

Do Aggregate Earnings Components Predict GDP Growth Better? An International Setting Comparison

Sari Atmini^{1,*}, and Sumiyana Sumiyana²

¹Faculty of Economics and Business, Universitas Brawijaya

²France Faculty of Economics and Business, Universitas Gadjah Mada

Abstract. This study investigates the usefulness of aggregate accounting earnings and their components to predict GDP growth. This study shows evidence that net income, net operating income, other comprehensive income, and net income change at aggregate level could predict GDP growth. This study splits sample into developed and developing countries. Almost all of aggregate earnings components could predict GDP growth in developed countries. On the contrary, only other comprehensive income and net income growth could predict it in developing countries. Moreover, sensitivity analysis shows evidence that the predictive power of accounting numbers are more consistently found in developed countries. It implies that all economic activities of firms listed in developed countries' stock exchanges fully reflect to that of macro economy. This reflection is better than those of in developing countries. We infer that the value relevance of accounting earnings and their disaggregation have reached not only in the capital markets but also in the national macroeconomy level. Indeed, this prediction seems dominantly to be accurate in developed countries only.

1 Introduction

If aggregate earnings as the bottom line can predict GDP growth [1], aggregate earnings components should also. Earnings disaggregation provides additional explanatory power [2]. It implies that each earnings component provides different information relevance. This study investigates the predictive value of aggregate earnings components to GDP growth.

Earnings informativeness studies at macroeconomy level take the position of "micro to macro" by investigating the relation between accounting and macroeconomic data [3]. The underlying argument is that corporations represent a substantial part of macroeconomy so that their aggregate activities affect it [4]. Aggregate corporate earnings are closely correlated with macroeconomy and affect each other [5]. Studies that associate aggregate corporate earnings and macroeconomic activity are still very limited in quantity [5]. Yet, such studies are important because empirical findings at the firm level may not necessarily be used as a basis to draw inferences about earnings informativeness at macro level [6].

* Corresponding author: sari.atmini@mail.ugm.ac.id

This study differs from previous studies in two important ways. First, it investigates the predictive ability of aggregate earnings components. Previous studies [1, 3] have major shortcomings for not distinguishing earnings before extraordinary items from net income. It can potentially weaken inferences drawn because extraordinary items are non-recurring items that can be ignored in making future earnings forecasts [7]. This study investigates recurring and non-recurring earnings components separately and hypothesizes aggregate earnings components can predict GDP growth. Research findings confirm the hypotheses.

Second, this study is conducted in an international setting. This study suspects that earnings ability to predict GDP growth is merely accurate in developed countries, not in developing countries. This suspicion arises due to the limited number of companies listed in developing countries' stock exchanges. This results in doubts about aggregate corporate earnings' ability in reflecting macroeconomic activity in those countries. This study investigates the predictive power of aggregate earnings and their components at macro-economic level in developed and developing countries, and expects aggregate earnings predictive ability in developed countries is better than those in developing countries. The findings confirm this expectation and emphasize the importance of contextual factors.

The main contribution of this study is, first, to verify the robustness of the test results showing that aggregate earnings are able to predict GDP growth [1, 3]. The findings of this study show incremental relationship between accounting earnings and their disaggregation with GDP growth. Second, contribution from the importance of international setting factors point of view, namely developed and developing countries contexts. Context consideration is extremely important because it results in different research findings.

2 Literature review and hypotheses development

2.1 Accounting earnings and GDP

GDP is an indicator of a country's economic progress [8], which measures current economic activity [9] and reflects the performance of the economy [10]. GDP value can be estimated either using value-added, income, or expenditure approaches [11]. Accounting earnings relate both indirectly and directly with GDP. Indirect linkage occurs because accounting earnings is a primary indicator of economic trends. It is supported by two macro theories: creative destruction [12] and sectoral shifts [13] theories. Both theories basically suggest that productivity at the firm level influences the dynamics of aggregate productivity growth at macro level. This implies that firm level accounting earnings, representing firm's productivity, are related to macro level income reflected in GDP. Meanwhile, direct linkage could be explained by the income approach [17]. According to this approach, GDP is a reflection of the whole income generated by firms and households in a particular country [11]. Accounting earnings are numbers that reflect firms' net income. Firms listed on a country's stock exchange represent a substantial portion of the country's macroeconomy. Previous research provides empirical support for the relation between accounting earnings and GDP [1, 3] which implies that aggregate accounting earnings growth is the primary indicator of incremental growth in nominal and real GDP. This study hypothesizes aggregate net income (H_{1a}) and its change (H_{1b}) affect GDP growth positively.

