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VALUE RELEVANCE OF OTHER COMPREHENSIVE INCOME

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Standard setters have in the past decades favored a new income measure based on fair value accounting; other comprehensive income. In the ongoing, rather ambiguous, discussion there are arguments and empirics both supporting and disagreeing with the usefulness of other comprehensive income. Critique from many practitioners argue that other comprehensive income is not as useful as first argued by IASB, but rather misleading and complex. In an attempt to add more conclusive empirical results to this discussion the aim of this thesis is to examine the association between other comprehensive income and stock price. The sample consist of quarterly data between 2009 and 2013 for 126 European companies and 282 American companies. Due to the recent implementation of other comprehensive income in Europe an effort has been made to manually gather all the available data for the years reported. Two models are developed based on the residual income valuation (RIV) model and the Fama French three factor model, referred to as the redefined RIV model and the five factor model. The redefined RIV model shows a small association between other comprehensive income and stock price, however, this effect appears to depend on the composition of other comprehensive income. Items such as translation differences and cash flow hedges seem to decrease the overall value relevance. The five factor model shows no association between other comprehensive income and stock return after controlling for the standard risk factors. In conclusion, the results do not support any association between other comprehensive income and stock price signifying a relative low usefulness compared to net income, especially for practitioners in the financial markets. In line with our conclusions, in June 2014, the IASB announced a statement, which proposed a change of direction back to the profit and loss statement to be the primary information source. As of now, the development appears to take a turn and shifting the focus from other comprehensive income back to the traditional accounting measures.

Keywords: Comprehensive income, Fama French three factor model, FASB, IASB, other comprehensive income, residual income valuation model, RIV, value relevance.

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ACF	Autocorrelation function
AR	Autoregressive
ARMA	Autoregressive moving average model
BE/ME	Book-to-market
BV	Book value of equity
CAPM	Capital asset pricing model
CI	Comprehensive income
CPS	Comprehensive income per share
CSO	Common shares outstanding
CSR	Clean surplus relation
d	Net dividend
EPS	Earnings (net income) per share
FASB	Financial Accounting Standards Boards
FX	Foreign Exchange
GAAP	General Accepted Accounting Principles
HML	High minus low (BE/ME)
HOMLO	High OCI-return minus low OCI-return
HRMLR	High ROE minus low ROE
IAS	International Accounting Standard
IASB	International Accounting Standards Board
IFRS	International Financial Reporting Standards
MA	Moving average
ME	Market value of equity
MEBE	Market-to-book
NI	Net income
OCI	Other comprehensive income
P	Share price
P&L	Profit and loss (statement)
PACF	Partial autocorrelation function
PVED	Present value of expected dividends
q	Permanent measurement bias
R_OCI	OCI-return
r_E	Required return on equity
r_f	Risk free rate
RI	Residual income
r_m	Excess market return
r_M	Market return
Rm-Rf	Excess market return
ROE	Return on equity
RIV	Residual income valuation model
SMB	Small minus big (size)

1 INTRODUCTION

As a step towards establishing global accounting standards, from 2005 and onwards mandatory appliance of International Financial Reporting Standards (IFRS) was introduced for all listed companies in the EU. The IFRS, issued by the International Accounting Standards Board[1] (IASB), emphasizes the improvement of true and fair representation of financial position and performance of a firm. This implied an extended usage of the "fair value" measurement concept. In addition to fair value measures used in the balance sheet, the IFRS recently extended the concept to the income statement requiring disclosure of the unrealized changes in fair value not included in net income to be reported in an additional section called the financial statement of comprehensive income. The bottom line is a company's comprehensive income (CI) and the difference between comprehensive income and net income is referred to as other comprehensive income (OCI).

While IASB has required application of OCI only since 2009, the US Financial Accounting Standards Board[2] (FASB) already issued FAS130 in 1997 on how to report OCI. A major reasoning behind reporting OCI is the shortcomings of the traditional income statement. Markets rely heavily on the income statement for valuation and income measures are used extensively by investors for assessing performance. Although the traditional income statement provides users with information about a company's past profitability and earnings growth, it remains object for manipulation in respect of timing and recognition of income and expenses. Thus, in order to improve comparability, consistency and transparency of financial reporting, FASB has emphasized OCI as an alternative financial analysis tool. OCI can be seen as an extended view of net income providing the users with detailed information regarding direct transactions to shareholders' equity that is either deemed to be not related to a company's core operations or overly volatile. In OCI these flows are specified in order to show a more holistic view of a company's operational drivers and other activities. In particular, OCI items are argued to reveal useful information about the amount of unrealized gains and losses which has not been disclosed but might have an impact on the firm's future performance.

A more diligent review of published articles and previous studies revealed that practitioners do not generally agree with the benefits of other comprehensive income. It is argued that other comprehensive income not necessarily adds more relevant information to the users, but instead adds complexity and confusion for users to interpret financial information. For instance, it opens up for the option to put certain items as OCI items and then recycle them to net income at a later point in time. The effect of such an option might undermine the credibility of net income, affect interpretations and valuations of businesses as well as give room to earnings management (Holt, 2014). Furthermore, it is argued to be a reporting structure mostly relevant for financial institutions which have a large amount of unrealized gains and losses that could impact on the firm's future performance. In that case other

[1] The IASB is a global independent organization established in 2001 with the aim to develop and approve IFRS. The vision of IASB is to develop global, high-quality accounting standards. Today, there are over 100 countries following the standards issued by IASB.

[2] The FASB is an independent organization providing standards of financial accounting in the US, known as the US GAAP.

comprehensive income could better reflect the financial institutions' investment management than traditional net income. Empirics have shown that comprehensive income of non-financial firms, where financial investment and other fair value measures are limited, does not prove to have more significant impact on a company's value than net income (Dhaliwal, Subramanyam, & Trezevant, 1999). Whilst the few studies within the field of comparing net income and comprehensive income show little evidence that comprehensive income is better in predicting value than net income, studies of fair value changes in specific OCI items indicated that some items are indeed value relevant (Barth, Beaver, & Landsman, 1996; Barth, 1994; Eccher, Ramesh, & Thiagarajan, 1996). As fair value accounting has become an increasingly popular measurement approach among standard setters, boards have increased the use of fair value accounting extensively the last years. However, no studies have been conducted on European data in which all the OCI items are included. Thus, additional studies reviewing the value relevance of other comprehensive income from this aspect is indeed motivated.

1.1 RESEARCH QUESTION, SCOPE AND THESIS STRUCTURE

Building on previous studies, this study aims to further investigate the value relevance of OCI by examining whether the additional OCI information (on top of net income) impacts stock value. For the first time since the implementation of IFRS in the EU, a significant amount of European data has been collected in order to examine the impact of OCI. By examining available European data with no limitation to specific industries, this paper adds additional insights to the true implications of IFRS and the use of OCI. The research question follows:

Is there any association between Other Comprehensive Income and Stock Price?

Value relevance is a commonly used term in evaluation of income measures' association with equity and stock market values. In general, the definition of the term is that an accounting amount is defined as value relevant if it has a statistically significant association with equity market values (Barth, Beaver, & Landsman, 2001). This paper intends to assess the value relevance of OCI from two different angles. First, the study will examine whether there is any association between OCI and stock price using a redefined version of the residual income valuation (RIV) model where OCI is incorporated. This redefined RIV model associates a firm's book value of equity and the residual income to current stock price. Second, in order to determine if changes in a firm's OCI-return are reflected in value changes, the Fama French three factor model (Fama & French, 1993) is extended into a five factor model with ROE and OCI-return added as additional explanatory variables.

This study is foremost an extension of Dhaliwal, Subramanyam & Trezevant (1999), which compared the association of net income and comprehensive income with stock price and stock return on American data. Regarding industry focus, the study of Dhaliwal, Subramanyam & Trezevant (1999) shows different results depending on the sample selection. The association between comprehensive income and stock price was significant for financial institutions but not for a sample of mixed industries[3]. With the continued implementation of IFRS and the last years' compulsory reporting of OCI recent European data has been gathered in order to

[3] Mixed industries is referred to as both financial and non-financial companies.

investigate the value relevance of OCI for European companies. Thus, by broadening the scope of which industries to include and the fact that two separate markets are analyzed and compared, this study challenge the previous results of OCI value relevance studies.

Scope and limitations

European and American large cap companies are examined on a quarterly basis during a period of four and a half years. The European data consist of 126 companies ranging from the third quarter in 2009 to the last quarter in 2013, whereas the American data consist of 282 companies extended one more quarter into March 2014. Even if no distinction on industry is made, both samples are dominated by industrial companies.

In terms of the research question, the study will not compare the two standards per se, i.e. details in the standards proposed by IASB and FASB will not be examined. Rather, if the characteristics of the results differ across markets, these differences might be attributable to differences in how specific OCI items are recognized and accounted for. As this study reviews OCI with a quantitative approach, it is more relevant to examine the impact of OCI rather than how individual standards have defined OCI. Furthermore, the differences between IASB and FASB are from the scope of our study negligible.

When deciding on the specific study design a few delimitations have been made in favor of simplicity and comparability. First, the limited availability of informative and easy accessible quarterly reports narrows our sample to large cap companies. Consequently, size related effects are not examined.

Moreover, specific OCI items are not tested in the study. The purpose of isolating a specific item is often related to only examine a specific industry where this item is common, e.g. studies on financial institutions tend to only analyze fair value changes related to loans and equity investments. Isolating specific OCI items can yield better results if noise is removed from other OCI items. The sample for this study has been intentionally chosen to include a range of different industries in order to increase the width of the study and examine the effect that the “total” other comprehensive income has on stock price. Instead, a more general discussion will be held around the possible effects resulting from different OCI items. Since this sample consists of mainly industrial companies, it might be a reasonable alternative approach to only look at e.g. foreign currency translation differences or cash flow hedges. However, it is deliberately decided to not break up OCI in order to get a more comprehensive view of the total effect.

