0.47 for M3 and M5). When combined with a dramatic fall of 21.5% in total liability holdings post-inflation, from 7.15 to 5.61 million Turkish lira

(see Table 2), we note that the market did not penalize debt accumulation until after inflation abated, consistent with Fisher (1930).

In summary we make several pertinent observations. First, the value relevance of balance sheet components significantly decline during financial crises, consistent with arguments that failure to rapidly adjust financial accounts to reflect changing price, lessens their feedback power. Second, the value relevance of earnings increases during hyper-inflation, more likely a reflection of relative input and output flows related to the ability to adjust and continue operations. Finally, the holding of debt during hyper-inflation is not penalized by the market.

Of particular note is that earnings is the only accounting variable that increases in value relevance, and given opposed results, robustness is further checked using earnings-return equations. Results are reported in Table 5 and support the price level results. The individually EPS and Δ EPS coefficients from models 7 and 8 are significantly higher in hyper-inflation and significantly lower in the GFC. Moreover, the F-statistics for the combined interaction coefficients for EPS and Δ EPS are significant (M9) and positive at the 1% and 5% levels for the hyper-inflation period, but insignificant for the GFC period.⁶

5. Other Valuation Impacts

5.1. The Real Cost of Debt

During the hyper-inflation the value relevance of earnings increased and liabilities declined to zero. This prompts further questions about the valuation impact of holding debt and the cost and revenue factors that flow through earnings.

On the one hand, if interest rates fully adjust to inflation and reflect opportunity costs, then gains from holding debt are mitigated. In effect, the holding of debt as an inflationary hedge is neutralized (Leibowitz, Sorensen, Arnott, & Nicholas, 1989). However, according to Fisher (1911) and Sweeney (1964), law and custom arbitrarily work to keep down nominal interest rates, such that perfect interest/inflation adjustment is seldom reached. Moreover, if during hyper-inflation the monetary authorities imposed a regime whereby real interest rates are held at low or negative levels then this could significantly feed through to increase profitability. In Turkey, real interest rates remained significantly negative for sustained periods during hyper-inflation (1997–1998 and 2000). On average they were negative (−3.48%) – reaching a low of minus 30.13% during the first quarter 2000. Interesting, after the GFC, real interest rates also turned negative during 2010–2012, albeit at a lower rate of 1.74% (see Figure 1). Consequently, inflation with negative real interest rates might work to increase profitability through inflationary related revenues and lower interest costs. Hence, our general prediction is that negative real interest rates will provide additional value relevance, over and beyond that contributed by accounting variables.

We focus on the indirect effects of real interest rates – whether interest rates, adjusted by the inflation rate, are an incremental driver of value. Similar to prior modelling, we start by estimating a basic model (M10), where the value relevance of negative interest rates is the sole explanatory variable. We then incrementally build to include the impact of hyper-inflation and balance sheet items (M11 and M12) and construct a final model (M13) that takes the following form:

$$\begin{aligned} \text{PRICE}_{j,t} = & \theta_0 + \theta_1 \text{EPS}_{j,t} + \theta_2 \text{EPS}_{j,t} \times D_{j,t,hi}nf + \theta_3 \text{NEG_INTE}_{j,t} + \theta_4 \text{NEG_INTE}_{j,t} \\ & \times D_{j,t,hi}nf + \theta_5 \text{TA}_{j,t} + \theta_6 \text{TA}_{j,t} \times D_{j,t,hi}nf + \theta_7 \text{TL}_{j,t} + \theta_8 \text{TL}_{j,t} \times D_{j,t,hi}nf \\ & + \sum \text{Year_Dummy} + \sum \text{Firm_Dummy} + \varepsilon_{j,t} \end{aligned} \quad (8)$$

where $\text{NEG_INTE}_{j,t} = 1$ if $(\text{INTE}_{j,t} - \text{INFL}_{j,t})$ is negative and 0 otherwise, and $(\text{INTE}_{j,t} - \text{INFL}_{j,t})$ is

