



## Does Financial Statements Information Contribute to Macroeconomic Indicators?

Ali Daemigah\*

*Department of Accounting, Imam Reza International University, Mashhad, Iran*

---

### Abstract

This paper aims to analyze the impact of financial statement information on macroeconomic indicators, including the labor market and domestic product data growth. We attempt to examine the effect of variables by applying Classical and Bayesian analyses. We applied quarterly GDP (Growth Domestic Product) data from the real-time data set for macroeconomists maintained by the Statistical Center of Iran (SCI). Additionally, financial statement information is collected from the Tehran Exchange Market database. The results suggest that earnings growth dispersion provides related data about final GDP growth. The results suggest that after considering the effect of other influential factors, specifically real initial GDP, earnings growth dispersion is useful in forecasting future GDP changes. However, the results indicate that there is no link between earnings growth dispersion and GDP restatements. The findings are important for economists and policymakers to have more accurate economic estimation and prediction by applying for accounting numbers.

---

**Keywords:** Gross domestic product, Financial numbers, GDP prediction, GDP restatement, Aggressive earning, Earning growth dispersion

---

\**Corresponding Author:* Department of Accounting, Email: [daemigah.ali@gmail.com](mailto:daemigah.ali@gmail.com)



## 1. Introduction

How will accurate macroeconomic factors be predicted in the future? This important question's response is the objective of macroeconomists and a bunch of decision and policymakers. The current study examines the applicability of financial statement analysis based on accounting earnings data extracted from individual firms to take the Iran economy's pulse.

The economic and finance researchers possess a long history of studying prices and earnings at the macroeconomic level; they mostly applied time series designs. Abstractly, "macroeconomic" variables include the meta-data of a region or nation, whereas practically the main indexes to measure them are prices and earnings provided by the capital market. In contrast, finance scholars have a long history of investigating the association between earnings and other financial variables, including the stock return and earning quality at the firm level. They mostly employed cross-sectional or pooled research designs. Abstractly, significant effective factors on earnings quality include timeliness, usefulness, conservatism, analyst forecast accuracy, value relevance, information asymmetry, trading volume, and liquidity at the firm level, mostly considered by a wide range of studies. The two kinds of literature have presented separately; but employing financial statement numbers to forecast economic activities at the firm level is traditionally a topic of accounting literature (Ou and Penman 1989; Penman 1992; Lev and Thiagarajan 1993; Abarbanell and Bushee 1998; Nissim and Penman 2001; Konchitchki 2011; Patatoukas 2012; Konchitchki and Patatoukas 2014; Nallareddy and Ogneva 2017). The current paper's main objective is to compare and contrast these approaches to how macroeconomic-level analysis is incorporated with accounting earnings reported by financial statements.

Prior studies evidence that changes in a firm's return and its drivers are useful for forecasting economic activity at the firm level (Fairfield and Yohn, 2001; Nissim and Penman, 2001; Soliman, 2008), in which a little investigation is conducted about the usefulness of financial statement analysis for predicting the overall economy. Such an investigation provides evidence to fulfill this academic gap.

Listed firms on the Tehran stock exchange are required to present financial statements on an annual basis. The annual reports provide information about each firm that is the underlying economic activity at the national level. Since listed firms are incorporated with a large part of the economy, changes in their respective economic activities can be informative about shifts in overall economic activity (Fama, 1981). Further analysis also suggests that gross domestic product is explained by foreign direct investment in Iran's economy, whereas foreign capitals are likely to be invested in Iranian corporations (Sharifi-Renani and Mirfatah, 2012). In Saudi Arabia, Mensi et al. (2018) demonstrate that a negative private investment shock reduces non-oil GDP in both the short- and long-run. As a consequence, it is expected that if investment in private sectors and financial reports influence the changes in economic activity at the firm level, then financial statement numbers, including the firm return, will impact on macroeconomic-level that can provide relevant information for prospects of the real economy.

The current investigation is conducted. It also investigates whether real-reveled aggregate accounting details are applicable to make predictions about macroeconomic indicators and emphasize gross domestic product (GDP) changes to examine the rectifying role of individual firm data for omissions in early statements of GDP. On the one hand, government bodies and economists' major economic decisions are affected by microeconomic announcements, including the private sector's financial statements. On the other hand, inaccurate and incomplete data are the foundation of government bodies' early statements, including initial GDP statements, mostly restated during the upcoming

years or quarters as soon as more information becomes available. Therefore, earnings growth dispersion is likely to forecast GDP growth changes because it contains macroeconomic information that economists have not fully paid attention to (Nallareddy and Ogneva, 2017).

Additionally, the GDP is one of the most significant indexes in economic growth analyses and the critical proxy for a country's economic activity. Therefore, it is used by the Iranian Planning and Budget Organization (IPBO)<sup>1</sup> to get the annual budget ready to shape monetary policy as guidance of economic activities. The reason being, the annual budget is likely to be taken into consideration by the business enterprises as a key factor for investment, production, employment, and general financial decisions. Taken all together, it is expected that former GDP restatements contain more relative information rather than initially GDP statements.

In terms of financial issues, this paper provides several contributions to the current literature. At first, we extend recent accounting research on macroeconomic forecasts (Kothari et al., 2013; Konchitchki and Patatoukas 2014, Nallareddy and Ogneva 2017) by responding to the question; How accurate macroeconomic factors will be predicted? Whether the government economists' prepared economic indicators are fully incorporated with accounting details, especially in emerging markets. Second, the results emphasize the importance of macroeconomic estimates yearly and provide accurate and clear outcomes. When investigating macroeconomic predictions efficiently, it is noticeable that such an investigation is not considered in Iran's economy. Thirdly, while prior research mostly concentrates on aggregate earnings (e.g., Ball and Sadka 2015) and relatively little is known about earnings dispersion (Jorgensen et al. 2012). We add to the research on the information content of accounting aggregates. Specifically, we focus on the real-time prediction of restatements in initial estimates of GDP growth. Fourthly, in this literature line, prior investigations are mostly conducted in the U.S. economy (Nallareddy and Ogneva, 2017). Regardless of the different structure of the U.S. economy and lack of consideration of influential factors on GDP growth, they may not be generalized in emerging economies. Therefore, we consider other influential items (including; oil price, inflation and exchange rates, and import and export rates) on GDP growth in the Iran economy, which is more applicable by macroeconomists and private sector bodies. Finally, to provide a more accurate picture of an accounting figure's predictability and classical analysis, we employ a Bayesian statistical method. These different objectives lead to different research designs and inferences, leading to such an investigation.

The remainder of the study is presented as follows. Section 2 describes the related line of literature and develops the paper's hypotheses. Section 3 discusses the data and details the empirical methods. Section 4 presents the results, and Section. 5 summarizes and concludes the findings.

## 2. Theoretical Framework and Literature Review

Statistical Center of Iran (SCI2) retains the responsibility of collecting and reviling periodical macroeconomic data. In this regard, we obtain applicable information from the official website<sup>3</sup> of SCI. The accuracy and efficiency of early GDP estimates are incorporated with news and noise among macroeconomics. The news interpretation states that restatements are unpredictable at the initial estimate and occur only because of incorporating new information. In contrast, the noise interpretation suggests that

---

1- Planning and Budget Organization is a subsidiary of Iranian Executive Branch (government) which task is to prepare annual budget of country in order to propound to parliament to be approved. The official website of this organization is: <http://www.mporg.ir>

---

restatements reflect information available at the initial estimate time. Thus, initial estimates are not rationally reliable.