The study is also limited by the theoretical boundaries of the RIV model. The model is often limited to a sample where companies with negative book value of equity are excluded. In a strict practical sense, these companies should add interesting insights of OCI and not be excluded. However, in order to keep simplicity in the applied models, no further efforts are made to understand how distressed companies are affected.

Thesis structure

The paper is structured as follow. In section 2 the study is motivated by presenting a background review over fair value accounting, comprehensive income, IASB and FASB as well as previous studies done in the field of value relevance of accounting earnings measures. Section 3 describes the method used to assess the value relevance of OCI. In section 4 descriptive statistics of the data is presented. Potential data biases will also be discussed in this section. The empirical results are described and analyzed in section 5 followed by a summary and conclusion in section 6.

2 Development and empirics of other comprehensive income

This section serves as an introduction to concepts related to this study and is structured around the topics of OCI and fair value accounting. First, the fair value accounting, as the underlying accounting method for OCI, will be presented. Thereafter, the concept of OCI is introduced, followed by a presentation of the two standards, IASB and FASB, presented and contrasted against each other. Finally, this section will end with highlighting the main critiques against OCI as well as presenting the empirical studies conducted within the topic of OCI and fair value accounting.

2.1 From reliability and historical cost accounting to relevance and fair value accounting

The income measures of comprehensive income and other comprehensive income are based on fair value accounting; an accounting method that has gained popularity in the past decades compared to traditional historical cost accounting. While historical cost accounting, as its name suggests, implies keeping books at historical costs, fair value accounting measures assets and liabilities at estimates of current market values. There has been a transition towards timely recognition of value changes of assets and liabilities as well as towards a more fair value-driven financial accounting system. The transition to fair value accounting has implications on global business as it affects investment choices and management decisions. The Wall Street crash in 1929 was blamed to be an effect of dubious fair value accounting practices, which resulted in fair value practices to be banned by the U.S. Securities and Exchange Commission from the 1930s through the 1970s. However, in the past decades, fair value accounting has regained its popularity. The accounting boards have increased their focus on fair value accounting arguing for that fair value information provides more relevant information, although not being as reliable as conservative historical cost accounting (Ramanna, 2013). The boards are struggling with the balancing act between the relevance and reliability of the financial statements - two qualities that are necessary for the presentation of useful information to investors and users - where none should trump the other. Irrelevant but reliable information or relevant but unreliable information are equally useless (IASB and FASB meeting, 2005). Although there seem to be doubts on and possible negative consequences of using fair value accounting, both the IASB and FASB continue to impose usage of fair values in measuring accounts such as derivatives and hedges, employee stock options and financial assets. The standard setters argue that fair values better reflect reality than historical cost accounting and provide users with complete and forward-looking information. The underlying idea for FASB to use fair values is that fair value represents an ideal market price since it incorporates all information available to market participants. Thus, fair value information should provide financial users with more complete, relevant and faithfully representable information as a basis for decision-making (Ramanna, 2013).

2.1.1 THE RATIONALE BEHIND FAIR VALUE ACCOUNTING

According to the IASB Framework, the objective of financial statements is to provide users with information about the financial position, performance and changes in financial position of an enterprise that is useful in decision-making processes[4]. Given that financial statements should provide relevant and forward-looking information for the users in decision-making, the relevance-driven fair value concept is a better tool than historical cost accounting. However, the financial crisis in 2008 brought the discussion to light again as skepticism once again sparked towards the consequences of advantageous fair value practices, the added complexity and undermined reliability of accounting information (Holt, 2014; Biddle & Choi, 2006). For instance, individual judgment involved in the decision of fair values gave space for managers to manipulate earnings and recognize fair value gains to improve executive bonus bases.

Nevertheless, both boards are convinced that all fair value changes in assets and liabilities should be disclosed in the financial statements as the changes have economic impact. The fair value adjustments affect earnings measures and act as a basis for management evaluation since the management is responsible for holding certain assets and liabilities. However, the question of whether the fair value changes should be included in net income or comprehensive income remains unsettled. Neither IASB nor FASB have any strong justifications for having some gains and losses reported in the P&L statement while others are not (Bertoni & De Rosa, 2013).

Ramanna (2013) attempted to find the explanation to why standard setters support fair value accounting when they know the consequences that such estimates might bring. She argued that the belief in fair value might be influenced by finance theories (such as market efficiency) dominating in the 1980s and 1990s, which resulted in the change of opinions on fair value accounting and historical cost accounting. Since the financial market was perceived as efficient, prevailing prices used for fair value measures are considered reliable (Ramanna, 2013). However, when market prices are not available, a problem occurs and individual judgment has to be considered, which undermines reliability. Another explanation, suggested by the study of Allen & Ramanna (2012), indicates that the increased usage of fair value accounting is a direct effect of individual standard setters. By examining the background and the nature of standards proposed by the individual standard setters in the FASB, the study showed evidence that standard setters with a background in financial services[5] tended to propose standards favoring relevance in expense of reliability, thus, they had a higher tendency to propose methods using fair value accounting. The fact that there were no individuals with a financial services background in the FASB back in 1993, but has now increased to more than a quarter of the board, further supports this explanation (Allen & Ramanna, 2012).

[4] Information in financial statements should be useful and satisfy the need of a wide range of users. However, since equity investors are the main users, financial statements should primarily satisfy their information need. In particular, information regarding the performance and profitability of an enterprise is important, since such information is required in events such as assessing potential changes in resources likely to affect a firm's future performance, predicting cash flow capacity and forming judgments about the effectiveness of an enterprise to employ additional resources.

[5] Financial services referring to investment banking or investment management.

2.2 THE INCEPTION OF OTHER COMPREHENSIVE INCOME

The FASB issued SFAS 130 already in 1997, requiring all companies in the US to report comprehensive income. Comprehensive income is defined by FASB as "*the change in equity [net assets] of a business enterprise during a period from transactions and other events and circumstances from non-owner sources. It includes all changes in equity over a period except those resulting from investments by owners and distributions to owners*". Comprehensive income is the net income adjusted with OCI items that is reported in the equity section of the balance sheet and in the statement of changes in equity. OCI items include, among others, foreign currency translation adjustments, actuarial gains and losses on defined benefit pension plans, revaluations of property, plant and equipment as well as changes in fair value of financial instruments. OCI items are unrealized fair value changes that do not meet the requirements to be included in the P&L. Also, all the tax effects that occur due to the OCI items are required to be disclosed within the actual statement of comprehensive income or in the referred notes. Thus, the company possesses some liberty in reporting these tax effects. It could either be reported for each individual OCI item net of the related tax effects or with a single aggregate income tax expense or benefit that relate to all OCI items.

The decision to include OCI in the financial statements is argued to provide a more complete presentation of information for users' decision-making process by increasing the overall relevance of the financial statements, especially compared to the traditional accounting measures of performance in historical cost accounting (Bradshaw & Sloan, 2002). Since investors tend to prefer "pro-forma"-earnings such as EBIT (earnings before interest and taxes) and EBITDA (earnings before interest, taxes, depreciation and amortization) in performance evaluations, these financial measures have in one sense replaced the traditional use of net income as the major performance indicator. Empirical evidence suggests that these pro-forma measures have a strong and increasing association with stock prices in the US capital markets, while there has been a decline in the value relevance of earnings measure provided in accordance with GAAP, such as net income (Bradshaw & Sloan, 2002). Comprehensive income has been introduced to regain the relevance of the bottom line by including adjustments for changes in unrealized fair values.

OCI increases the transparency of valuable information regarding unrealized fair value gains and losses that might have an impact on a corporation's present and future operations. There are several examples of such events coming to the public attention just in the past years. One of them took place in 2005 when both United Airlines and Delta Airlines filed for bankruptcy which caused billions of pension liabilities to be defaulted and taken over by the US government (Maynard, 2005; Hargreaves, 2005). The fact that the pension liabilities were unrealized made the companies inattentive to the threat until it was too late to handle in a reasonable manner. Another example is when General Motors in 2008 were confronted with their employee benefit schemes which had caused huge liabilities to build up in accumulated OCI somewhat hidden from the profit and loss. The sheer size of these liabilities became too large to handle, not to mention repay, when the financial crisis hit, which played a big role in the bankruptcy of General Motors (Hoogervorst, 2014). Although unrealized, these deficits had a real impact on the companies, driving some of them to bankruptcy. Thus, the information from OCI could indeed have a great impact on a company's performance. The

Chairman of IASB, Hoogervorst (2014), concluded his statement with: "*Unrealized does not mean unreal*", stressing the importance of using OCI but also warns for the danger of assuming that unrealized liabilities are somehow less real.

2.3 OTHER COMPREHENSIVE INCOME UNDER IASB AND FASB

The IASB proposed in 2006 that all non-owner changes in equity should be presented in the financial statement. The proposition initiated several projects which led to the decision of more items being presented in OCI than previously included in net income, some of these changes were suggested in *IFRS 9 Financial Instruments* and *IAS 19 Employee Benefits*. The proposition of OCI became effective for European companies during 2009. A few years before, leading up to this in 2009, the IASB and FASB recognized the increased importance of reporting OCI in a similar manner, thus, the boards decided to work together in an effort to issue still separate but convergent guidelines for reporting OCI. The changes were argued to improve the comparability of the financial statements. As an aim to align the two boards and improve the usefulness and comparability of the two standards, the IASB and FASB have since 2002 formally collaborated towards the goal of converging global accounting standards (IFRS, 2011). Together the two standard setters have worked on improving the quality of the standards and at the same time reducing the differences between the two standard setters (FASB, 2012).