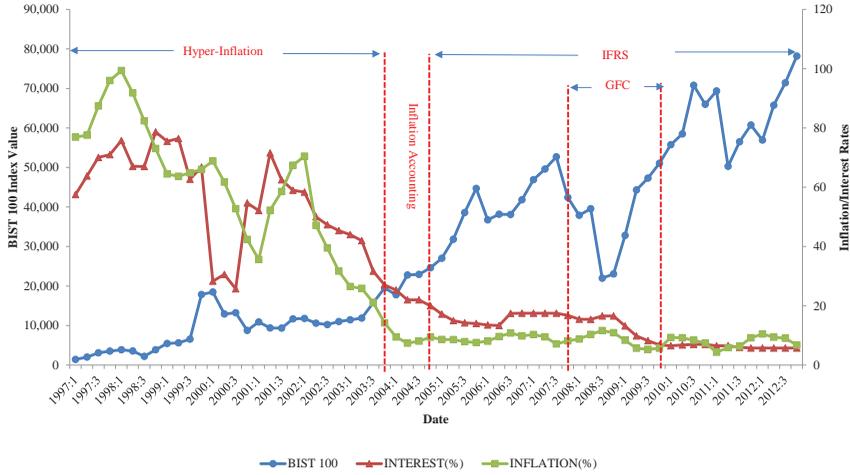


Figure 1. BIST100 index, hyper-inflation, the GFC, and IFRS.

the Turkish Central Bank benchmark deposit interest rate minus the consumer price inflation rate on a quarterly basis. Other accounting variables are as previously defined. Results are reported in Table 6.

Our first parsimonious model (M10) indicates that negative interest rates have an overall positive impact on price, but the dummy model (M11) shows it is confined to hyper-inflation. When the accounting variables are added in models 12 and 13, negative interest rates remain highly positive during the hyper-inflation (M13: $t = 5.86$; $F = 44.19$), indicating that negative interest rates are an incremental valuation factor to stock prices. Similar to early results (Table 4) earnings increase in value relevance and debt levels have no valuation impact. Total assets remain value relevant, but association is diminished during hyper-inflation, supporting results reported in Table 4.

The above analysis, however, does not directly assess the impact of inflation which may also have incremental impact. For additional robustness we separately added both inflation and real interest rates to assess individual impact. Because of high correlation ($\rho = 0.59$) we orthogonalised by regressing the inflation rate against the real interest rate and applied residuals. In unreported results, we found that negative interest rates dominated and the individual effect of inflation was insignificant.

In summary, real negative interest rates provided incremental and positive value relevance over and above raw inflation and accounting variables during the Turkish hyper-inflation. The added analysis further supports the contention that carrying debt during hyper-inflation (when real interest rates are basically negative), is not penalised by the market.

5.2. Changing Accounting Policies

In this section we address the possibility that the adoption of ‘higher quality’ accounting improved the valuation associations with stock prices. Pre-2003, Turkish companies prepared their financial statements in accordance with the Turkish Uniform Accounting System based on historic costs. Continued regulatory intervention, economic crises, and high inflation led commentators to question the relevance and reliability of cost-based financial accounting information disclosed pre-2003. Essentially, historic cost accounts were perceived to produce heavily

Table 6. Negative interest rates and price association.

	(M10) PRICE	(M11) PRICE	(M12) PRICE	(M13) PRICE
EPS			2.717*** (5.41)	1.850* (1.84)
EPS × HINF				1.721* (1.75)
NEG_INTE	1.595*** (3.85)	-0.658 (-0.78)	2.079*** (4.80)	-1.930** (-2.55)
NEG_INTE × HINF		2.854*** (3.10)		5.512*** (5.86)
TA			1.333*** (6.75)	1.497*** (9.15)
TA × HINF				-0.556* (-1.91)
TL			-1.076*** (-2.68)	-1.477*** (-4.04)
TL × HINF				1.096** (2.55)
Intercept	10.667*** (5.40)	8.471*** (4.23)	5.044*** (4.01)	4.266*** (3.39)
Year & Firm FE	Yes	Yes	Yes	Yes
F -test(p -value) of $H_0 = 0$: NEG_INTE + NEG_INTE × HINF		23.65*** (0.000)		44.19*** (0.000)
TA + TA × HINF				7.29*** (0.000)
TL + TL × HINF				0.47 (0.494)
N	7232	7232	7232	7232
adj. R^2	0.424	0.434	0.680	0.686