### 2.1. Macroeconomic indicators

An aspect of macroeconomic investigations concentrates on the widespread consequences of uncertainty. Previous analytical and empirical analyses show that uncertainty is an important determinant of macroeconomic activity (e.g., Bloom, 2009; Bloom et al., 2014; Baker et al., 2015; Kalay et al., 2016). These studies show that since investors and companies are uncertain about the prospects of their investments, then macroeconomic activities are expected to be slow during periods of high uncertainty, and leads to postponing investments. These postponements lead to a remarkable decrease in investment and output. Consequently, capital reallocation is delayed and causes lower growth in investments, production, productivity, and employment. In this regard, Kalay et al. (2016) suggest that dispersion in analyst forecast revisions captures labor reallocation and firm-level uncertainty. Kazerooni and Sajudi (2011) investigate the effect of uncertainty on economic growth; they evidence a negative influence of uncertainty in trading relations on Iran's economic growth rate.

The other aspect of macroeconomic and accounting research investigates the usefulness of financial statement numbers for predicting future changes in firm fundamentals (Ou and Penman 1989; Penman 1992; Lev and Thiagarajan 1993; Abarbanell and Bushee 1998; Nissim and Penman 2001; Konchitchki 2011; Patatoukas 2012; Nallareddy and Ogneva 2017). Patatoukas (2013) shows that earnings changes at the stock market level are correlated with new information about expected future cash flows and discount rates. He also reveals that aggregate earnings changes are tied to news about all components of the expected future stock market return, i.e., the real riskless rate, expected inflation, and the expected equity risk premium.

### 2.2. Firm-level indexes

One applicable factor for predicting future economic activities is the ratio of operating income after depreciation to net operating assets (RNOA), which is typically applied to measure overall firm performance. Operating income is explained as sales subtract the cost of goods sold, selling, general, and administrative costs and depreciation expense. Net operating assets are explained as operating assets, total assets subtracting cash and short-term investments, subtracting operating liabilities, total liabilities subtracting long- and short-term liabilities. Both operating income and net operating assets are abstracted away from the influences of financial leverage. Therefore RNOA presents a measurement for firm operating performance. The researchers also provide empirical evidence, confirm changes in RNOA and its drivers are useful for forecasting firm fundamentals (Fairfield and Yohn 2001; Nissim and Penman 2001; Soliman 2008).

The other suggested indicator for predicting economic activities is annual reported earnings through financial statements. Campbell (1991) states a theoretical guideline for understanding the simultaneous relationship between earnings changes and stock returns both at the firm and aggregate levels. At the firm level, earnings changes are employed to measure cash flow news, and strong positive simultaneous evidence between firm-level earnings changes and firm-level stock returns is reported. In this regard, Hecht and Vuolteenaho (2006) find a positive association demonstrating the association's complexity depends not only on the covariation of earnings changes with cash flow news but also on the covariation of earnings changes with the remaining components of realized stock returns. The common interpretation of firm-level findings is that higher earnings increase expected cash flows resulting in a positive association between

earnings changes and stock returns. At the aggregate level, inconsistent with firm-level findings, studies provide evidence of a weak, and in some cases, negative, simultaneous relationship between stock market returns and aggregate earnings changes. At the aggregate stock market level, existing literature suggests two points of view. On the one hand, Kothari et al. (2006) suggest that aggregate earnings changes are informational. Specifically, aggregate earnings changes are mostly unanticipated and correlated with value-relevant news that causes investors to revise their expectations about future cash flows and discount rates.

On the other hand, it is argued that aggregate earnings changes are non-informational. This view suggests that aggregate earnings changes provide little or no new value-relevant information and merely confirm investors' expectations (Sadka and Sadka 2009). Overall, previous literature suggests that earnings growth dispersion is applicable to predict financial events at both the firm and aggregate levels.

The other alternative measurement to predict future economic fluctuations is the stock return. The previous studies demonstrate stock market investors as a group of macro forecasters (Fama 1981; Fischer and Merton 1984; Barro 1990; Fama 1990). Based on their argument, stock market prices are related to investors' expectations of future overall economic activity. Konchitchki and Patatoukas (2014) investigate the usefulness of financial statement analysis based on accounting profitability data, emphasizing stock return from individual firms to take the pulse of the U.S. real economy. They provide evidence that the predictive ability of stock returns for future economic activity stretches over one year.

### 2.3. Accounting numbers dispersion and macroeconomic predictions

Many academic research studies put effort into the link between accounting data and nominal economic activity (Basu et al. 2010; Cready and Gurun 2010; Shivakumar 2010; Konchitchki 2011; Kothari, Shivakumar, and Urcan 2013; Konchitchki and Patatoukas 2013; Patatoukas 2013). The current investigation concentrates on the association between real GDP growth and accounting data. This line of literature provides mixed results. Early studies find some shreds of evidence about predictability in GDP growth restatements. Ball and Brown (1967) studied the association between an individual firm's earnings, competing in an industry, and all firms' earnings in the economy. They find that 35% to 40% of annual earnings variation can be associated with the variation of all firms' earnings, whereas 10% to 15% percent can be associated with the industry average. Mankiw and Shapiro (1986) conclude that restatements in real and nominal gross national product (GNP) growth estimates are unpredictable using initial GNP estimates, aggregate stock market returns, three-month Treasury bill rates, and lagged GNP growth estimates. In this regard, Bernstein (1993) indicates that the accrual system undertakes higher subjectivity degrees than the determination of cash flow.

Recent studies document restatement predictability, including; Faust et al. (2005) find that two-year (final) restatements in real quarterly GDP growth are not predictable (are predictable using the level of initial forecasts). Even other studies (Arnedo et al., 2007; Coppens & Peek, 2005) find that income decreasing actions are associated with private companies. Aruoba (2008) finds that three-year restatements in nominal and real GDP growth rates can be predicted using initially announced estimates, past restatements, and unemployment rates (the latter is a proxy for the business cycle stage). Furthermore, Trombetta and Imperatore (2014) find that, for analyzing the association between the business cycle and accounting information characteristics, the firms' situation, including financial distress, must be taken into full consideration; for this purpose, they indicate that the dynamics of financial crises and business cycles are not

---

entirely consistent. They also find that as the financial crisis's intensity becomes more severe, managers are more likely to employ earnings management practices.

Konchitchki and Patatoukas (2013) find that financial statement analysis of firm profitability drivers applied at the aggregate level yields timely insights relevant to forecasting real economic activity. They show that accounting profitability and stock return data aggregated across the one hundred largest firms have predictive content for subsequent real Gross Domestic Product (GDP) growth. Navarro-García and Madrid-Guijarro (2016) explore a relationship between economic conditions and financial reporting in a continental European country such as Spain. They also evidence that such a relationship may be weaker in the case of non-listed firms. Kalay et al. (2016) show that earnings dispersion and conditional dispersion relate to unemployment and industrial production, and aggregate stock returns.

Furthermore, they show that conditional dispersion predicts economists' forecast errors who forecast unemployment and industrial production. They also highlight that dispersion and conditional dispersion have separate, additive relations with the macroeconomy. Nallareddy and Ogneva (2017) investigate whether earnings growth dispersion contains information about labor reallocation trends, unemployment change, and, ultimately, aggregate output. They find that initial macroeconomic estimates released by government statistical agencies do not fully incorporate this information. Consequently, earnings growth dispersion predicts future restatements in nominal and real GDP growth (and unemployment change) in the in-sample and out-of-sample tests.