A long-term goal of the IASB and FASB is to merge the two standards, thus, in general the two standard setters are aligned regarding the presentation of the OCI items. However, there are still some minor differences. For instance, according to US GAAP all the OCI items are recognized as an accumulated one line item on the balance sheet (suggestively *Accumulated other comprehensive income/loss*), while according to IFRS all the OCI items are split up and referred to under the corresponding line item on the balance sheet. Other differences in OCI are more related to detailed applications. For example, in determining defined benefit plans, IFRS has an asset ceiling which acts as an upper limit on what is allowed to be recognized as a defined benefit asset (KPMG's Global IFRS Institute, 2013). No such restrictions exist in the US GAAP. Moreover, while the IFRS requires the value changes in strategic equity investments to go through OCI, the US GAAP will require value changes in all equity investments to go through profit and loss. Under the IFRS standard, some changes in fair value are required to be disclosed only in other comprehensive income and to "recycle" them to profit and loss only when realized. The reason for excluding certain changes in fair value is due to their relatively low reliability in measurement (Bertoni & De Rosa, 2013). Minor differences also exist in the guidelines for how to structure and present some information such as the titles. However, these differences have no significant implications on the comparability and consistency of the financial statements.

An important conclusion in terms of this study is that the accounting information gathered is based on comparable information and comparable methods for recognition and hence, create no issues in comparing the empirical results, i.e. there will be no significant data biases related to the specific accounting method applied.

2.4 Critiques of Other Comprehensive Income

With the many amendments in the accounting standards in favor of fair value accounting by both IASB and FASB, discussions regarding pros and cons of OCI have amplified. There are plenty of theoretical arguments both supporting and disagreeing with the argued usefulness of OCI. On the critique side many practitioners argue that OCI is not deliberate and fully thought through but rather misleading and complex. In line with the ambiguous theoretical discussion empirical studies also show indecisive results and have not been able to settle the debate or show conclusive results in any ones favor.

2.4.1 Vague Definition of Other Comprehensive Income

The wide range of OCI items and the lack of a clear distinction between different items have resulted in a misalignment among users and preparers with regards to the separation of items into net income and other comprehensive income (Holt, 2014; IFRS, 2011). According to IFRS, profit and loss is defined as "*the total of income less expenses, excluding the components of other comprehensive income*" and OCI comprises "*items of income and expense (including reclassification adjustments) that are not recognized in profit or loss as required or permitted by other IFRSs*". The conceptual difference between P&L and OCI is suggested by the IASB in two broad principles:

(a) P&L provides the primary source of information about the return an entity has made on its economic resources in a period.
(b) To support (a), OCI should only be used if it makes P&L more relevant.

The vague definition of the difference between P&L and OCI suggest that there is no clear guidance for practitioners to follow. In an attempt to clear the ambiguity IFRS published a discussion paper regarding the presentation, clarifying that OCI is intended to enhance the predictive value of P&L and make it more understandable (IFRS Staff Paper, 2013). However, the IASB has not been able to distinguish the two categories or identify a single principle which could decide which category an item will fall into (Hoogervorst, 2014).

2.4.2 Complexity in Reclassification

Another critique against OCI is the complexity and weaknesses surrounding reclassification of OCI items. In June, 2011, the IASB presented the amendments to IAS 1[6] which implied that the preparer had to group OCI items on the basis of the items' likelihood of being reclassified into P&L in the future. Reclassification adjustments refer to recycling of unrealized gains and losses that have been recognized in OCI in earlier periods into net income for the current period. The recycling of items is implemented when the underlying assets with the unrealized gains or loss are sold, and thus, realized. In practice, items that are more likely to be realized and reclassified into net income are e.g. unrealized foreign currency gains and losses from the disposal of a foreign operation, gains or losses on cash flow hedges undertaken in previous periods. Other items, such as actuarial gains and losses on a defined benefit plan and revaluation surplus of property, plant and equipment, are not to be recycled according to the IFRS (Holt, 2014). Table 1 provides a suggestion of how such an OCI

[6] In addition, the standard setters agreed to leave the option of P&L and OCI to be presented in either one statement or two continuous statements, with items of profit or loss presented separately.

presentation could be structured and what components to be included in the two groupings according to the amendments of IAS 1:

TABLE 1 GROUPING OF OCI ITEMS UNDER THE AMENDMENTS TO IAS 1

OCI items that can be reclassified into profit or loss

- Foreign exchange gains and losses arising from translations of financial statements of a foreign operation (IAS 21)
- Effective portion of gains and losses on hedging instruments in a cash flow hedge (IAS 39)

OCI items that cannot be reclassified into profit or loss:

- Changes in revaluation surplus (IAS 16 and IAS 38)
- Actuarial gains and losses on defined benefit plans (IAS 19.93A)
- Gains and losses from investments in equity instruments measured at fair value through OCI (IFRS 9)
- For those liabilities designated at fair value through profit or loss, changes in fair value attributable to changes in the liability's credit risk (IFRS 9)

Source: EY IFRS Developments. (2011). Changes to the presentation of other comprehensive income - amendments to IAS 1.

The above classification of specific items has no implication on the nature of the items included, i.e. there exist no further detailed explanation about what kind of assets or instruments that belong to each category. Instead, the purpose is to facilitate for the users to understand the future impact of OCI items on P&L from a time perspective and therefore improve the relevance[7] in the information provided. The lack of agreement about what specific items should be recognized in net income and other comprehensive income is still unclear. Adding the separation of reclassification further increases complexity and ambiguity in recognizing items in either OCI or net income. The reclassification option is argued to interfere with the fundamental definitions of *revenue* and *expense* as the change in the asset or liability may have occurred in a previous period (Holt, 2014). According to IFRS, expenses are recognized when occurred and revenues are recognized with the matching principle when they are realized or earned (the product is delivered or sold). However, with the recycling option, revenues and expenses are not matched.

2.4.3 INVOLVEMENT OF SUBJECTIVE JUDGMENT

In addition to the added reporting of the recycling option, Holt (2014) also argued that fair value changes and reclassification lead to earnings management. OCI is criticized for involving subjective judgment in deciding the fair values measures in the financial statement. Assets and liabilities are measured and re-measured periodically to reflect the fair value. However, due to the fact that not all assets and liabilities are traded in an active market and an objective market value can be obtained, alternative approaches are used to capture the changes in values. *IFRS 13 Fair Value Measurement* applies the following valuation hierarchy (Table 2).

[7] Here, relevance refers to paragraph 26 in the IASB Framework for the *Preparation and Presentation of Financial Statements* (IASB Framework) stating that relevant information "*influences the economic decisions of users by helping them evaluate past, present or future events or confirming, or correcting, their past evaluations*."

TABLE 2 THE FAIR VALUE HIERARCHY

Classification	Description
Level 1	Fair values are derived from quoted market prices for identical assets or liabilities from an active market for which an entity has immediate access. The quoted market price is used without adjustments to measure fair value whenever available, with limited exceptions.
Level 2	These are other input than quoted market prices included in Level 1. Fair value are derived from i) quoted market prices for similar (as opposed to identical) assets or liabilities from an active market, ii) quoted prices for identical or similar assets or liabilities in markets that are not active, iii) inputs other than quoted prices that are observable for the asset or liability, for example interest rates, implied volatilities and credit spreads and iv) inputs that are derived principally from or corroborated by observable market data by correlation or other means ('market-corroborated inputs').
Level 3	Level 3 inputs are unobservable inputs for the asset or liability. If values for levels 1 or 2 are not available, fair value is estimated using valuation techniques using the best information available in the circumstances, which might include the entity's own data, taking into account all information about market participant assumptions that is reasonably available.

Source: *IFRS 13 Fair Value Measurement.*

The subjective judgment increases with the level as the market prices becomes increasingly unobservable. On level 3, fair values are measured using all available data and information as well as necessary subjective assumptions. Thus, it opens up for a risk of manipulation of the fair values. Fair value components that are not actively traded in the market tend to be criticized for incorporating subjective judgments that could be misused for earnings management (Khurana & Kim, 2003). Therefore, the fair value measures of “level 3” OCI items are not considered especially value relevant for users.

2.5 MIXED EMPIRICAL EVIDENCE ON THE VALUE RELEVANCE OF OTHER COMPREHENSIVE INCOME

Given the mixed opinions on the usefulness of OCI, a set of studies have attempted to find out the implications of OCI in practice by studying various data sets. However, limited studies exist on the topic and the few of these studies are aligned. Due to the different characteristics of OCI items, some specific OCI components have also been of greater interest for researchers. Although no conclusive results support the superiority of other comprehensive income compared to net income, there exist empirical studies that have proven that some specific OCI items do provide value relevant information to the users (Biddle & Choi, 2006; Dhaliwal, Subramanyam, & Trezevant, 1999; Khurana & Kim, 2003). In the set of value relevance literature, two main streams of studies have been conducted; value relevance in terms of association to stock return and value relevance in terms of association to stock price.

2.5.1 EMPIRICS ON THE ASSOCIATION BETWEEN OTHER COMPREHENSIVE INCOME AND STOCK RETURN

Dhaliwal, Subramanyam & Trezevant (1999) conducted a study comparing comprehensive income (defined by SFAS 130) and net income by investigating the association with stock returns. The data, consisting of American companies with over 11,000 firm-years over the period 1994-1995, showed no evidence that comprehensive income is more strongly associated with stock returns than net income. In fact, the result from the models (1A and 1B) used in the study was ambiguous (see Table 3).

$$R_t = \alpha_0 + \beta_1 NI_t + \varepsilon_t \qquad (1A)$$

$$R_t = \alpha_0 + \beta_1 CI_t + \varepsilon_t \qquad (1B)$$

TABLE 3 PREVIOUS STUDY, STOCK RETURN ASSOCIATION WITH NI AND CI

Model	Intercept *(t-Stat)*	NI *(t-Stat)*	CI *(t-Stat)*	Adj. R^2
1A	0.141***	0.665***		0.038
	(22.12)	*(21.30)*		
1B	0.139***		0.680***	0.042
	(21.84)		*(22.41)*	

Description: the table shows the results from model (1A) and (1B) specified above. The sample consists of all 1994 and 1995 firm-years that have COMPUSTAT and CRSP data needed to calculate return, net income, and comprehensive income. Sample size is 11,425 firm-years. NI is net income after extraordinary items and discontinued operations and CI is as-if SFAS 130 comprehensive income. The symbols ***, **, and * indicates the statistical significance at 1%-, 5%- and 10%-confidence level.
Source: Dhaliwal, Subramanyam & Trezevant (1999).