Note: Table 6 reports year and fixed effects regression results using stock prices as dependent variables for the period 1997Q1–2012Q4. HINF is an indicator variable equal to 1 for the period from 1997Q1 – 2003Q4, otherwise 0. INTE is the Turkish Central Bank benchmark quarterly deposit interest rate. NEG_INTE is an indicator variable equal to 1 if the inflation is greater than the interest rate. EPS × HINF, NEG_INTE × HINF, TA × HINF and TL × HINF are interaction terms. t -statistics in parentheses are based on the standard error corrected for heteroscedasticity and clustered at firm-level. The F -test ($H_0 = 0$) tests whether the combined coefficients are significantly different from zero. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$ indicate significance levels.

distorted financial statements that lacked transparency and a curtailment of investor confidence (Arsoy & Guenme, 2009).

In order to overcome these shortcomings, the Capital Markets Board of Turkey (CMB) introduced several new accounting regulations. First, consolidation and inflation accounting became effective in December 2003. These involved inflation gain (loss) adjustments to net monetary items passed through the income statement and non-monetary adjustments to balance sheet items applying Wholesale Price Indexes (Arsoy & Guenme, 2009, Appendix A). Second, in 2005 inflation accounting was revoked and, in conjunction with European Union regulations, IFRS were introduced. IFRS adoption, however, was graduated with part immediate adoption and further gradual adoption completed in 2008.⁷

There are several before and after studies that analyse the adoption of IFRS in Turkey with inconsistent results. For example, Türel (2009) reports decreased value relevance of book values over the 2001–2006 period, Suadiye (2012) reports decreased earnings and book values

over the 2000–2009 period, and Karğın (2013) and Bilgic and Ibis (2013) both report increased book value relevance and decreased earnings value relevance after IFRS.⁸

However, a simple before and after examination of IFRS adoption in Turkey, without controlling for economic conditions, represents a constrained test. To address this concern we cover several mitigating possibilities. We start by using a base model that examines valuation impacts before and after IFRS adoption, and build by placing indicator dummy variables to account for different market phases across the IFRS adoption period. We delineate the IFRS tests into pre-GFC, actual GFC and post GFC in order to compare value relevance in a bubble period that has substantial price increases (+114% from 24,600 to 52,682), price declines during the GFC (−58%), and recovery post GFC (+53%). This segmentation takes account of the fact that there was incremental impact of IFRS in the period 2005–2009 and this overlaps the GFC period – where significant lower accounting value relevance was noted. One reason for these lower coefficients could be the incremental and incomplete application of IFRS, rather than the GFC downturn. Another reason could be that asset bubbles before the GFC drove prices above fundamental firm values. The following regression design adjudicates between these three IFRS market phases as follows:

$$\begin{aligned}
 \text{PRICE}_{j,t} = & \theta_0 + \theta_1 \text{EPS}_{j,t} + \theta_2 \text{EPS}_{j,t} \times D_{j,t,\text{ifrs}} + \theta_3 \text{EPS}_{j,t} \times D_{j,t,\text{ifrs_bgfc}} \\
 & + \theta_4 \text{EPS}_{j,t} \times D_{j,t,\text{ifrs_gfc}} + \theta_5 \text{EPS}_{j,t} \times D_{j,t,\text{ifrs_agfc}} + \theta_6 \text{TA}_{j,t} + \theta_7 \text{TA}_{j,t} \times D_{j,t,\text{ifrs}} \\
 & + \theta_8 \text{TA}_{j,t} \times D_{j,t,\text{ifrs_bgfc}} + \theta_9 \text{TA}_{j,t} \times D_{j,t,\text{ifrs_gfc}} + \theta_{10} \text{TA}_{j,t} \times D_{j,t,\text{ifrs_agfc}} + \theta_{11} \text{TL}_{j,t} \\
 & + \theta_{12} \text{TL}_{j,t} \times D_{j,t,\text{ifrs}} + \theta_{13} \text{TL}_{j,t} \times D_{j,t,\text{ifrs_bgfc}} + \theta_{14} \text{TL}_{j,t} \times D_{j,t,\text{ifrs_gfc}} + \theta_{15} \text{TL}_{j,t} \\
 & \times D_{j,t,\text{ifrs_agfc}} + \sum \text{Year_Dummy} + \sum \text{Firm_Dummy} + \varepsilon_{j,t}
 \end{aligned} \tag{9}$$