2.2 Disaggregating Accounting Earnings Components

Earnings components are informative and have predictive power [2]. This study disaggregates earnings into net operating income, non-operating net income, other

comprehensive income, total expenses, and depreciation expenses. Net operating income and non-operating net income represents recurring and non-recurring items. Different transactions and events underlying these two items result in different predictive ability [7]. Permanence level of net operating income is higher than non-operating net income [18]. Based on stochastic processes, differences in permanence level of earnings components lead to differences in their predictive ability [19]. The more permanent is the earnings components, the stronger the predictive ability. This study believes in logical reasoning that the predictive ability of net operating income is different from non-operating net income. Meanwhile, accounting earnings aggregation of all firms listed on a country's stock exchange are expected to reflect the country's GDP. Consequently, this study investigates differences in the ability of both items to predict GDP growth, and hypothesizes aggregate net operating income (H_{2a}) and its change (H_{2b}) as well as aggregate non-operating net income (H_{3a}) and its change (H_{3b}) affect GDP growth positively.

Net income has dirty surplus components or other comprehensive income. It is transitory and should not have direct implications for firm's future operating performance. Because it represents changes in fair value of the statement of financial positions accounts, other comprehensive income reflects changes in firm value. Firm value is related to firm's ability to generate future income. If certain accounts related to other comprehensive income are realized, such as sales of assets, settlement of liabilities, or funding of pension plans, there will be an association between other comprehensive income and future firm's performance and cash flows as well. Accordingly, this study hypothesizes aggregate other comprehensive income (H_{4a}) and its changes (H_{4b}) affect GDP growth positively.

Income approach estimates GDP through total domestic income of various production factors including compensation and payments [11]. Compensation and payments are total expenses recognized by a firm. Total expenses are economic benefits sacrificed by a firm to generate revenues. So, it can be inferred that firm's total expense may reflect firm's ability to generate revenues. On the contrary, from the counter party point of view, total expenses of a particular firm are a reflection of revenues generated by counter party. In macroeconomy level, aggregation of total expenses of all firms listed on stock exchange reflects income of the country. Based on this logical reasoning, this study hypothesizes aggregate total expenses (H_{5a}) and its changes (H_{5b}) affect GDP growth positively.

Depreciation expenses are allocation of fixed assets costs to the periods of the assets' economic life. Recognition of depreciation expenses are related to the use of fixed assets in a firm's production process and operational activities to generate revenues. It means that depreciation expenses can be used to predict firm's revenues. This logical reasoning is supported by previous research which states that depreciation expenses is one of the components to estimate GDP based on income approach [11]. This study hypothesizes aggregate depreciation expenses (H_{6a}) and its changes (H_{6b}) affect GDP growth positively.

3 Research Method

3.1 Population, sample, and unit of analysis

The population is 215 countries (<http://data.worldbank.org/indicator/NY.GDP.MKTP.CD>) while the sample is 73 countries (35 developed and 38 developing countries). Developed and developing countries are classified based on economic conditions of a country according to Development Policy and Analysis Division (DPAD) of Department of Economic and Social Affairs of the United Nations Secretariat (UN/DESA) ([www.un.org/en/development/.../2014wesp_country_classification.pdf](http://www.un.org/en/development/desa/policy/2014wesp_country_classification.pdf)) and the level of the country's GDP according to The Worldbank (<http://data.worldbank.org/indicator/NY.GDP.MKTP.CD>). In

this study, developed countries are developed economies according to DPAD UN/DESA and high income nations according to The Worldbank. Developing countries are developing economies according to DPAD UN/DESA and upper middle income, lower middle income, or low income nations according to The Worldbank. The unit of analysis is the nation-year.