The R-square values are below 0.05 which drastically reduce the reliability of the results. Furthermore, the difference between the two coefficients is negligible. Inclusion of OCI should, according to the arguments for OCI, improve the association of comprehensive income to stock return compared to net income. However, since the coefficient only improved slightly (from 0.665 to 0.680) including OCI, the superior use of comprehensive income cannot be proven from these results.

In an interesting turn, a replication of the above study was conducted by Biddle & Choi (2006), where they arrived at the opposite conclusion. Using the same definitions for income and return variables as Dhaliwal, Subramanyam & Trezevant (1999), with only a slight difference in notation and the addition of abnormal returns, their results showed that comprehensive income exhibited a greater association with stock returns than net income. The different results could possibly be explained by the samples used in the studies. Biddle & Choi (2006) conducted the study based on a larger sample consisted of 23,427 firm-years compared to 11,425 during a longer time period between 1994 and 1998 compared to between 1994 and 1995.

Another interesting conclusion by both Dhaliwal, Subramanyam & Trezevant (1999) and Biddle & Choi (2006) are the fact that significant inferences could be drawn when breaking down OCI to a component level and investigating their individual value relevance. Their studies examined whether the association between net income and stock return improved when adding on specific OCI items. Three OCI items were examined: (i) the change in the balance of unrealized gains and losses on marketable securities, (ii) the change in the cumulative foreign currency translation adjustment and (iii) the change in additional minimum pension liability in excess of unrecognized prior service costs. Both their results showed that only (i) marketable securities adjustments proved to be value relevant implicating that the noise from the other non-value relevant items probably were responsible for the inconclusive results in Dhaliwal, Subramanyam & Trezevant (1999). Biddle & Choi (2006) also concluded that adjustments in pension liabilities had the second largest impact on return, i.e. also proved to be value relevant whereas Dhaliwal, Subramanyam & Trezevant (1999) did not reach this conclusion.

When testing the association of marketable securities on an industry level, the results showed that the proven value relevance was driven by marketable securities adjustments for financial companies. The fact that financial companies, mainly banks, operate with a huge amount of financial instruments and that these items' unrealized fair-value gains and losses are not fully reflected in the P&L is a logical reason for these results. Moreover, since financial instruments and securities are actively traded on a market and considered to provide more objective and reliable information, the value relevance should be greater for these types of OCI items (Khurana & Kim, 2003). Value relevance and objectivity is argued to be correlated. The more subjective the fair value measures become, the lower is the value relevance.

Relevance for this thesis

We can make two interesting conclusions from these previous studies. First, the inconclusive and differing results for comprehensive income, without any distinction on specific OCI items, definitely motivates our approach on studying "total" OCI further. It also tells us that that the results are very likely to depend on which OCI items dominate the data. Second, the model set-up regressing a return measure against accounting values appears to be somewhat misused. It makes more sense to compare returns to returns and absolute values against absolute values, which motivates our efforts in developing two much more rigorous and robust models for this purpose.

2.5.2 EMPIRICS ON THE ASSOCIATION BETWEEN OTHER COMPREHENSIVE INCOME AND STOCK PRICE

Dhaliwal, Subramanyam & Trezevant (1999) also concluded that net income was more strongly associated with stock price than comprehensive income. The models had an identical set up as in (1A) and (1B) but with stock price instead of stock return as the dependent variable. Unfortunately, no coefficients are presented, but the R-square values were between 0.34 (for 1B) and 0.36 (for 1A). The analysis was also repeated with book value of equity included, but with similar results, arriving at the conclusion that OCI does not add more value relevant information to the users than net income.

Based on the fact that financial companies and especially banks have most of their assets in tradable products subject to fair value adjustments, a large amount of studies are conducted on only financial companies. Barth, Beaver & Landsman (1996) studied the association between stock price and fair value estimates of loans, securities and long-term debts for 136 US banks between 1992 and 1993. Their results showed a strong association between these items and stock price, verifying the results from two similar studies by Barth (1994), which investigated whether disclosed fair value estimates of US banks' investment securities and securities gains and losses are reflected in share price compared to historical cost, and Eccher, Ramesh & Thiagarajan (1996) that examined the value relevance of fair value disclosures of financial instruments. Many of these studies also discuss the issue of subjectivity in fair value measurements and the impact on value relevance. In general, they conclude, minor measurement errors will not lead to weaker value relevance of the OCI items in question. However, when subjectivity increases and the measurement errors are exacerbated the reliability decreases substantially. In these cases the tested OCI items no longer show any value relevance (Barth, Beaver, & Landsman, 2001; Barth, 1994; Eccher, Ramesh, & Thiagarajan, 1996).

However, as previous mentioned much of the empirical studies show inconclusive results and sometimes direct opposite conclusions about the value relevance. This is also the situation for financial companies. Khurana & Kim (2003) investigated the association of financial instruments and stock price for US banks during 1995-1998 and concluded that there were no difference in value relevance between holdings held at historical cost and holdings held at fair value. A study of Nelson (1996) also showed no value relevance for fair value disclosures of loans, deposits, long-term debt or net off-balance sheet financial instruments and market securities after controlling for future profitability, i.e. estimated ROE, and growth in book value of equity.

Additionally, in a study of non-American data previous results are again challenged. In an attempt to investigate the usefulness of the new requirements of reporting comprehensive income in Canada[8], Kanagaretnam, Mathieu & Shehata (2009) examined the value relevance of other comprehensive income applying a similar method as previous studies where specific OCI items are added on to net income. The sample consisted of 203 firm-years observations on reported data on other comprehensive income for a sample of Canadian firms (mixed industries) cross-listed in the US in the period 1998–2003. For stock price they found evidence that available-for-sale investments (coefficient value 0.68) and cash flow hedges (coefficient value -6.04) were significantly associated with stock price (R-square of 0.69). On an aggregated level they also test the association between stock price and NI or CI. Both NI (coefficient value 0.92) and CI (coefficient value 0.85) were significant (R-square 0.67 and 0.70). From these results the authors concluded CI to be more value relevant compared to NI based on the marginally better R-square for CI.

Considering the usefulness of OCI, Dhaliwal, Subramanyam & Trezevant (1999) concluded that the predictive ability of comprehensive income in forecasting the operating cash flow and operating income was lower than for net income. In a replication of the test, Biddle & Choi (2006) arrived at the same conclusion. Kanagaretnam, Mathieu & Shehata (2009) also showed that net income is a better predictor of future cash flows and future net income relative to comprehensive income, supporting the argument that (some) components of other comprehensive income are value-relevant, but indeed poor predictors of future profitability due to their transitory nature.

[8] Canadian Accounting Standards Board issued in January 2005 new accounting standards requiring reporting of fair values of and gains and losses on financial assets and liabilities as an attempt to harmonize Canadian GAAP with US and International GAAP.

Relevance for this thesis

Again, it is rather obvious that the inconclusive results motivate further empirical studies of the value relevance of "total" OCI. However, the main critique we have against these previous studies of stock price concerns both the time periods and statistical evaluations. First, many studies are rather dated which narrows the data down to American companies. Considering the continuously ongoing implementation of OCI in Europe a more current study of European data will add a good contribution. Second, many of the conclusions and claims are drawn based on a very small change in R-square, i.e. a slightly better model R-square is translated to CI being more value relevant than NI. But at the same time many of these studies lack a rigorous discussion of potential data and model biases which we know can influence the results if not considered. Hence, it appears that previous results rest on a quite questionable statistical ground. The evaluation should not be based on comparing R-square, which in one sense only acts as a sanitary check for robustness, but rather focus on the relative differences in coefficient magnitudes and significance levels if any.

2.5.3 FURTHER ELABORATION ON THE EMPIRICAL INSIGHTS

It stands clear that previous studies on OCI have arrived at mixed conclusions, both stating that there is and that there is not an association between OCI and stock return or stock price. The fact that the methods used in these studies differ also makes it difficult to draw any general conclusions. The models used could differ in, for instance, inclusion of other factors (e.g. book value of equity), definitions of income measures (incl. or excl. extraordinary items) and model structure, which add complexity to arrive at a comparable conclusion. However, on a component and industry level, there are in general more aligned results. It appears that financial instruments and securities are more value relevant than other OCI items. Also pension liabilities seem to have some value relevance, especially considering the last years' scandals and bankruptcies surrounding these items. Furthermore, previous literature has not considered any possible differences between countries. There are no studies reviewing and comparing two or more geographical areas against each other. The fact that there are diverging conclusions on studies based on data from different countries (e.g. the US, the UK, New Zealand and Canada), would suggest differences in results depending on the market.

To conclude this section, this study extends the scope of previous value relevance studies by assessing OCI as a collective measure for recent European and American data. Additional efforts are made to develop better and more robust models for this purpose.

3 METHOD

This section is structured as follows. First, the theoretical foundation for how to study the research question is presented. The RIV model (Ohlson, 1995) is used to anchor accounting fundamentals to stock price. The second part presents the study design for how to apply the RIV model in order to examine if OCI is reflected in firm value. Additionally, in order to determine if changes in OCI-return are reflected in stock returns, a five factor regression model based on the Fama French three factor model (Fama & French, 1993) tests the association between stock return and OCI-return. The last section summarizes all the models, discusses the underlying assumptions and potential measurement errors.

3.1 THEORETICAL FOUNDATION FOR EXAMINING VALUE RELEVANCE

The theoretical foundation is based on the RIV model, which determines a firm's market value of equity by anchoring the residual income to the book value of equity. The residual income is calculated by adding together the present value of all future abnormal returns, where abnormal refers to a return other than the expected return given by e.g. the CAPM (capital asset pricing model) or the risk free rate.