Indicator dummy $D_{j,t,\text{ifrs}}$ is one for the period of IFRS adoption (i.e. 2005Q1–2012Q4), and zero otherwise. Indicator dummies $D_{j,t,\text{ifrs_bgfc}}$, $D_{j,t,\text{ifrs_gfc}}$ and $D_{j,t,\text{ifrs_agfc}}$ are placed on sub-periods before, during and after the GFC which overlaps the incremental application of IFRS standards. Figure 1 represents these sub-periods as well as the introduction of inflation accounting in 2004 and the hyper-inflation period prior to 2004. The idea is to isolate the GFC period as a subset when IFRS was operative in order to determine if ‘higher quality accounting’ is more or less informative during crisis. Results are reported in Table 7 and sub-periods are highlighted in Figure 1.

Model (M14) tests before and after IFRS, and shows a significant decline in value relevance for earnings after IFRS (earnings have no value relevance $F = 0.75$, $p = 0.39$) and a significant increase in value relevance for total assets and liabilities. This result is in line with the general empirical results of Brüggemann et al. (2013) for EU firms, Tsalavoutas, André, and Evans (2012) for Greek firms, and Karğın (2013) and Bilgic and Ibis (2013) for Turkish firms, and the conceptual move towards a balance sheet valuation approach by the IASB.

Model (M15) breaks IFRS into three components – before GFC (IFRS_BGFC), during GFC (IFRS_GFC), and after GFC (IFRS_AGFC). The calendar time decomposition of IFRS allows an examination of different stock market phases. Pre-GFC, Turkish stock prices increased by 114% from 24,600 to 52,682, and during the GFC, stock prices declined 58% back down to 21,966, and subsequently rose up to 51,064, and then increased post GFC to 78,166 (+53%). The focus is on the comparative value relevance during the GFC as a proxy for crisis and consistent with our conjecture that macro-economic disruptions affect accounting value relevance.

During the GFC the value relevant coefficients are not significantly different from the base (i.e. pre-IFRS) – earnings are (−2.32, $t_{\text{GFC}} = -1.64$), assets (0.08, $t_{\text{GFC}} = 0.41$), and liabilities (−0.36, $t_{\text{GFC}} = -1.17$). In comparison, the IFRS coefficients either side of the GFC record significant

Table 7. Price valuation impact around IFRS and the GFC.

	(M14) PRICE	(M15) PRICE
EPS	3.773*** (7.22)	3.725*** (7.27)
EPS × IFRS	-2.815** (-2.32)	
EPS × IFRS_BGFC		-2.838*** (-3.47)
EPS × IFRS_GFC		-2.321 (-1.64)
EPS × IFRS_AGFC		-4.534*** (-2.84)
TA	0.924*** (3.54)	0.917*** (3.54)
TA × IFRS	0.689*** (3.57)	
TA × IFRS_BGFC		0.536*** (2.92)
TA × IFRS_GFC		0.079 (0.41)
TA × IFRS_AGFC		1.372*** (5.95)
TL	-0.464 (-1.05)	-0.476 (-1.09)
TL × IFRS	-1.065*** (-3.30)	
TL × IFRS_BGFC		-1.337*** (-3.84)
TL × IFRS_GFC		-0.363 (-1.17)
TL × IFRS_AGFC		-1.520*** (-3.76)
Intercept	4.959*** (3.89)	5.037*** (3.92)
Year & Firm FE	Yes	Yes
<i>N</i>	7232	7232
adj. <i>R</i> ²	0.689	0.720
<i>F</i> -test (<i>p</i> -value) of $H_0 = 0$:		
EPS + EPS × IFRS	0.75 (0.39)	
EPS + EPS × IFRS_BGFC		1.48 (0.22)
EPS + EPS × IFRS_GFC		1.03 (0.31)
EPS + EPS × IFRS_AGFC		0.29 (0.59)
TA + TA × IFRS_GFC		24.05*** (0.00)
TL + TL × IFRS_GFC		5.54** (0.02)