Further, they find statistically and economically significant effects on monetary policy prescriptions and banking regulation. Present literature concerning GDP estimates suggests that early GDP estimates are partly based on acquired data from prior periods. The precision of estimates and early GDP figures can be enhanced by analyzing accurate data related to any co-vary indicators with aggregate output. Taken together, evidence on GDP restatement predictability in emerging economies, specifically, the Iran market, is missing, furthermore presented documents in this line of literature according to the previous conclusion, internationally, is mixed. In current empirical tests, we control the previously documented predictability to establish whether aggregate earnings growth dispersion and stock return dispersion are incrementally applicable in forecasting GDP restatements.

### **3. Research Methodology and Sample Selection**

#### **3.1. Bayesian and Classical multilevel models**

The current paper's statistical employed models include Classical and Bayesian methods, leading to the accurate exploration of facts or phenomena and perhaps new results.

#### **3.2. Sample selection**

We applied quarterly GDP and unemployment data from the real-time data set for macroeconomists maintained by Iran's Statistical Center (SCI). We adjust GDP growth rates to represent seasonally by percentage. Accounting numbers are collected from the Securities and Exchange Organization's database between 2004 and 2015. The paper's sample includes 170 firms listed on the Tehran stock exchange market. The exclusive features imply; companies are not sub-industry of the financial intermediation, holding, and banks industries. This is because such companies differ in terms of the nature of the activities and the classification of financial statements compared with other companies.

---

<sup>2</sup> <https://www.codal.ir>

The stock trading of companies should not be completely stopped during the research period. Companies have been listed on the Tehran Stock Exchange since the beginning of 2004. All required research data for those companies will be available and during the research period. Furthermore, the justification for the chosen period is data availability.

### 3.3. Earnings, employment, and Returns effects on GDP growth Predictors

#### 3.3.1. Earnings Growth dispersion

Dispersion in aggregate earnings growth is measured in four steps, similar to Nallareddy and Ogneva (2017) and Kalay et al. (2016). First, we estimate annual earnings changes (ChEarn) for each firm  $i$  and year  $t$  as follows:

$$ChEarn_{i,t} = \frac{(Earn_{it} - Earn_{i,t-4})}{BV_{it-1}} \quad (1)$$

$Earn_{it}$  ( $Earn_{i,t-4}$ ) is realized earnings for firm  $i$  in year  $t$  ( $t-4$ ), and  $BV_{it-1}$  is the book value of equity for firm  $i$  at the end of year  $t-1$ .

Second, we estimate aggregate earnings changes (AggChEarn) for year  $t$  is an equal-weighted average of firm-level earnings changes:

$$AggChEarn_t = \frac{1}{N_t} \sum_{i=1}^{N_t} ChEarn_{it} \quad (2)$$

Where  $ChEarn_{it}$  is as previously defined, and  $N_t$  is the number of firms in year  $t$ . Third, we estimate aggregate earnings changes dispersion (AggEarDisp) for quarter  $t$  as:

$$\sqrt{\frac{1}{N_t} \sum_{i=1}^{N_t} (ChEarn_{it} - AggChEarn_t)^2} \quad (3)$$

Where  $AggChEarn_t$ ,  $ChEarn_{it}$ , and  $N_t$  are as previously defined.

Fourth, we are interested only in the new information contained in earnings dispersion that is not fully incorporated into macroeconomic estimates. Therefore, the earnings growth dispersion measure,  $Ear\_Disp_t$ , is the innovation in aggregate earnings changes dispersion. We estimate it as a residual from the AR (2) model:

$$AggEarDisp_t = \rho_0 + \rho_1 AggEarDisp_{t-1} + \rho_2 AggEarDisp_{t-2} + e_t, \quad (4)$$

Where  $AggEarDisp_t$ ,  $AggEarDisp_{t-1}$ , and  $AggEarDisp_{t-2}$  are aggregate earnings changes dispersion estimates for years  $t$ ,  $t-1$ , and  $t-2$ , respectively;  $Ear\_Disp_t$  is equal to the residual  $e_t$ . To avoid any look-ahead bias, we estimate the model on a rolling basis, using all observations prior to and including year  $t$ .

#### 3.3.2. Dispersion in Employment Growth

Aggregate employment growth dispersion (EmpG\_Dis) is based on annual employment data for the 3 economy super sectors reported by the SCI. We first calculate quarterly growth (year-over-year) in employment for each sector. Then we estimate employment growth dispersion as a standard deviation in these sectoral employment growth estimates. Finally, we remove the persistent component of the series. Specifically, the employment growth dispersion measure,  $EmpG\_Disp$ , is the residual from the AR (2) model. We estimate the model on a rolling basis, using all observations prior to and including year  $t$ .

We estimate the following yearly cross-sectional regressions, where  $i$  and  $t$  subscripts correspond to firms and years, respectively (the  $t$  subscript for coefficients is omitted):

$$EmpG\_Disp_t = \alpha + \beta_1 ChEarn_{i,t-1} + \beta_2 ChEarn_{i,t-2} + \beta_3 EmpGr_{i,t-1} + \beta_4 EmpGr_{i,t-2} + \beta_5 Ret_{i,t-1} + \beta_6 Ret_{i,t-2} + \varepsilon_{i,t} \quad (5)$$

$EmpGr_{i,t}$  is employment growth rate from year  $t-1$  to year  $t$ ;  $ChEarn_{i,t}$  changes in annual earnings from year  $t-1$  to year  $t$ , scaled by book value at the end of year  $t-1$ ; and  $Ret_{i,t}$  is the annual stock return for calendar year  $t$ .

### 3.3.3. Dispersion in Stock Returns

Aggregate return dispersion (Ret\_Disp) is estimated using equations (2), (3), and (4) after replacing earnings changes with stock returns for the year. Aggregate return dispersion is autocorrelation-adjusted and represents a residual from the AR (2) model. We estimate the model on a rolling basis, using all observations prior to and including quarter  $t$ .

### 3.3.4. Alternative GDP Restatement Predictors

The main analysis of the current paper investigates whether earnings growth dispersion can predict GDP growth restatements after controlling for different expected GDP growth benchmarks, including the initially released GDP estimates (Initial\_est) for year  $t$ , the GDP growth estimate for year  $t-1$ , revised by the year  $t$ , initial GDP release date (Est <sub>$t-1$</sub> ). We include some expanded regressions control for several additional variables that prior literature identifies as restatement predictors. In contrast, the employed model of Nallareddy and Ogneva (2017) has not taken into account other influential factors in real economic activities, therefore due to domestic findings of Zeinali and Bahadin (2013) and Behboodi et al. (2010) and Nazari and Barzgardovin (2015), demonstrating a significant impact of fluctuation in exchange and inflation rate, amount of annual export and import, and oil price on GDP growth, we indicate following variables in order to consider their effect in the statistical models, which are as follow; annual growth of oil price (A\_OP), annual growth of export and import goods and services (A\_EGS) and (A\_IGS) which contain related data to GDP. We include exchange (A\_EX) and inflation (A\_INF) rates annually to control for their effects. In GDP (unemployment) prediction regressions, the GDP announcement date is used. We control aggregate stock market return (Mkt\_Ret)—the equal-weighted average return on all stocks in the sample in a given year—for year  $t$  and the two prior years because it is a leading economic indicator. Prior research finds that macroeconomic forecasts do not fully incorporate the information in simple aggregated earnings (e.g., Konchitchki and Patatoukas 2014; Kothari et al. 2013).