The RIV model

Ohlson (1995) derives the RIV model from the present value of expected dividends (PVED) valuation model (Edwards & Bell, 1961). The RIV model relies on five essential assumptions; (i) the market value of a firm is obtained with the PVED model, (ii) the clean surplus relation (CSR) holds, (iii) current earnings are not affected by a company's dividend policy, i.e. the MM dividend irrelevance proposition holds (Miller & Modigliani, 1961), (iv) abnormal earnings satisfy an autoregressive process ensuring a model that only rely on residual income to explain a company's excess market value other than book value of equity, i.e. all the value relevant information will at some point in time be captured by the residual income measure and (v) adding a risk premium to the risk free rate in order to adjust the model for risk aversion can be considered empirically just. Based on these five assumptions the RIV model is derived:

The residual income measure is defined as:

$$\mathrm{RI_t = NI_t - r_E BV_{t-1} = BV_{t-1}(ROE_t - r_E)} \quad (1)$$

where

$\mathrm{RI_t}$ = residual income, period t

$\mathrm{NI_t}$ = net income, period t

$\mathrm{r_E}$ = required return on equity

$\mathrm{BV_{t-1}}$ = (net) book value of equity, date t-1

$\mathrm{ROE_t}$= return on equity, period t.

The following relation is then derived by Ohlson (1995) from the PVED:

$$P_t = \sum_{\tau=1}^{\infty} \frac{E_t[d_{t+\tau}]}{(1+r_E)^{\tau}} \quad \Leftrightarrow \quad P_t = BV_t + \sum_{\tau=1}^{\infty} \frac{E_t[RI_{t+\tau}]}{(1+r_E)^{\tau}} \tag{2}$$

where

P_t = market value, price, of the firm's equity, date t

d_t = net dividend, date t

r_E = required return on equity

BV_t = (net) book value of equity, date t

RI_t = residual income, period t

$E_t[\cdot]$ = the expected value operator conditioned on the information at date t.

3.2 STUDY DESIGN

Combining the theoretical background of the RIV model and the concept of OCI allow us to derive a redefined RIV model. A five factor regression model is also developed to test the association between stock return and OCI-return. Table 4 describes the general applied method throughout this paper:

TABLE 4 GENERAL STRUCTURE OF THE METHOD

Category	General set up
Linear time series regression with fixed effects	$Y_t = \alpha_0 + \beta_i X_t + \varepsilon_t$
Statistical test	t-test of the general hypothesis: $H_0: \beta_i = 0$ $H_1: \beta_i \neq 0$
Significance level	1% := ***, 5% := **, 10% := *
Potential mesurement errors	
Heteroscedasticity	Huber/White sandwich estimator, rvf plots
Non-linearity	rvf plots
Biased estimators	Correlation analysis
Autocorrelation	Ljung-Box, ACF, PACF and ARMA(p, q)

Description: the table illustrates the general structure and logic behind the study design. The methods applied are standard use in similar studies. rvf plots are defined as regression residuals vs. fitted values from the models. Ljung-Box is a statistical test for white noise in the residuals. (P)ACF stands for (partial) autocorrelation function which is used to measure the autocorrelation. ARMA(p,q) is an autoregressive moving averages model with p,q number of lags. This model is used to extend existing regression models to also include potential lagged effects.

3.2.1 The redefined RIV model

Introducing other comprehensive income, the clean surplus relation will still hold by replacing net income with comprehensive income:

$$\mathrm{CI_t = NI_t + OCI_t} \tag{3}$$

where

$\mathrm{CI_t}$ = comprehensive income, date t

$\mathrm{NI_t}$ = net income, date t

$\mathrm{OCI_t}$ = other comprehensive income, date t.

The clean surplus relation:

$$\mathrm{BV_t = BV_{t-1} - d_t + NI_t + OCI_t} \tag{4}$$

where

$\mathrm{BV_t}$ = (net) book value of equity, date t

$\mathrm{d_t}$ = net dividend, date t

$\mathrm{NI_t}$ = net income, date t

$\mathrm{OCI_t}$ = other comprehensive income, date t.

A new definition of the residual income from (1) thus follows:

$$\mathrm{RI_t^{CI} = CI_t - r_E BV_{t-1} = (NI_t + OCI_t) - r_E BV_{t-1}} \tag{5}$$

where

$\mathrm{RI_t^{CI}}$ = residual income, period t

$\mathrm{CI_t}$ = comprehensive income, period t

$\mathrm{r_E}$ = required return on equity

$\mathrm{BV_{t-1}}$ = (net) book value of equity, date t-1.

Combining (4) and (5) allow for the redefined RIV model to replace the original model (2):

$$\mathrm{P_t^{CI} = BV_t + \sum_{\tau=1}^{\infty} \frac{E_t\left[RI_{t+\tau}^{CI}\right]}{(1+r_E)^{\tau}} = BV_t + \sum_{\tau=1}^{\infty} \frac{E_t[(NI_{t+\tau} + OCI_{t+\tau}) - r_E BV_{t+\tau-1}]}{(1+r_E)^{\tau}}} \tag{6}$$

where

$\mathrm{P_t^{CI}}$ = market value, price, of the firm’s equity, date t

$\mathrm{r_E}$ = required return on equity

$\mathrm{BV_t}$ = (net) book value of equity, date t

RI_t^{CI} = residual income, period t

$E_t[\cdot]$ = the expected value operator conditioned on the information at date t.

Assumptions in the redefined RIV model

Based on the assumptions made by Ohlson (1995) the following assumptions most hold for the redefined RIV model:

$$P_t^{CI} = \sum_{\tau=1}^{\infty} \frac{E_t[d_{t+\tau}]}{(1+r_E)^{\tau}} \qquad \text{(PVED)} \qquad \text{(A1)}$$

The PVED model still stands as an essential part in imposing market value to depend on accounting fundamentals.

Further on, the CSR must hold:

$$BV_t = BV_{t-1} - d_t + NI_t + OCI_t \qquad \text{(A2)}$$

If (A2) holds and following the same logic as Ohlson (1995) shows that the partial derivative $\partial CI_t / \partial d_t = 0$. If you substitute CI to the sum of NI + OCI it follows from linearity that

$$\partial CI_t / \partial d_t = 0 \Leftrightarrow \partial NI_t / \partial d_t = 0 \, , \partial OCI_t / \partial d_t = 0 \qquad \text{(A3)}$$

(A3) ensures that current OCI is not affected by the dividend policy, i.e. the MM dividend irrelevance proposition still holds. In practical terms this can for example mean that asset write-ups cannot be used to increase the dividend paid out by the company as a mean to increase the value of the company.

Another important assumption concerns the time-series characteristics of the residual income. For estimation purposes the stochastic series $\{\widetilde{RI}_\tau\}_{\tau \geq 1}$ need to satisfy an autoregressive process:

$$\widetilde{RI}_{\tau+1}^{CI} = \alpha RI_\tau^{CI} + v_\tau + \varepsilon_{1,\tau+1} \qquad \text{(A4a)}$$

$$\tilde{v}_{\tau+1} = \beta v_\tau + \varepsilon_{2,\tau+1}$$

where

RI_τ^{CI} = residual income. Tilde represents the estimated residual income for future periods $\tau + 1$

v_τ = summarized value relevant events/information that have yet to have an impact on the financial statements. Tilde represents the estimated value of v for future periods $\tau + 1$

$\varepsilon_{1,2}$ = stochastic error terms.

The error terms are unpredictable and white noise with zero means. The exogenous parameters α and β are fixed and known parameters determined by the economic environment and specific accounting principles for the company. These parameters are restricted to be nonnegative and less than one, implicating a mean reverting process. Estimations of any future value relevant events not yet captured in the financial statements $E_{\tau}[\tilde{v}_{\tau+1}]$ will be independent of RI. However, the actual realization of these events can never "bypass" the financial statements but will eventually be fed into the RI as seen in (A4a). To better understand the economic meaning of this assumption, we will illustrate this through an example.

Assume a company X at time $\tau = 1$ with the given parameters α and β. An analyst decides to make a forecast of RI for one period ahead, $E_1[\widetilde{RI}_2^{CI}]$. This estimated value will be based on information given in the financial statement at $\tau = 1$ as the value αRI_1^{CI}, it will also be based on events occurring at $\tau = 1$ that have not yet been realized in the financial statements, perhaps company X just released a promising strategy to expand its business into Asia. These value relevant events are given by the value v_1. The error term is assumed to add no value, i.e. $E_1[\varepsilon_{1,2}] = 0$. The analyst is of course free to make any predictions of future events that might motivate a higher value of company X in additional future periods, perhaps it is rationale to assume that an establishment in Asia will lead to a future establishment in Russia at $\tau = 2$; $E_1[\tilde{v}_2]$. However, this forecast does not motivate any increased value of $E_1[\widetilde{RI}_2^{CI}]$ since it is pure speculation by the analyst and not any concrete event for company X. But if the analyst then decides to forecast RI for two periods ahead, $E_1[\widetilde{RI}_3^{CI}]$, this information will matter and consequently be fed into the forecasted value of RI.

This example paints a very important picture of the theoretical dynamics behind the value of a company according to Ohlson (1995) in deriving the RIV model. The factor v_{τ} is for obvious reasons hard to estimate and even harder to include in an empirical model to test the value relevance of accounting fundamentals, but it will shed some light on the logic behind the model and what type of information that might potentially be lost when doing an approximation of the model.

If the dynamics in (A4a) holds, it should be in any standard setters' best interest to minimize the effects from v_{τ} by introducing accounting standards that forces the company to quantify these unrealized value effects in the financial statements which is exactly the purpose of other comprehensive income. Hence, by redefining the RIV model to also include other comprehensive income should logically result in a more reliable valuation model.