3.2 Data and variables

This study uses 2004-2014 data, excluding 2007-2009 data to minimize bias due to 2008 economic crisis. This study obtains accounting data from OSIRIS database available at Gadjah Mada University, Indonesia (<https://osiris.bvdinfo.com>), and GDP data from The Worldbank website (<http://data.worldbank.org/indicator/NY.GDP.MKTP.CD>). Dependent variable is subsequent year GDP growth (GDP_{it+1}). Independent variables are aggregate net income (NI_{it}), aggregate net operating income (OI_{it}), aggregate non-operating net income (NO_{it}), aggregate other comprehensive income (OCl_{it}), aggregate total expenses (EXP_{it}), and aggregate depreciation expenses (DEP_{it}). Accounting earnings and its disaggregation are measured in level and change. Control variable is current year GDP growth (GDP_{it}).

3.3 Hypotheses tests

This study analyzes data with multiple linear regression analysis using these equations:

$$GDP_{it+1} = \alpha + \beta_1 NI_{it} + \beta_2 GDP_{it} + \varepsilon_{it} \quad (1)$$

$$GDP_{it+1} = \alpha + \beta_1 OI_{it} + \beta_2 NO_{it} + \beta_3 OCl_{it} + \beta_4 GDP_{it} + \varepsilon_{it} \quad (2)$$

$$GDP_{it+1} = \alpha + \beta_1 EXP_{it} + \beta_2 DEP_{it} + \beta_3 GDP_{it} + \varepsilon_{it} \quad (3)$$

Three equations are used as certain independent variables are conceptually correlated. This study measures accounting numbers in level and change. Those equations are for level model. For change model, independent variables are measured as previous year difference.

3.4 Sensitivity tests

This study considers international setting to explore contextual differences between developed and developing countries by splitting the sample into two subsamples. Moreover, to obtain more comprehensive conclusions, this study undertakes two sensitivity tests. The first test adds one and two previous-year GDP growth (GDP_{it-1} , GDP_{it-2}) to each regression equation. The second test divides research period into three subperiods, i.e. pre-crisis (2004-2006), crisis (2007-2009), and post-crisis (2010-2013) subperiods.

4 Results and Discussions

4.1 Hypotheses test results and discussions (overall sample)

Hypothesis test obtains significant results for aggregate net income (t-stat. = 3.06, p-value < 0.01), aggregate net operating income (t-stat. = 1.96, p-value < 0.05), aggregate other comprehensive income (t-stat. = 3.26, p-value < 0.01) and aggregate net income change (t-stat. = 2.74, p-value < 0.01) and supports H_{1a} , H_{2a} , H_{4a} , and H_{1b} . Net income, net operating income, and other comprehensive income at aggregate level are predictors of subsequent year GDP growth. These findings confirm previous findings [1, 3] and provide empirical evidence of the informativeness of earnings and their components in macroeconomy level.

These findings are also consistent with [2] and [20] that earnings components provide additional information and are important in predicting and expecting future performance.

This study is unable to find any predictive ability of aggregate non-operating net income (t-stat.=1.37, p-value=0.17). The most likely reason is that it is non-recurring with low permanence level. This finding confirms [19] that permanence level of earnings component affects predictive ability and consistent with the expectation that the predictive ability of non-operating net income differs from that of net operating income. This study fails to document predictive abilities of aggregate total expenses (t-stat.=0.36, p-value=0.72) and aggregate depreciation expenses (t-stat.= -0.88, p-value=0.38). Indeed, the coefficient sign of aggregate depreciation expenses is not consistent with prediction, although statistically insignificant. Depreciation expense is a non-cash expense. Its recognition does not lead to revenue recognition by other party. Yet, its recognition will decrease economic value of assets, implying a decrease in production capacity of the assets. Meanwhile, research findings indicate aggregate earnings components changes lack of additional information.