Nevertheless, we include a lagged innovation in aggregate earnings changes (Eart-1) as an additional control variable. Eart-1 is the AR (2) residual from a rolling expanding-window regression (4), where AggEarDisp is replaced with AggChEarn from equation (2). Most restatement predictors, including GDP growth, are estimated using publicly available information by the end of quarter  $t$ . The quarter  $t$  employment growth dispersion, prior-quarter macro estimates, and initial macroeconomic estimates are available to economists when the initial GDP estimates for quarter  $t$  are announced. The purpose of including these variables is to rule out alternative explanations for the link between earnings growth dispersion and future restatements.

## 3.4. Earnings Growth Dispersion on GDP Growth

### 3.4.1. Predicting GDP Growth Restatements

This section investigates whether such publicly available data is fully incorporated within initially announced GDP estimates. The initially announced estimate represents a forecast of the final estimate plus error:

$$\text{GDP final}_t = \alpha + \beta \text{ Initial est}_t + \varepsilon \quad (6a)$$

If the initially announced estimate is an unbiased predictor of the final estimate, then the coefficients from estimating (6a) using OLS should be  $\alpha=0$  and  $\beta=1$ . To test whether the initial estimate is fully incorporated within information about earnings dispersion, we can evaluate the following regression:

$$\text{GDP final}_t = \alpha + \beta_1 \text{ Ear Disp}_{t-1} + \beta_2 \text{ Initial est}_t + \varepsilon_t, \quad (6b)$$

On the condition that the error in the initially announced estimate is associated with



earnings growth dispersion. Therefore the coefficient  $\beta_1$  should be significantly contrasting from zero. The final model, for answering the question; whether earnings growth dispersion contains information about the final GDP estimate, which is also incremental to other known GDP expectation benchmarks or restatement predictors, we can estimate a full regression specification considering (real and nominal) GDP estimates:

$$\begin{aligned} \text{GDP final} = & \alpha + \beta_1 \text{ Ear Disp}_{t-1} + \beta_2 \text{ Initial est}_t + \beta_3 \text{ EmpG\_Disp}_{t-1} & (6c) \\ & + \beta_4 \text{ Ret\_Disp}_{t-1} + \beta_5 \text{ Est}_{t-1} + \beta_6 \text{ A\_OP}_t + \beta_7 \text{ A\_EGS}_t + \beta_8 \text{ A\_IGS}_t \\ & + \beta_9 \text{ A\_E}_t + \beta_{10} \text{ A\_INF}_t + \beta_{11} \text{ Mkt\_Ret} + \varepsilon_t, \end{aligned}$$

Where labor reallocation proxies include Ear\_Dispt-1 (earnings growth dispersion for fiscal year t-1 earnings that are released in year t), EmpG\_Dispt-1 (employment growth dispersion for year t-1), and Ret\_Dispt-1 (dispersion in year t-1 returns); the final GDP growth expectation benchmarks include Initial\_estt (the initially announced real or nominal GDP growth for the quarter I), Estt-1 (a revised GDP growth estimate for the quarter t-1 contained in the quarter t initial GDP release), Other control variables are discussed in the former section. It is noted that we analyzed both real and nominal GDP growth to obtain the association in this context. Since previous investigations report the results of a regression that is equivalent to (6c), which has the GDP restatement (i.e., GDP\_final – Initial\_est) on the left-hand side, in respect to be consistent with prior research on macro restatement prediction, specifically, we estimate the following regression model considering (real and nominal) GDP estimates:

$$\begin{aligned} \text{GDP\_Restatement}_t = & \alpha + \beta_1 \text{ Ear Disp}_{t-1} + \beta_2 \text{ Initial est}_t & (6d) \\ & + \beta_3 \text{ EmpG\_Disp}_{t-1} + \beta_4 \text{ Ret\_Disp}_{t-1} + \beta_5 \text{ Est}_{t-1} + \beta_6 \text{ A\_OP}_t \\ & + \beta_7 \text{ A\_EGS}_t + \beta_8 \text{ A\_IGS}_t + \beta_9 \text{ A\_E}_t + \beta_{10} \text{ A\_INF}_t + \beta_{11} \text{ Mkt\_Ret} + \varepsilon_t, \end{aligned}$$

Where GDP\_Restatement<sub>t</sub> is the restatement in nominal and real GDP growth for quarter<sub>t</sub> (equal to GDP\_final – Initial\_est). All coefficient estimates in (6d) equal their equivalents in (6c).

## 4. Empirical Results

### 4.1. Descriptive statistics

Table 1 reports descriptive statistics. The Table suggests that the mean (median) of nominal of real final GDP growth (Final NGDP t and Final RGDP t) are respectively 33.39 (6.6) and 247.6 (210). Furthermore, these indexes of nominal and real GDP\_Restatement are 127.26 (-15) and -55.85 (-280). Finally, the initial GDP growth (Initial NGDP t and Initial RGDP t) are respectively 60.73 (-7.5) and 302.56 (290). Both the mean and median of all variables are statistically significant. The results are economically significant. Moreover, it is observed that the sign of Initial NGDP growth is changed. Specifically, the nominal GDP growth estimates switch signs from negative to positive, which are -7.5 (Initial\_NGDP t) and 290 (Initial RGDP t). Overall, the shift of GDP's growth, their extent ranges, and the variability of sign between the nominal and real initial GDP values suggest that the initial GDP restatements are economically significant. Other descriptive statistics of variables are presented in the following Table (1).

The coefficients above (below) the diagonal are the Pearson (spearman) correlation. The coefficients in bold are significant at the 0.05 level. The other coefficients are not significant at the 0.05 level. The sample is based on the years 2004 through 2015 and consists of 2040 firm-year observations from non-financial and non-utility industries. The results are presented in Table (2).

**Table 1.** Descriptive statistics of variables

Variable	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
Final NGDP	-341.6	-58.8	6.6	33.39	73.5	546.9
Final RGDP	-660	0	210	247.6	450	1230
NGDP Restatemen	-870	-130	-15	-27.26	90	760
RGDP Restatemen	-480	-340	-280	-55.85	130	1320
Initial_NGDP	-217.2	-60.2	-7.5	60.73	55.3	811.2
Initial_RGDP	-320	-90	290	302.5	720	790
Est	-800	-200	0	47.43	100	1600
EarnDisp	-17.785	-7.763	0	-1.127	0	400.763
EmpGDispr	-342.1	-205.3	-19.3	5.7	192.2	421.3
RetDisptr	-78.16	-27.79	-11.49	-7.04	0	911.42
Oil price	-486	-90	132	87.49	283	403
Exports goods and services	-253	-26	0	-16.47	35	120
Imports goods and services	-231	-187	-18	-44.37	30	99
Exchange Rate	10	35	53	127.7	118	734
Inflation Rate	-575	-237	138	66.5	419	734
Mkt_ret	-283	-25	175.5	197.5	442	634

#### 4.2. The classical regression results for employment changes determinants

Table 3 includes the result of the regression model selection of this study. For this purpose, the Chow test is applied to examine and choose between fixed effect and ordinary least square models. In this regard, results suggest that the fixed effect model is preferred. According to the Chow test, the fixed-effect model, including the time effect, is preferred. Next, using ALC, BIC, and LogLik tests, we chose fixed effects and fixed effects, including time effect models. The results suggest that the fixed effect is favorable to examine the models of this study.