Continuing from (A4a) we have the given properties:

$$E[\widetilde{RI}_{\tau+1}^{CI}] = E[\alpha RI_{\tau}^{CI}] + E[v_{\tau}] + E[\varepsilon_{\tau+1}] = E[\alpha RI_{\tau}^{CI}] + E[\beta v_{\tau-1}] \tag{A4b}$$

Thus, the recursive series can be written:

$$E[\widetilde{RI}_{\tau+1}^{CI}] = \alpha^{\tau} E[RI_{\tau}^{CI}] + \beta^{\tau} E[v_{\tau-1}] \rightarrow 0 \text{ when } \tau \rightarrow \infty.$$

It follows that (6) will truly converge to the market price P_t^{CI}, consisting of the book value of equity and additional value added from the discounted residual income. The assumptions (A4a) and (A4b) are two important assumptions for empirical approximations of the model and to make robust approximations of equity values.

Assumption (A5): the RIV model is based on risk neutrality i.e. $r_E = r_f$. Ohlson (1995) argues that simply adding on risk, $r_E > r_f$, through e.g. CAPM poses no problem in analytical and technical terms and can be adequately used in many empirical applications such as intended in this paper. Hence, adding risk $r_E > r_f$, do not break the previous assumptions. Even if this is no problem in theoretical terms, Fama (1977) shows that adding risk in this manner can potentially increase the noise in the results.

Assumption (A6): the last assumption regards the usefulness of the redefined RIV model across different accounting standards. Skogsvik (2002) points out the usefulness of the RIV model since it only relies on the CSR. As long as the accounting is done in compliance with the CSR all the different accounting methods (historical cost accounting, current cost accounting etc.) will yield the same value. Hence, the choice of accounting standard does not affect the redefined RIV model. In accordance with this, the redefined RIV model (6) is assumed to be equally indifferent to the applied accounting standard.

Defining the regression models

To make empirical use of the redefined RIV model a few approximations have to be made. A problem applying (6) is the limited possibility to forecast RI. Even though some firms are covered by analysts the reliability of these forecasts can be questioned. In a similar manner to Hodder, Hopkins & Wahlen (2006), Khan & Bradbury (2014), Higgins (2010), Barth, Landsman & Wahlen (1995) and Clarkson, Hanna, Richardson & Thompson (2011) the following approximation is made:

$$\sum_{\tau=1}^{\infty} \frac{E_t\left[RI_{t+\tau}^{CI}\right]}{(1+r_E)^{\tau}} \approx \frac{CI_t - r_E BV_t}{r_E} \quad \Rightarrow \quad P_t^{CI} \approx BV_t + \frac{CI_t - r_E BV_t}{r_E}. \tag{7}$$

This approximation is consistent with (A4a) and should reflect all the cross sectional price effects related to a firm's market value other than its book value of equity. It is also consistent with the Gordon growth model applied to companies close to steady state[9]. Even if this method is commonly used in value relevance studies, it is still a drastic simplification from the ideal use of the RIV model and the true adverse effects on the results remain uncertain. From a statistical point of view, assigned this much weight to a single approximation of RI makes the model more sensitive to extreme values and consequently to the characteristics of the company. For example, a growth company far from steady state will have more volatile changes in RI not consistent with applying the Gordon growth model and result in less significant coefficients and lower R-square values. To minimize these effects, we seek companies that are close to steady state. In order to ensure this we use the Market-to-Book ratio (market value of equity divided by book value of equity) to sort out companies, more on this in the sections below.

[9] The Gordon growth model also includes growth, g, in the denominator. Since g in steady state is usually small and hard to estimate for many different markets we choose not to include this in favor of a more parsimonious model.

Scaled by the number of shares outstanding the approximated RIV model becomes:

$$P_t^{CI} = BV_t + \frac{CI_t - r_E BV_t}{r_E} = BV_t + \frac{1}{r_E} NI_t + \frac{1}{r_E} OCI_t - \frac{1}{r_E} r_E BV_t \Leftrightarrow$$

$$P_t^{CI} = BV_t + \frac{1}{r_E} NI_t + \frac{1}{r_E} OCI_t - BV_t = \frac{1}{r_E} NI_t + \frac{1}{r_E} OCI_t.$$

The book value of equity cancels from the expression and the price will only depend on the scaled values of net income and other comprehensive income. However, bear in mind that this is only a consequence of the previous simplification and to completely disregarding book value of equity would be a naïve conclusion. Based on this, two regression models, (M1) and (M2), are defined on a per share basis. The first model include book value of equity, the second model omits book value of equity:

$$P_t = \alpha_0 + \beta_1 BV_t + \beta_2 NI_t + \beta_3 OCI_t + \varepsilon_t \qquad \text{(M1)}$$

$$P_t = \alpha_0 + \beta_2 NI_t + \beta_3 OCI_t + \varepsilon_t \qquad \text{(M2)}$$

where

P_t = stock price, date t

BV_t = book value of equity per share, date t. The book value of equity is calculated as book value of equity plus deferred taxes minus book value of preferred stocks[10]. This value is then divided by the number of common shares outstanding at date t

NI_t = net income per share, period t. The net income for period t is divided by the number of common shares outstanding at date t-1

OCI_t = other comprehensive income per share, period t. The OCI for period t is divided by the number of common shares outstanding at date t-1

α_0 = intercept

ε_t = error term, period t.

These two models cover the most important aspects of the redefined RIV model and are defined in accordance with the assumptions (A1) to (A6). Hence, this will give us a solid base for further analysis of the value relevance of OCI.

[10] Consistent with previous studies deferred taxes are included as a whole in book value of equity. An alternative method is to only include the equity part of deferred taxes by multiplying deferred taxes with (1 – corporate tax rate). In order to ease the calculations across the many different countries we choose not to include this adjustment for corporate taxes.

Expected estimates of the explanatory variables

The expected estimated coefficients are:

$$\alpha_0 \neq 0, \qquad \beta_1 = 1, \qquad \beta_2 = \frac{1}{r_E}, \qquad \beta_3 \leq \frac{1}{r_E}.$$

The expected estimated coefficient of BV ($\beta_1 = 1$) reflect a break-up value no less than the actual value of the recognized net assets. However, omitted variables such as off-balance-sheet net asset values or hidden dirty expenses/surpluses may induce this coefficient to deviate from 1.

The expected estimated coefficient of NI ($\beta_2 = 1/r_E$) should be inversely proportional to the expected return on equity, preferably a discount rate in line with the CAPM. This value is different for different industries depending on the intrinsic risk, however, based on our data (see section 4) most values of r_E are between 5% and 11%, giving us a rough estimate of β_2 between 9 and 20.

Considering the expected estimated coefficient of OCI ($\beta_3 \leq 1/r_E$) the inequality sign reflects the fact that some of the items in OCI are mean reverting and might not be considered value relevant by the investors. Consequently, depending on the composition of OCI items, NI should have a greater or equal impact on value compared to OCI and therefore show a larger or equal coefficient.

Table 1 provides an overview of the OCI components. To get a better understanding for the accumulated effect on β_3 from the different OCI components we will go through each item individually to conclude which items might potentially lower the value of β_3.

(1) *Translation differences*: empirics have shown that foreign currency translation differences are not value relevant (Dhaliwal, Subramanyam, & Trezevant, 1999). Since these items have to be reclassified into P&L after divestment, the effects from currency fluctuations are likely only short-term and mean reverting. Hence, the value of the estimated coefficient should be lowered by a large portion translation differences; $\beta_3^{\text{Trans.diff}} < 1/r_E$.

(2) *Actuarial gains/losses on defined benefit plan*: the pension plan solution is a long-term commitment for the company. In most cases this is a (diversified) portfolio of quoted assets which in an efficient market must be consistent with $\beta_3^{\text{Act.G/L}} = 1/r_E$. Another argument by Holt (2014) is that since actuarial gains and losses cannot be reclassified into P&L the value changes are more permanent than e.g. translation differences which are recycled. Both these arguments support a coefficient inversely proportional to the discount rate $\beta_3^{\text{Act.G/L}} = 1/r_E$.

(3) *Cash flow hedges*: these items will be reclassified into P&L and only create a short-term effect. Due to the mean reverting characteristics the value of the estimated coefficient should be lowered by a large portion cash flow hedges; $\beta_3^{\text{CF hedge}} < 1/r_E$.

(4) *Gains and losses on investments in equity instruments*: these are also quoted assets which in an efficient market must be consistent with $\beta_3^{\text{Act.G/L}} = 1/\text{r}_\text{E}$. Empirical results by Dhaliwal, Subramanyam & Trezevant (1999), Hodder, Hopkins & Wahlen, (2006), Barth (1994) and Eccher, Ramesh & Thiagarajan (1996) also show a supporting view of this with permanent value effects for investment holdings.

(5) *Changes in revaluation surplus*: assets and liabilities that is not classified under (1) to (4) are possibly assets used in the core business and not likely to be handled as a tradable asset, especially for industrial companies. The behavior of these items are a bit uncertain, but similar studies (Dhaliwal, Subramanyam, & Trezevant, 1999; Eccher, Ramesh, & Thiagarajan, 1996) indicate that these items are mean reverting in the long run, therefore it is fair to assume $\beta_3^{\Delta\text{rev.suplus}} < 1/\text{r}_\text{E}$.

(6) Deferred tax effects: these tax effects should for most of the companies come from deferred tax liabilities that arise when the fair value exceeds the taxable amount. It is unclear if this effect is permanent or mean reverting, but since it should lie in the company's interest not to repay the deferred taxes the effect should be close to permanent. Thus, a reasonable conclusion is a coefficient inversely proportional to the discount rate $\beta_3^{\text{Def.tax}} = 1/\text{r}_\text{E}$.