4.2 Subsamples test results and discussions

To explore the influence of developed and developing countries contextual differences, this study examines these subsamples separately. In developed countries, test obtains significant results for aggregate net income (t-stat.=3.77, p-value<0.01) and its change (t-stat.=2.89, p-value < 0.01), aggregate net operating income (t-stat.= 2.37, p-value<0.05), and its change (t-stat.=2.72, p-value<0.01), aggregate non-operating net income (t-stat.=2.33, p-value < 0.05), aggregate other comprehensive income (t-stat.=2.81, p-value<0.01) and its change (t-stat.=2.37, p-value<0.05), and aggregate total expense change (t-stat.=3.3, p value<0:01). This study reconfirms to support H_{1a} , H_{2a} , H_{3a} , H_{4a} , H_{1b} , H_{2b} , H_{4b} , and H_{5b} . In developing countries, test gets significant results for aggregate other comprehensive income (t-stat. = 1.98, p-value<0.05) and aggregate net income changes (t-stat.=1.68, p-value<0.1), supports H_{4a} and H_{1b} . The results show stronger predictive power in developed countries in both models. These findings reemphasize the importance of contextual factors consideration.

Most firms in developed countries are listed on stock exchange so that their activities reflect macroeconomic activity of the country. In developing countries, the number of firms listed on stock exchanges is still very limited. Moreover, compared to developed countries, underground economy level is higher while macroeconomic-related regulations and institutions are still less-established. Currencies of developing countries often depreciate while ability to anticipate the shock tends to be weak. These developing country-specific conditions result in higher economic uncertainty level. Under high economic uncertainty, macroeconomic indicators prediction is almost impossible and assumed to be nil [21].

4.3 Sensitivity test results and discussions

Results of first sensitivity test (not reported) with GDP_{it} and GDP_{it-1} are consistent with subsamples test results for each subsample and both models. Sensitivity test results with GDP_{it} , GDP_{it-1} , and GDP_{it-2} (not reported) also show consistent results, except for level model of developed countries. In developing countries, only aggregate net income change and aggregate other comprehensive income that can predict GDP growth. Current year GDP growth is a factor that has consistent predictive power of subsequent year GDP growth. These results reemphasize that the predictive power of aggregate net income and its components to GDP growth is higher in developed countries. In developing countries, current year GDP growth is the best predictor of subsequent year GDP growth.

Results of second sensitivity test are not reported but discussed. Pre-crisis test results support H_{4a} , H_{4b} , and H_{5a} for developed countries, but none for developing countries. Crisis subperiod test results support H_{1a} , H_{2a} , H_{1b} , H_{2b} , H_{3b} , H_{4b} , and H_{6b} for developed countries and H_{1b} and H_{6b} for developing countries. Post-crisis test results support H_{1a} , H_{2a} , H_{1b} and H_{2b} for developed countries and H_{1b} and H_{2b} for developing countries. The findings show the predictive power of aggregate net income and its components occurs sporadically among subperiods, with a higher level of consistency is found in developed countries.

Current year GDP growth is consistently able to predict subsequent year GDP growth in developing countries. Special caution should be given to economic crisis subperiod as the relationship sign of these variables is negative. In developed countries, current year GDP growth cannot predict subsequent year GDP growth especially in crisis and post-crisis subperiods. In both subperiods, aggregate net income and its components are generally able to predict subsequent year GDP growth. Sensitivity test results confirm previous findings that the power of aggregate net income and its components in predicting GDP growth of developed countries is higher than that of developing countries. Besides, current year GDP growth is the best predictor of subsequent year GDP growth for developing countries.

5 Concluding remarks

In general, this study finds evidence concerning with the informativeness of aggregate accounting earnings and their components at macroeconomy level. The results support the notion that earnings components provide additional information and are important to be considered in predicting future performance. The power of aggregate net income and its components in predicting GDP growth is documented to be higher in the context of developed countries than in developing countries. Although hypotheses test results for the overall sample support the findings of previous studies [1, 3], the sensitivity test results do not fully agree with their conclusions. The conclusions of both studies can be applied in developed countries context, but not in developing countries. This study demonstrates the importance of contextual factors, which are ignored in previous research [1, 3].

This study has two major limitations. First, it only tests GDP growth prediction for one year ahead so that it cannot give any conclusions about forecast horizons of aggregate net income and its components. Second, it does not consider the quality of aggregate earnings.

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