Note: Table 7 reports year and firm fixed effects regression results using stock price as the dependent variable. IFRS is an indicator variable equal to 1 for the period 2005Q1 – 2012Q4, IFRS_BGFC is an indicator variable equal to 1 for 2005Q1 – 2007Q4, IFRS_GFC is an indicator variable equal to 1 for the period 2008Q1 – 2009Q4, and IFRS_AGFC is an indicator variable equal to 1 for 2010Q1 – 2012Q4, all otherwise zero. PRICE is the closing stock price at the announcement day of the quarterly financial statement, EPS is quarterly earnings, BV is net book value, TA is quarterly total assets, and TL is quarterly total liabilities, all on a per share basis. *t*-statistics in parentheses are based on standard errors corrected for heteroscedasticity and clustered at the firm-level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$ indicate significance levels. The *p*-values of *F*-test on the individual test of difference between coefficients IFRS_GFC and IFRS_BGFC (IFRS_AGFC) are contained in squared brackets. The bottom section of the table reports *F*-test (*p*-value), which tests whether the combined coefficients are significantly different from zero.

change – earnings are significantly negative and not different from zero ($F_{BGFC} = 1.48, 0.22$; $F_{AGFC} = 0.29, 0.59$), and assets and liabilities in M15 both have significant increases in value relevance ($0.536, t_{BGFC} = 2.92; 1.32, t_{AGFC} = 5.95$). Clearly, there is a fundamental change in the value relevance of accounting after IFRS with increased valuation importance of the balance sheet and a decline in earnings, but this is not translated to the same extent during the GFC when explanatory power reverts backwards towards prior levels. Hence, if accounting is argued to be less relevant during hyper-inflation, then this is also the case during the GFC recession, regardless of the supposed higher quality.

One possible mitigating factor is the introduction of inflation accounting (IACC) in 2004. We therefore add further interaction terms: EPS_IACC , TA_IACC and TL_IACC . In unreported results, inflation earnings increased their association with price but inflation adjustments to assets and liabilities, contrary to predictions (Sweeney, 1964), did not improve in value relevance.

One final test asks whether the predictive value of accounting components for stock prices improved before and after IFRS. We regressed lagged variables (one to four quarters) and found greater predictive power for earnings in the pre-IFRS period and greater predictive power for balance sheet components after IFRS. In addition, adjusted R squares increase by about 15% across balance sheet regressions after IFRS (after excluding the GFC), suggesting that these components have higher value relevance under IFRS compared to Turkish GAAP. However, earnings have greater predictability during hyper-inflation. Regardless, and consistent with the conceptual framework of the International Accounting Standards Board, the application of IFRS fundamentally refocused value relevance from earnings to the balance sheet.

In summary, IFRS adoption improved the value relevance of balance sheet items but not during the GFC. That is, a fundamental weakening in the valuation strength of accounting components during the GFC, despite IFRS adoption designed to strengthen association through fair value adjustments.

6. Summary and Conclusion

Turkey provides a country specific setting to contemporaneously examine the impact of two financial crises on the value relevance of accounting. Hyper-inflation where general consumer prices increased by an average of 59% and, amongst other factors, an association with negative real interest rates, a depreciation of the Turkish Lira by almost 70% against the US dollar, and a foreign exchange crisis with a loss of more than half of Turkey's international reserves. Then the GFC which saw the Turkish BIST 100 Index drop over 60% of its value which was associated with a reduction in employment, gross domestic product, international trade, and asset values.