The estimated coefficient for OCI will depend on the weights of these different OCI components. An illustrative explanation for the accumulated value of β_3 is:

$$\beta_3 = \beta_3^{\text{Trans.diff}} + \beta_3^{\text{Act.G/L}} + \beta_3^{\text{CF hedge}} + \beta_3^{\text{G/L inv.}} + \beta_3^{\Delta\text{rev.suplus}} + \beta_3^{\text{Def.tax}} \leq \frac{1}{\text{r}_\text{E}}.$$

The regression analysis is made on panel data where fixed effects are adjusted for. Including fixed effects is a statistical method to remove time-invariant company specific characteristics that may or may not influence the book value of equity, net income or other comprehensive income variables without adding any useful economic interpretation. This could for example be country specific business practices regarding accruals or currency effects. Since these time-invariant characteristics are unique to the company they should not be associated with other company's individual characteristics which may corrupt the results. Statistically these fixed effects are translated to the intercept. Our data sample consist of companies from many different countries and industries, hence, these fixed effects are almost for certain not zero which makes a good argument for why the intercept should differ from zero.

Extreme values, statistical tests, heteroscedasticity and autocorrelation

Companies with a negative book value of equity during any period will be removed from the data set. To narrow down the selection of companies to those close to steady state, the focus will be on companies with a consistent Market-to-Book ratio (MEBE) between 0.8 and 5.0 that is, if a company has a lower or greater MEBE in any period this company will be removed from the data set. As a reference, companies with a MEBE between 0.8 and 10.0 will also be included in an attempt to see potential effects from growth companies in the interval 5.0 to 10.0. The smallest interval between 0.8 and 5.0 are chosen based on the calculated industry values of the permanent measurement bias (Runsten, 1998), also known as q, which is calculated for companies assumed to be close to steady state. The definition of q is:

$$q_{\text{steady state}} = \text{MEBE} - 1 \qquad \text{(Permanent measurement bias)}$$

The calculated industry values of q are between 0.3 and 1.7 which corresponds to a MEBE interval between 1.3 and 2.7. Extending this interval to 0.8 downwards allow for companies with an inherent market discount, such as forest and investment companies to be included. Extending the interval upwards to 5.0 allow us to be a bit more inclusive in order to increase the number of observations without losing the important close-to steady state characteristics.

To reduce any potential scale related errors when accounting for fixed effects in the European data, all the observations are translated into Euro, using spot exchange rates. Even if in theory the fixed effect regression method should account for these currency effects we can conclude that the method is not perfect and a translation into a common currency does indeed improve the explanatory power of the models.

The coefficients are tested using a t-test where the significance is determined on a 10%, 5% or 1% level. To account for potential heteroscedasticity in the data, the Huber/White sandwich estimator which allows for heteroscedasticity-consistent standard errors (Huber, 1967; White, 1980) is applied.

Autocorrelation are examined by applying an implementation of Wooldridge (2002) test for serial correlation in panel data.[11] A more detailed discussion of the effects from autocorrelation will be held in the next section.

3.2.2 THE FIVE FACTOR MODEL

The Fama French three factor model developed by Fama & French (1993) empirically identifies three common risk factors (market beta, size and book-to-market equity) explaining common variation in stock returns. Two return measures, ROE and R_OCI, are added to this model:

$$\text{ROE}_t = \frac{\text{NI}_t}{\text{BV}_{t-1}}, \qquad \text{R\_OCI}_t = \frac{\text{OCI}_t}{\text{BV}_{t-1}},$$

where

ROE_t = return on equity, period t

R_OCI_t= OCI-return on equity, period t

NI_t = net income, period t.

OCI_t = other comprehensive income, period t.

BV_{t-1} = book value of equity, date t-1. The book value of equity is calculated as book value of equity plus deferred taxes minus book value of preferred stocks.

[11] The Stata command xtserial is used. For more information about this statistical test see Drukker (2003), *"Testing for serial correlation in linear panel-data models"*.

Two important notes need to be made. First, the original three factor model use risk factors to explain variation in stock return, ROE and R_OCI represent profitability not risk. The extension should not be interpreted as an asset pricing model in the conventional sense but instead a method to measure if stock returns are associated to changes in ROE and R_OCI after controlling for the standard risk factors. Second, ROE is not of any particular interest in this study. Several studies (Ball & Brown, 1968; Barth, Landsman, & Wahlen, 1995; Dechow, Sloan, & Zha, 2014) have already shown that there is a strong association between stock return and ROE. Rather, we add ROE to sort out this effect.

In terms of value relevance this model cannot add any significant interpretations of the actual association between OCI and stock price due to the "return"-characteristics of the explanatory variables. Instead, the reason to include the five factor model is to assure ourselves that the results from the redefined RIV model are robust. If R_OCI show no signs of association to stock return this would mean that the value relevance of OCI shown by the redefined RIV model is not persistent over time and thus not a particularly useful measure to include in e.g. a valuation model. This will be examined by looking at the change in portfolio returns from an increase in OCI-return and from the magnitude of the estimated coefficients for OCI-return. If the dependent portfolios do not increase in return when we increase the OCI-return indicates no association between OCI-return and stock return. Also, coefficient magnitudes inside unity would indicate a mean reverting characteristics and could be interpreted as R_OCI not having any persistent value effects. A more thorough explanation about this will follow under *expected estimates*.

The chosen method and the development of the five factor model deviated from what previous studies have done (Hodder, Hopkins, & Wahlen, 2006; Khan & Bradbury, 2014). The focus in these studies has been on the risk relevance of OCI and the question whether the volatility of comprehensive income (and consequently OCI) leads to the perception of increased risk. This is investigated by simply examining the correlation between the stock price and the volatility of comprehensive income. From our conclusions this approach lacks in finesse and creates a weak basis for correct inference from the results, especially since it ignores the standard risk factors and opens up for the problem of harmful cross correlation from omitted variables. Arguably, a more robust technique would be to employ the more acknowledged Fama French three factor model and extend it with the OCI-return in an attempt to truly sort out all the known risk factors.

Defining the regression model

Step 1: creating the explanatory returns

26 portfolios are formed from sorts of stocks on *ME* (market value of equity given by price times shares outstanding), *BE/ME* (book value of equity plus deferred taxes minus book value of preferred stocks divided by market value of equity), ROE and R_OCI. These portfolios are meant to mimic the underlying risk- and profitability factors in returns related to size, book-to-market equity, ROE and R_OCI.

Size: for each quarter t, all companies are ranked on size (*ME*). The median size is used to divide the companies in two portfolios; S (small companies) and B (big companies). S and B are reformed at quarter t + 1.

BE/ME: for each quarter t, all companies are ranked on *BE/ME*. The companies are divided into three portfolios; L (bottom 30% of the companies with the lowest *BE/ME*), M (middle 40% of the companies) and H (top 30% of the companies with the highest *BE/ME*). L, M and H are reformed at quarter t + 1.

ROE: for each quarter t, all companies are ranked on ROE. The companies are divided into three portfolios; LR (bottom 30% of the companies with the lowest ROE), MR (middle 40% of the companies) and HR (top 30% of the companies with the highest ROE). LR, MR and HR are reformed at quarter t + 1.

R_OCI: for each quarter t, all companies are ranked on R_OCI. The companies are divided into three portfolios; LO (bottom 30% of the companies with the lowest R_OCI), MO (middle 40% of the companies) and HO (top 30% of the companies with the highest R_OCI). LO, MO and HO are reformed at quarter t + 1.

First, for each quarter t, 6 portfolios are constructed from the intersection of companies in S and B against L, M and H (S/L, S/M, S/H, B/L, B/M and B/H). For example, the S/L portfolio consists of companies both in the S and in the L portfolio, i.e. small companies with low book-to-market equity. In the same manner, 20 additional portfolios are created from the intersection of companies in HR, LR, HO and LO against S, B, L, M, H. For example, the HR/B portfolio consists of big companies with a high ROE. Monthly value weighted returns on these 26 portfolios are calculated from quarter t to quarter t + 1 and then reformed at quarter t + 1.

We specify the explanatory variables by calculating five return measures: $\mathrm{r_m}$ (market portfolio return minus risk free rate), SMB (small size minus big size), HML (high BE/ME minus low BE/ME), HRMLR (high ROE minus low ROE), HOMLO (high R_OCI minus low R_OCI).

SMB: this portfolio, meant to mimic the risk factor in returns related to size (small companies tend to outperform big companies), is the excess return of small companies minus big companies with approximately the same weighted average BE/ME. Due to this construction the return measure should be free of any major influence from BE/ME, isolating the effect of size:

$$\mathrm{SMB_t} = \frac{\mathrm{r_{S/L,t}} + \mathrm{r_{S/M,t}} + \mathrm{r_{S/H,t}}}{3} - \frac{\mathrm{r_{B/L,t}} + \mathrm{r_{B/M,t}} + \mathrm{r_{B/H,t}}}{3}.$$

HML: this portfolio, meant to mimic the risk factor in returns related to book-to-market equity (high BE/ME companies tend to outperform low BE/ME companies), is the excess return of high BE/ME companies minus low BE/ME companies with approximately the same weighted average size. Due to this construction the return measure should in a similar manner be free of any major influence from size, isolating the effect of BE/ME:

$$\mathrm{HML}_t = \frac{r_{S/H,t} + r_{B/H,t}}{2} - \frac{r_{S/L,t} + r_{B/L,t}}{2}.$$

HRMLR: this portfolio represents the excess return of companies with high ROE minus companies with low ROE with approximately the same weighted average size and BE/ME. Due to this construction the return measure should be free of any major influence from both size and BE/ME, isolating the effect of ROE:

$$\mathrm{HRMLR}_t = \frac{r_{HR/S,t} + r_{HR/B,t} + r_{HR/L,t} + r_{HR/M,t} + r_{HR/H,t}}{5} - \frac{r_{LR/S,t} + r_{LR/B,t} + r_{LR/L,t} + r_{LR/M,t} + r_{LR/H,t}}{5}.$$

HOMLO: this portfolio represents the excess return of companies with high R_OCI minus companies with low R_OCI with approximately the same weighted average size and BE/ME. Due to this construction the return measure should be free of any major influence from both size and BE/ME, isolating the effect of R_OCI:

$$\mathrm{HOMLO}_t = \frac{r_{HO/S,t} + r_{HO/B,t} + r_{HO/L,t} + r_{HO/M,t} + r_{HO/H,t}}{5} - \frac{r_{LO/S,t} + r_{LO/B,t} + r_{LO/L,t} + r_{LO/M,t} + r_{LO/H,t}}{5}.$$

Market excess return: the proxy for the market risk factor in stock returns is the excess market return from a value weighted stock index minus the risk free rate from a 1-month T-bill:

$$r_{m,t} = r_{M,t} - r_{f,t}.$$

To reduce noise the portfolios SMB and HML must only consist of shared undiversifiable risk. This implies minimizing the variance of firm specific factors. As noted, the portfolios are value weighted which is a good way to achieve this (Fama & French, 1993).