After selecting the appropriate model to test this study's model, the Dickey-Fuller test is applied to test residuals' durability. According to the results, it is suggested that the residuals are durable. Durbin-Watson test is used to examine the correlation between the errors of the model. The results show a serial correlation between errors. Thus the generalized fixed effects model is applied to fix this problem. It is noticed that the results of other classic assumptions provide that the selected model is proper to test the hypothesis. According to the above results, the generalized fixed effect model is used to test the equation (5).

The results of empirical analyses indicate that only employment growth predictors are significantly associated with future employment growth. In contrast, earnings changes and stock returns are not statistically related to future employment growth. Therefore, current employment growth is incrementally useful in predicting employment growth for two years ahead. The findings of Nallareddy and Ogneva (2017) evidence that all three predictors—earnings changes, employment growth, and stock returns—are significantly associated with future employment growth.

#### 4.3. The classical regression results for earnings growth dispersion and GDP restatement

Table 5 includes the result of the regression model selection of this study. For this purpose, the Chow test results show that the fixed effect model is proper, and the fixed effect model, including the time effect, is not preferred. Next, by using the Hausman test Ols model is determined. Finally, Godfrey test results demonstrate no serial autocorrelation between the model's errors. According to the results, the fixed-effect model is used to test the equation (6c) after controlling for the initial real GDP.

Table 2. Pearson and Spearman correlations of variables

Variables	Final NGDP t	Final RGDP t	RGDP Restatement t	NGDP Restatement t	earnDispt-1	Initial_NGDP t	Initial_RGDP t	EmpGDisprt-1	RetDisprrr-1	Est t-1	oil price	Exports	Imports	Exchange Rate	Inflation Rate	Mkt_ret t
Final NGDP t	1	0.247	0.609	0.884	0.004	-0.387	-0.257	-0.579	-0.038	-0.289	-0.604	-0.031	0.260	-0.083	-0.322	0.079
Final RGDP t	0.365	1	0.211	0.237	-0.007	-0.120	0.594	-0.355	-0.018	-0.079	-0.070	0.353	0.580	-0.404	-0.425	-0.148
RGDP Restatement t	0.436	0.595	1	0.478	-0.009	-0.158	-0.461	-0.260	-0.028	-0.068	-0.656	-0.039	-0.032	0.070	-0.613	-0.121
NGDP Restatement t	0.741	0.294	0.364	1	0.025	-0.829	-0.089	-0.471	-0.002	-0.340	-0.414	0.010	0.004	0.085	-0.111	0.257
EarnDispt-1	-0.005	0.069	0.132	0.037	1	0.115	0.094	0.027	0.436	0.054	0.144	0.145	0.159	-0.108	-0.134	0.058
Initial_NGDP t	-0.239	-0.039	0.077	-0.692	-0.040	1	0.062	0.565	0.135	0.445	0.315	0.013	0.189	-0.124	-0.141	-0.160
Initial_RGDP t	-0.086	0.438	-0.420	-0.194	0.001	0.054	1	-0.101	0.011	-0.009	0.662	0.438	0.682	-0.524	0.221	-0.025
EmpGDisprt-1	-0.553	-0.016	-0.226	-0.598	0.003	0.221	0.037	1	0.093	0.278	0.295	-0.297	-0.314	0.230	0.088	0.213
RetDisprrr-1	-0.054	0.043	0.104	0.023	0.157	-0.042	0.102	0.024	1	0.079	0.207	0.155	0.164	-0.107	-0.096	0.160
Est t-1	-0.297	-0.290	0.150	-0.327	-0.003	0.247	-0.207	0.464	0.023	1	-0.120	0.445	-0.283	0.249	-0.405	-0.095
oil price	-0.400	0.229	-0.535	-0.534	-0.025	0.261	0.712	0.084	0.063	0.103	1	0.092	0.483	-0.424	0.441	0.222
Exports	0.036	0.216	0.107	0.106	-0.034	0.016	0.167	-0.519	0.035	0.176	0.454	1	0.362	-0.118	-0.454	-0.061
Imports	0.322	0.547	-0.027	0.132	-0.022	0.261	0.598	-0.462	-0.004	-0.102	0.517	0.642	1	-0.739	0.079	0.119
Exchange Rate	-0.010	-0.468	0.052	0.021	0.005	-0.131	-0.525	-0.052	0.033	0.162	-0.261	0.024	-0.540	1	-0.199	0.066
Inflation Rate	-0.153	-0.296	-0.780	-0.278	-0.023	0.024	0.232	0.074	0.018	-0.386	0.546	-0.192	-0.003	-0.080	1	0.467
Mkt_ret t	0.205	-0.143	-0.308	0.228	-0.028	-0.203	-0.079	0.199	0.061	-0.105	0.369	-0.030	0.075	0.106	0.467	1

**Table 3.** The regression test selection

Test	Statistics	P-value	H <sub>0</sub> Hypothesis	Results
F-limer	0.311	1.000	Priority of Ols	Priority of Ols
F-limer	-7.861	1.000	The priority of Ols (IET )	The priority of Ols (IET <sup>3</sup> )
Kolmogorov-Smirnov	0.691	0.000	Priority of Ols	Priority of Gls
Durbin-Watson	1.616	0.000	Priority of Ols	Priority of Gls
Dickey - Fuller	-12.943	0.010	Non-durable	Durable
Test	AIC Test	BIC Test	LogLik Test	Results
OLS	-7331	-7289	3674	Priority of Ols (IET )
Ols (IET )	-103179	-103089	51606	Priority of Ols (IET )

**Table 4.** The estimated results by applying Gls regression model of equation 5

Variables	Value	Std.Error	T-value	P-value
(Intercept)	0.000	5.835	0.000	1.000
Chearn <sub>t,t-1</sub>	0.031	0.062	0.507	0.612
Chearn <sub>t,t-2</sub>	0.011	0.054	0.201	0.840
EmpGri <sub>t,t-1</sub>	0.191	0.017	11.436	0.000*
EmpGri <sub>t,t-2</sub>	0.124	0.017	7.074	0.000*
Ret <sub>t,t-1</sub>	0.000	0.123	0.003	0.997
Ret <sub>t,t-2</sub>	0.036	0.131	0.278	0.781
Residual standard error:	74.27 on 1963 degrees of freedom			
Multiple R-squared:	0.8983			
Adjusted R-squared:	0.8974			

**Table 5.** The regression test selection

Test	Statistics	P-value	H <sub>0</sub> Hypothesis	Results
F-limer	31.148	0.000	Priority of Ols	Priority of Ols
F-limer	31.148	0.000	Priority of Ols (IET )	Priority of Ols
Hausman	2750.000	0.000	The priority of random effect	Priority of Ols
Godfrey	7.564	0.006	there is no serial correlation	Priority of Gls

Table 6 is presented to determine the proper statistical model for testing equation (6c) after controlling for the initial nominal GDP. Finally, it suggests that the fixed effect is the best statistical model to determine the association.