Utilising a long series of quarterly financial accounting data from 1997 to 2012, we report that earnings and negative interest rates assume a dominant valuation role in the hyper-inflation period. Moreover, consistent with Fisher (1930), the holding of debt in hyper-inflation had no negative impact on prices. The combination of negative interest rates and holding higher levels of debt has policy implications by suggesting they contributed to inflation through overinvestment in debt. Currently, worldwide interest rates are below historical average and fiscal authorities should be aware of the inflation risk associated with undertaking policies that keep interest artificially low. Further research similar to Chen et al. (2016) would be instructive in informing policy.

After the hyper-inflation, and during the application of IFRS, the dominant valuation role shifted from earnings to assets and liabilities – consistent with the conceptual valuation approach of the IASB. However, the increased valuation importance of the balance sheet was not evident in the GFC. This raises accounting policy issues of whether firms (more especially in developing economies) who apply fair value adjustments in rising markets, whether they impair to the same extent during macro downturns.

To our mind, the main contribution of this paper is to highlight that accounting value relevance is contextual and volatile and, to some extent, determined by exogenous economic factors. In short, the accounting–price valuation relationship is not straight forward and the decline in earnings valuation is not always linear as previously argued by Brown, Lo, and Lys (1999) and Francis and Schipper (1999). Moreover, general inflation accounting adjustments during 2004 (albeit over a short period) are not significantly more informative. Hence, general and direct price adjustments may not always provide higher quality value relevant information.

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Notes

¹For example, earlier studies show that the association is affected by firm earnings persistence, net book values and systematic risk (Collins & Kothari, 1989; Easton & Zmijewski, 1989; Kormendi & Lipe, 1987), the presence of losses (Hayn, 1995), and firm size (Easton & Zmijewski, 1989). Later research focuses on value relevance after firm adoption of IFRS (see review by Brüggemann et al., 2013).

²Hugo Stinnes ... ‘grew rich during inflation by going into debt and having the debt virtually wiped out by that inflation.’ (Fisher, 1928, p. 7).

³Whittington, Saporta, and Singh (1997), noting the high levels of Turkish hyper-inflation, illustrate the impact of inflation adjustments on listed firms. They find decreases in mean net assets growth from 57.7% to 28.8%, sales growth from 56.2% to 3.2%, earnings before tax/net assets ratio from 32.4% to 12.3%, and earnings after tax/net worth from 25.5% to 9.4%.

⁴Resulting from incompliance with IMKB listing rules.

⁵Up until 2009 Q2, financial statements were announced to the public by means of IMKB Daily Bulletins after the second trading session ended and then disclosed on the IMKB website. Since the financial statements are effectively disclosed to the public with a one day lag, the price impact is adjusted to take this into account.

⁶As another robustness test we replicated the inflation adjustments of Filip and Raffournier (2010, Eq. 2, p.92). We obtained the same reversal impact, with adjusted earnings OLS coefficients of 0.31 (-0.29) and adjusted earnings change coefficients of 0.02 (-0.02), significant at the 5% level.

⁷CMB regulates the principles and procedures of preparation, presentation and announcement of financial statements prepared by the entities with the Communiqué No: XI-29, ‘Principles of Financial Reporting in Capital Markets’ (the Communiqué). The Communiqué is effective for the annual periods starting from 1 January 2008 and supersedes Communiqué No: XI-25, ‘The Accounting Standards in the Capital Markets’. According to the Communiqué, entities shall prepare their financial statements in accordance with International Financial Reporting Standards (IAS/IFRS), as endorsed by the European Union, under the oversight of the Turkish Accounting Standards Board (TASB).

⁸An interesting alternative perspective is that the main objective of financial reporting is to maintain financial stability in markets, rather than provide information to investors. This issue and the political role that the European Commission played in lobbying for reclassification under IAS39 during the GFC are discussed in André, Cazavan-Jeny, Dick, Richard, and Walton (2009).

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