**Table 6.** The regression test selection

Test	Statistics	P-value	H <sub>0</sub> Hypothesis	Results
F-limer	-3.9599	1	Priority of Ols	Priority of Ols
F-limer	-3.9599	1	The priority of Ols	The priority of Ols
Kolmogorov-Smirnov	0.68497	0	Priority of Ols	Priority of Ols
Durbin-Watson	1.5863	0.2565	Priority of Ols	Priority of Ols
Dickey – Fuller	-28.827	0.01	Non-durable	Durable
Test	AIC Test	BIC Test	LogLik Test	Results
OLS	-74036.05	-73964.76	37032.02	Priority of Ols
Ols (IET )	-74036.05	-73964.76	37032.02	Priority of Ols

Table 7 presents the results of regressing earnings growth dispersion and other predictors on GDP growth estimates. The coefficient and p-value of Earndisp<sub>t-1</sub>, which are -0.009 and 0.915, suggest no association between earning growth dispersion and nominal GDP final. In contrast, reported results in real GDP final columns with the coefficient and p-value of Earndisp<sub>t-1</sub>, which are -0.0278 and 0.000, at 0.05 level, suggest a negative association. It means that the real GDP final is predictable using earnings growth dispersion. The findings align with Nallareddy and Ogneva (2017) results, indicating a negative association between given variables in this context. The

<sup>3</sup> Including Effect of Time

reported findings in Table 7 suggest that after considering control variables, we can comprehend earning dispersion in former years also has predictive information to allocate change in real GDP final. Comparing real and nominal GDP results specify that earnings growth dispersion provides a forecasting feature for only real GDP. Therefore the effect of firms accounting numbers results in real GDP.

**Table 7.** the estimated results by applying Gls regression model of equation (6c)

Variables	Final nominal GDP results					Final real GDP results				
	Estimate	Std. Error	T-value	Pr(> t )		Estimate	Std. Error	T-value	Pr(> t )	
Intercept	86.916	3.124	27.824	0.000	*	164.143	15.409	10.652	0.000	*
EarnDispt-1	-0.009	0.080	-0.107	0.915		-0.537	0.307	-1.748	0.081	*
EmpGDispr-1	-0.396	0.017	-23.289	0.000	*	-0.278	0.060	-4.637	0.000	*
RetDispr-1	-0.065	0.031	-2.128	0.000	*	0.101	0.118	0.852	0.394	
Initial_GDPt	-0.109	0.009	-12.677	0.000	*	0.649	0.024	26.775	0.000	*
Est t-1	0.113	0.004	30.071	0.000	*	-0.044	0.014	-3.053	0.002	*
A_OPt	-0.789	0.014	-56.472	0.000	*	-0.778	0.055	-14.152	0.000	*
A_EGSt	-0.757	0.035	-21.839	0.000	*	0.119	0.128	0.927	0.354	
A_IGSt	2.073	0.044	47.119	0.000	*	0.973	0.138	7.035	0.000	*
A_Et	0.197	0.015	12.810	0.000	*	-0.365	0.050	-7.338	0.000	*
A_INFt	0.168	0.008	20.893	0.000	*	-0.502	0.030	-16.490	0.000	*
Mkt_ret t	0.313	0.009	36.744	0.000	*	0.426	0.028	15.167	0.000	*
R <sup>2</sup>	0.911					0.700				
Adjusted R <sup>2</sup>	0.910					0.698				

Further analyses evidence that employment fluctuation (EmpGDispr<sub>t-1</sub>) is negatively associated with GDP final. It supports the idea of indicating the change in labor reallocation leads to a change in GDP final. The results also suggest that the sign of Initial\_GDP<sub>t</sub> differs in real and nominal GDP, suggesting that the initial GDP estimate is taken into account by statistic analyzers in the final GDP.

Further results of other control variables are presented in Table 7. The results are robust for the main analysis. By and large, the provided results are consistent with the idea that macroeconomists do not fully consider the informativeness of earnings growth dispersion.

#### 4.4. The classical regression results for forecasting GDP restatements

Table 8 includes the result of the regression model selection of this study. For this purpose, the Chow test is applied, and the results show that the fixed effect model is preferred. Next, it is the Ols model that is determined by the Hausman test. Finally, Godfrey test results demonstrate the serial autocorrelations between the model's errors. Thus, the general last square model is applied to fix the problem.

**Table 8.** The regression test selection

Test	Statistics	P-value	H <sub>0</sub> Hypothesis	Results
F-limer	34.65700	0.00000	Priority of Ols	Priority of Ols
F-limer	34.65700	0.00000	Priority of Ols (IET )	Priority of Ols
Hausman	853.31000	0.00000	The priority of random effect	Priority of Ols
Godfrey	4.54400	0.03303	there is no serial correlation	Priority of Gls

Table 9 also are presented to determine a proper statistical model for testing equation (6d) for adjusted nominal (final) GDP growth. Finally, it suggests that the fixed effect is the best statistical model to determine the association.

**Table 9.** The regression test selection

Test	Statistics	P-value	H <sub>0</sub> Hypothesis	Results
F-limer	-1.4874	1	Priority of Ols	Priority of Ols
F-limer	-1.4874	1	The priority of Ols	The priority of Ols
Kolmogorov-Smirnov	0.69146	0	Priority of Ols	Priority of Ols
Durbin-Watson	1.9124	0.06762	Priority of Ols	Priority of Ols
Dickey - Fuller	-22.743	0.01	Non-durable	Durable
Test	AIC Test	BIC Test	LogLik Test	Results
OLS	-84136.54	-84065.25	42082.27	Priority of Ols
Ols (IET )	-84136.54	-84065.25	42082.27	Priority of Ols

**Table 10.** the estimated results by applying Gls regression model of equation (6d)

Variables	Real GDP restatement results					Nominal GDP restatement results				
	Estimate	Std. Error	T-value	Pr(> t )		Estimate	Std. Error	T-value	Pr(> t )	
Intercept	168.4152	15.5738	10.8140	< 2e-16	*	85.6801	3.1356	27.3250	0.0000	*
EarnDispt-1	-0.5450	0.3104	-1.7560	0.0792		-0.0087	0.0804	-0.1080	0.9138	
EmpGDIspr-1	-0.2597	0.0606	-4.2860	0.0000	*	-0.4028	0.0171	-23.5810	0.0000	*
RetDisptr-1	0.1004	0.1192	0.8420	0.3998		-0.0655	0.0309	-2.1230	0.0339	*
Initial_GDPt	-0.3563	0.0245	-14.5380	0.0000	*	-1.1082	0.0086	-128.9950	0.0000	*
Est t-1	-0.0422	0.0146	-2.8830	0.0040	*	0.1119	0.0038	29.7490	0.0000	*
A_OPt	-0.7868	0.0556	-14.1560	0.0000	*	-0.7795	0.0140	-55.5870	0.0000	*
A_EGSt	0.1390	0.1299	1.0710	0.2845		-0.7625	0.0348	-21.9180	0.0000	*
A_IGSt	1.0581	0.1398	7.5710	0.0000	*	2.0433	0.0442	46.2780	0.0000	*
A_Et	-0.3521	0.0503	-6.9980	0.0000	*	0.1906	0.0154	12.3500	0.0000	*
A_INFt	-0.4884	0.0308	-15.8620	0.0000	*	0.1568	0.0081	19.4350	0.0000	*
Mkt_ret t	0.4185	0.0284	14.7360	0.0000	*	0.3161	0.0085	37.0240	0.0000	*
R <sup>2</sup>	0.7027					0.9700				
Adjusted R <sup>2</sup>	0.7009					0.9699				

Table 10 presents the results of eq. 6d. Among all regression specifications, lagged earnings growth dispersion does not significantly forecast the adjusted GDP growth restatements after controlling for nominal and real initial GDP restatement. The findings mean that both the nominal and real GDP restatements are not predictable using earnings growth dispersion. Consequently, there is no link between earnings growth dispersion and final real (nominal) GDP restatements, which is not illustrated by final GDP changes. In this regard, Nallareddy and Ogneva (2017) find a predictive role of earnings growth dispersion for nominal and real GDP restatements. Their findings are inconsistent with this study finding in this way. Taken together, the findings suggest that government bodies still do not fully incorporate this information in reported restatements because no association is obtained from the presented results. Overall, the results are not consistent with the hypothesis that earnings growth dispersion is incorporated with GDP restatements because earnings growth dispersion does not affect GDP restatements.

#### 4.5. Bayesian results

The one-level Bayesian tests lead to a calculation of 4000 numerical repetitions to achieve convergence and estimate of later samples. The possibility to calculate this volume of transactions and repeated numbers seems far-fetched to achieve a reasonable estimate or correct covariance for the investigation that uses Gypsum and Metropolis-Hastings sampling methods. Thus, in this study, we test the hypothesis using NUTS sampling algorithms run in the default package of STAN and by a statistical package of BRMS in R software that can compute the complex models with fewer than a thousand repetition number (transaction). The equations (6c) and (6d) are presented in table 11 by

applying a Bayesian multilevel correlation.

Table 11 the estimated results by applying Bayesian multi-level of equations (6c) and (6d)

Variables	Final nominal GDP results			Final real GDP results			Real GDP restatement			Nominal GDP restatement		
	-95%	U-95%	P value	-95%	U-95%	P value	-95%	U-95%	P value	-95%	U-95%	P value
Intercept	80.66	92.76	0.00	135.76	194.31	0.00	139.18	198.87	0.00	79.08	91.55	0.00
EarnDispt-1	-0.22	0.12	0.58	-1.05	0.27	0.25	-1.09	0.26	0.23	-0.22	0.12	0.58
EmpGDispr-1	-0.43	-0.36	0.00	-0.40	-0.16	0.00	-0.38	-0.15	0.00	-0.44	-0.37	0.00
RetDispr-1	-0.12	0.00	0.05	-0.14	0.32	0.45	-0.15	0.32	0.45	-0.12	0.00	0.05
Initial_GDPt	-0.13	-0.09	0.00	0.60	0.70	0.00	-0.40	-0.31	0.00	-1.12	-1.09	0.00
Est t-1	0.11	0.12	0.00	-0.07	-0.02	0.00	-0.07	-0.01	0.00	0.10	0.12	0.00
A_OP <sub>t</sub>	-0.81	-0.76	0.00	-0.88	-0.67	0.00	-0.90	-0.68	0.00	-0.81	-0.75	0.00
A_EGS <sub>t</sub>	-0.83	-0.69	0.00	-0.12	0.38	0.32	-0.11	0.41	0.25	-0.83	-0.70	0.00
A_IGS <sub>t</sub>	1.99	2.16	0.00	0.70	1.24	0.00	0.77	1.32	0.00	1.96	2.13	0.00
A_Ex <sub>t</sub>	0.17	0.23	0.00	-0.46	-0.27	0.00	-0.45	-0.25	0.00	0.16	0.22	0.00
A_INF <sub>t</sub>	0.15	0.18	0.00	-0.56	-0.44	0.00	-0.55	-0.43	0.00	0.14	0.17	0.00
Mkt_ret t	0.30	0.33	0.00	0.37	0.48	0.00	0.36	0.48	0.00	0.30	0.33	0.00

---

The 4000 number repeat chain calculates the research model to obtain convergence and late Sampler Estimation. This model is examined by applying the NUTS estimator algorithm. According to the above explanations, the test hypotheses' results using Bayesian models, similar to the former section, despite the p-value less than 0.05 level, show no significant relationship between earnings growth dispersion and all GDP reports (including nominal and real GDP final and restatements). Furthermore, the p-values less than 0.05 level of  $EmpGDispr_{t-1}$  in all equations reveal that labor reallocation is statistically associated with GDP statements, which means that the labor market has predictive content for GDP restatements. A different result is a consequence of more accurate analyses of Bayesian methods.

Overall, it is recommended that most, the empirical results of Bayesian models are similar to classic regression results (except earnings growth dispersion effect). Besides, the Bayesian method results besides its benefits mentioned former, which indicate their more credibility than classic models, are similar to classical regression methods, resulting in the robustness of the findings.

## 5. Conclusion and Discussion

Economists regard that one of the most indicative economic indexes for an economy's health is GDP growth. Because GDP fluctuation predictions, directly or indirectly, are recognized as a decision-making indicator by public institutions, private entities, stock market investors and analyzers, and governments' bodies, importantly. The only information provider, in this regard, in which publishing credible and reliable forecasts is the Statistic Center of Iran organization as part of the survey of professional forecasters, presenting the consensus required by professional macroeconomic experts—extending the unexplored line of literature linking Financial Statements Information to the macroeconomy and, more specifically, upon the paper of (e.g., Konchitchki and Patatoukas, 2013, 2014; Ball and Sadka, 2015; Nallareddy and Ogneva, 2017). This article provides an innovative way of forecasting the aggregate GDP growth by Iranian companies by investigating the predictive information in listed firms' earnings data in the Tehran stock exchange market.

The results of classical regression document that, at the firm level information, earnings growth dispersion based on accounting numbers have no predictive ability to determine the GDP growth estimates used in macroeconomic papers. In contrast, further analyses provide that, similar to (Nallareddy and Ogneva, 2017), after controlling the effect of other influential factors, at the macro level, earnings growth dispersion contribute to predicting GDP growth estimates in which government bodies and statistical information providers do not fully take into account this information. Moreover, Bayesian analyses provide contradictory findings suggesting no significant predictive effect of earnings growth dispersion on GDP growth estimates. The main reason for the distinct results refers to the accuracy of Bayesian regression methods. Further findings suggest that both the nominal and real GDP Restatements are not predictable when applying earnings growth dispersion. It is the notion that both statistical methods confirm the findings in this context.

Since the idea of investigating the association between firms' profitability variables to macroeconomic performance has only been developed in recent years, existing literature on this issue is still limited. Notably, such a study has not been conducted in Iran's economy. Therefore, this article is the first to investigate this geographical area. Furthermore, provided findings contribute to governmental bodies to provide more accurate estimations by considering firm-level information. Therefore accounting numbers may lead to practical and useful information for meta-programming of



countries' futures.

Opportunities for future works emerge from the limitations of this study. The unexplained macroeconomic content of firm-level details would further scrutinize the association between accounting disclosures and the macroeconomic indicators, including employment allocation. This paper only provides evidence about the effect of firm-level information on the macro-level economy. However, the correlation might be applicable in the opposite direction, with the GDP growth estimate as an indicator of predicting entities' profitability. An important limitation of this research is that listed firms' financial statements in the Tehran stock exchange are stated annually. If quarterly discloser was available, we might precede more accurate results.

Moreover, there is no control for the industry because of the applied sample selection method, which consists of 170 companies. Therefore it seems pretty small to permit subsamples of industry. Hence, future research could base their work on a more extended sample.

## References

- Abarbanell, J. and Bushee, B. (1998). Abnormal Returns to a Fundamental Analysis Strategy. *The Accounting Review*, 73(1), 19-45. <https://www.jstor.org/stable/248340>
- Aruoba, S.B. (2008). Data revisions are not well behaved. *Journal of Money, Credit, and Banking*, 40(2-3), 319-340. <https://www.jstor.org/stable/25096254>
- Baker, S. Bloom, N. and Davis, S.J. (2015). What triggers stock market jumps?. *Work in progress presented at the January ASSA meetings*.
- Ball, R. and Brown, P. (1967). An Empirical Evaluation of Accounting Income Numbers. *Journal of Accounting Research*, 6(2), 159-178. <https://doi.org/10.2307/2490232>
- Ball, R. and Sadka, G. (2015). Aggregate Earnings and Why They Matter. *Journal of Accounting Literature*, 34, 39-57. <https://doi.org/10.1016/j.acclit.2015.01.001>
- Basu, S. Markov, S. and Shivakumar, L. (2010). Inflation, earnings forecasts, and post-earnings announcement drift. *Review of Accounting Studies*, 15(2), 403-440. <https://link.springer.com/article/10.1007/s11142-009-9112-9>
- Behboodi, D. Motefakerazad, M.A. and Rezazadeh, A. (2010). The effect of oil price fluctuation on growth domestic product (GDP). *The reviews of economic energy*, 6(20), 1-31. (In Persian)
- Bernstein, L. (1993). *Financial statement analysis*. Homewood, IL: Irwin.
- Bloom, N. (2009). The Impact of Uncertainty Shocks. *Econometrica*, 77(3), 623-685. <https://doi.org/10.3982/ECTA6248>
- Bloom, N. Max, F. Nir, J. and Itay. S.T. (2014). Really Uncertain Business Cycles. *Econometrica*, 86(3), 1031-1065. <https://doi.org/10.3982/ECTA10927>
- Coppens, L. and Peek, E. (2005). An analysis of earnings management by European private firms. *Journal of International Accounting, Auditing & Taxation*, 14(1), 1-17. <https://doi.org/10.1016/j.intaccudtax.2005.01.002>
- Cready, W.M. and Gurun, U.G. (2010). Aggregate market reaction to earnings announcements. *Journal of Accounting Research*, 48(2), 289-334. <https://www.jstor.org/stable/40784950>
- Fairfield, P.M. and Yohn, T.L. (2001). Using asset turnover and profit margin to forecast changes in profitability. *Review of Accounting Studies*, 6(4), 371-385. <https://link.springer.com/article/10.1023/A:1012430513430>
- Fama, E.F. (1981). Stock returns, real activity, inflation, and money. *American Economic Review*, 71(4), 545-565. <https://www.jstor.org/stable/1806180>
- Faust, J. Rogers, J.H. and Wright, J.H. (2005). News and noise in G-7 GDP

- announcements. *Journal of Money, Credit and Banking*, 37(3), 403-419. <https://www.jstor.org/stable/3839161>
- Jorgensen, B. Li, J. and Sadka, G. (2012). Earnings dispersion and aggregate stock returns. *Journal of Accounting and Economics*, 53 (1-2), 1-20. <https://doi.org/10.1016/j.jacceco.2011.06.001>
- Kalay, A. Nallareddy, S. and Sadka, G. (2016). *Macroeconomic Activity Under Uncertainty: How Firm-Level and Aggregate-Level Uncertainties Interact*. Columbia University.
- Kazerooni, S.A. and Sajudi, S. (2011). Investigation of the effect of uncertainty in trading relation on Iran's economic growth. *The economic reviews*, 45(90), 119-139.
- Konchitchki, Y. (2011). Inflation and nominal financial reporting: Implications for performance and stock prices. *The Accounting Review*, 86(3), 1045–1085. <https://www.jstor.org/stable/23045567>
- Konchitchki, Y. and Patatoukas, P.N. (2013). Accounting earnings and gross domestic product. *Journal of Accounting and Economics*, 57(1), 76-88. DOI: [10.1016/j.jacceco.2013.10.001](https://doi.org/10.1016/j.jacceco.2013.10.001).
- Kothari, S.P. Shivakumar, L. and Urcan, O. (2013). Aggregate earnings surprises and inflation forecasts. *SSRN Electronic Journal*, DOI: [10.2139/ssrn.2194122](https://doi.org/10.2139/ssrn.2194122)
- Lev, B. and Thiagarajan, R. (1993), Fundamental information analysis. *Journal of Accounting Research*, 31(2), 190-215. <https://doi.org/10.2307/2491270>
- Mankiw, N.G. and Shapiro, M.D. (1986). News or noise? An analysis of GNP revisions. *Survey of Current Business*, 66(5), 20-25. [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=344767](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=344767)
- Mensi, W. Hussain, S.J. Hammoudeh, S.S. and Al-Yahyaee, K.H. (2018). Asymmetric impacts of public and private investments on the non-oil GDP of Saudi Arabia. *International Economics*, 156, 15-30. Doi: [10.1016/j.inteco.2017.10.003](https://doi.org/10.1016/j.inteco.2017.10.003)
- Nallareddy, S. and Ogneva, M. (2017). Predicting Restatements in Macroeconomic Indicators using Accounting Information. *The Accounting Review*, 92(2), 151-182. [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2444014](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2444014)
- Navarro-García, J.C. and Madrid-Guijarro, A. (2016). Real economic activity and accounting information in Spanish construction and real estate firms. *Spanish Accounting Review*, 19(1), 21–30. <https://doi.org/10.1016/j.resar.2014.10.002>
- Nazari, M.R. and Barzgardovin, M. (2015). Investigating the Impact of Inflation on Growth in Iran Economy. *Iranian Journal of Trade Studies quarterly*, 19(73), 145-170. (In Persian)
- Nissim, D. and Penman, S.H. (2001). Ratio analysis and equity valuation: From research to practice. *Review of Accounting Studies*, 6(1), 109–154. <https://link.springer.com/article/10.1023/A:1011338221623>
- Ou, J. and Penman, S. (1989). Financial statement analysis and the prediction of stock returns. *Journal Of Accounting And Economics*, 11(4), 295-329. [https://doi.org/10.1016/0165-4101\(89\)90017-7](https://doi.org/10.1016/0165-4101(89)90017-7)
- Penman, S. (1992), return to fundamentals, *Journal of Accounting, Auditing, and Finance*.
- Patatoukas, P.N. (2012). Customer-base concentration: Implications for firm performance and capital markets. *The Accounting Review*, 87(2), 363–392. <https://www.jstor.org/stable/23245608>
- Patatoukas, P.N. (2013). Detecting news in aggregate accounting earnings: Implications for stock market valuation. *The Review of Accounting Studies* (forthcoming). DOI: [10.1007/S11142-013-9221-3](https://doi.org/10.1007/S11142-013-9221-3).
- Sharifi-Renani, H. and Mirfatah, M. (2012). The Impact of Exchange Rate Volatility on

- 
- Foreign Direct Investment in Iran. *Procedia Economics and Finance*, 1, 365-373. [https://doi.org/10.1016/S2212-5671\(12\)00042-1](https://doi.org/10.1016/S2212-5671(12)00042-1)
- Shivakumar, L. (2010). Discussion of aggregate market reaction to earnings announcements. *Journal of Accounting Research*, 48(2), 335–342. <https://www.jstor.org/stable/40784951>
- Soliman, M.T. (2008). The use of DuPont analysis by market participants. *The Accounting Review*, 83(3), 823–853. <https://www.jstor.org/stable/30244502>
- Trombetta, M., and Imperatore, C. (2014). The dynamic of financial crises and its nonmonotonic effects on earnings quality. *Journal of Accounting and Public Policy*, 33(3), 205–232. <https://doi.org/10.1016/j.jaccpubpol.2014.02.002>
- Zeinali, Q.Z. and Bahadin, N. (2013). Investigation of real exchange rate on growth domestic product (GDP) and agricultural export. *Agricultural economy*, 6(3), 97-119. (In Persian).
-