Step 2: creating the returns to explained

The dependent variables consist of 16 portfolios formed on ROE and R_OCI. In the same manner as in step 1, these portfolios are constructed using four cutoff points that for each quarter t ranks all the companies on ROE and R_OCI. The companies are then divided into four portfolios each; LR and LO (bottom 25% of the companies with the lowest ROE and R_OCI), 2 (low middle 25% to 50% of the companies), 3 (high middle 50% to 75% of the companies) and HR and HO (top 25% of the companies with the highest ROE and R_OCI). These portfolios are reformed at quarter t + 1.

16 portfolios are constructed from the intersection of the portfolios illustrated in Table 5. Monthly value weighted excess returns on the 16 portfolios are calculated from quarter t to quarter t + 1 and then reformed at quarter t + 1. These excess returns are the dependent variables in the time series regression.

TABLE 5 THE DEPENDENT PORTFOLIOS IN THE FIVE FACTOR MODEL

		ROE			
		LR	2	3	HR
R_OCI	LO	LO/LR	…	…	LO/HR
	2	…	…	…	…
	3	…	…	…	…
	HO	HO/LR	…	…	HO/HR

Step 3: specifying the regression model

The regression model is defined as:

$$r_{i,t} - r_{f,t} = \alpha_0 + \beta_1 r_{m,t} + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 HRMLR_t + \beta_5 HOMLO_t + \varepsilon_t \quad \text{(M3)}$$

where

$r_{i,t}$ = return from portfolio i, period t

$r_{f,t}$ = risk free rate from 1-month T-bill, period t

$r_{m,t}$ = market excess return, period t

SMB_t = return from the SMB portfolio, period t

HML_t = return from the HML portfolio, period t

$HRMLR_t$ = return from the HRMLR portfolio, period t

$HOMLO_t$ = return from the HOMLO portfolio, period t

α_0 = intercept

ε_t = error term, period t.

Assumption in the five factor model

The arbitrary split of ranked companies does not affect the results. (A7)

Companies are ranked and split into different portfolios ranked on size, book-to-market, ROE and R_OCI. The cutoff values are arbitrarily chosen based on Fama & French (1993) and assumed not to affect the results.

Expected estimates of the explanatory variables

The estimated coefficient of the market risk factor (β_1) is expected to be close to 1 for all the 16 dependent portfolios. If the portfolios are well diversified it should only consist of undiversifiable risk which by definition will produce a coefficient of 1 (Sharpe, 1964; Lintner, 1965).

The coefficients for size (β_2) and book-to-market equity (β_3) are expected to be less significant compared to a sample of firms consisting of both small, medium and large cap companies. Due to the exclusion of small and medium cap companies as well as companies outside a specified interval of market-to-book it is reasonable to expect a limited impact, however not negligible, from these risk factors. Compared to the approach in Fama & French (1993) the dependent portfolios are not constructed from differences in size and BE/ME and will in general consist of a mix of these. This limits the possibility to draw any logical and detailed conclusions on the coefficients. But in broad terms, based on the results of Fama & French (1993), the coefficients for size (β_2) can be expected to have a positive value below 1 while for the coefficients for book-to-market equity (β_3) a negative value above -1.

Portfolios with high ROE (β_4) or high R_OCI (β_5) are expected to have positive coefficients whereas the opposite are expected for portfolios with low ROE or low R_OCI. This reflects the trivial assumption that companies with good profitability are expected to perform better in the market compared to those with poor profitability. The absolute magnitude of the coefficients indicates the persistence of these value effects. A coefficient above 1 in absolute terms, $|\beta_i| > 1$, means that a 1% change in R_OCI are reflected in a price change larger than 1% and implicitly an underlying belief among investors' that the value effects are persistent into future time periods. A coefficient equal to 1, $|\beta_i| = 1$, reflect a simple 1:1 correspondence and a coefficient below 1, $|\beta_i| < 1$, reflect a belief among investors that the value effects are not persistent into future periods and mean reverting. Consequently, the absolute magnitude will tell us how good R_OCI is as a predictive measure of a firm's future performance.

Since excess returns are used, the intercept are expected to be 0 which will indicate a well specified model.

Expected portfolio returns

The change in portfolio returns across the 16 dependent portfolios is the main factor for evaluating the association between OCI-return and stock return. We expect the portfolio returns to change on a par with the corresponding changes in R_OCI. Assuming that companies with good profitability perform better in the market compared to those with poor profitability the expected pattern for these portfolios would be a lower return for those portfolios with a low R_OCI gradually increasing in portfolio return when R_OCI increases.

Extreme values, statistical tests and heteroscedasticity

Companies with a negative book value of equity during any period will be removed from the data set. A Market-to-Book restriction of values between 0.8 and 10.0 is used. A lower upper bound of 5.0 would unfortunately reduce the number of companies to the extent that too few companies remain to be sorted into the portfolios such that the risk of not getting a diversified portfolio becomes too big. This risk is believed to have worse effects on the results than if a few growth companies are included; hence, we favor a good amount of observations.

The coefficients are tested using a t-test where the significance is determined on a 10%, 5% or 1% level. To account for potential heteroscedasticity in the data, the Huber/White sandwich estimator is used.

Autocorrelation

We test for autocorrelation in the explanatory returns and in the regression residuals for the dependent portfolios using the Ljung-Box test for white noise. If any return series are autocorrelated, the autocorrelation function (ACF) or the partial ACF (PACF) is used to determine the number of lags/moving averages. The results from model (M3), adjusted with an ARMA (p, q) model, is then tested to infer if any major changes occur. This is done to ensure robust results.

In short, autocorrelation in any of the explanatory variables can cause the standard errors to be underestimated and the t-scores overestimated which might result in incorrect inference from the model. Autocorrelation can either be due to time lags in the explanatory returns or due to changing averages (beta-values) over time for which the error term will be related against. The ARMA model will correct for these two undesired effects in the following manner:

Time lags: using an autoregressive model, AR(p), on a return series $\{x_t\}$ simply introduce the relationship $x_t = \alpha_0 + \sum_{i=1}^{p} \alpha_i x_{t-i} + \varepsilon_t$where p decides the number of time periods to be lagged. In some sense, this effect can be related to an inefficient market bias (section 4.3) and a lagged market reaction due to information drifts.

Changing beta-values: using a moving-average model, MA(q), on a return series $\{x_t\}$ introduce the relationship $x_t = \sum_{i=0}^{q} \beta_i \varepsilon_{t-i}$ where q decides the number of time periods to be lagged. This effect can be related to a change in the underlying trend of the return series, sometimes referred to a structural break in macroeconomics. In terms of this study and especially HOMLO it would rather indicate some trend change due to e.g. a change in how the market interpret the OCI and the underlying value relevance. However, a more detailed interpretation of this is beyond the scope of this study.

The AR and MA will transfer the undesired effects from the unobservable error terms to variables we can observe improving the correctness in the significant levels, coefficient values and the R-square improving the overall robustness of the models and the results.

3.3 ASSUMPTIONS, SUMMARY OF THE MODELS AND POTENTIAL MEASUREMENT ERRORS

Efficient capital markets

An essential assumption throughout this paper is the assumption of efficient capital markets (Ohlson, 1995; Barth, Beaver, & Landsman, 2001). All the relevant accounting information at closing balance date t is expected to be directly incorporated into the market prices at date t. This is a necessary assumption in order to ensure comparability with previous research and for a comprehensible study design. However, extensive research on post-earnings announcement drifts (Bernard & Thomas, 1989; Liu, Strong, & Xu, 2003; Lo & MacKinlay, 1990; Setterberg, 2011) indicates the opposite. To fully understand the implications of assuming an efficient market in an inefficient market we rely on the work by Barth, Beaver & Landsman (2001) and Aboody, Hughes & Liu (2002).

However, Barth, Beaver & Landsman (2001) conclude that it is not an essential requirement to assume market efficiency in the sense that observable market values are unbiased measures of the "true" unobservable market values. Assume a scenario where share prices are only the reflection of investors' consensus beliefs, i.e. not the true market values, then the result from a value relevance study will show the extent to which OCI reflects the amounts of value implicitly assessed by investors to be reflected in share prices. In an opposite scenario, if market efficiency *is* assumed the result from a value relevance study will instead show the extent to which OCI reflects the amounts of value of the true underlying market value. It is obvious that studies of value relevance are indifferent to which assumption that holds both will generate equally important results. One must not forget that value relevance studies are designed to assess whether particular accounting amounts reflect information that is used by investors in valuing firms, not to estimate firm value.

Building on this reasoning, Aboody, Hughes & Liu (2002) studied the consequences on the estimated coefficients if an inefficient market is not considered. They conclude that conventional value relevance regressions fail to pick up the price effects from an information drift. If the prices are not corrected the coefficients will on average be underestimated. This issue will not affect the statistical significance and any conclusions *if* a variable is value relevant, only the magnitude. In favor of a parsimonious study design we will not use any of the suggested price corrections made by Aboody, Hughes & Liu (2002).

Unbiased estimators

Another important assumption is that of unbiased estimators. When constructing the models it is essential to include all of the variables believed to have a relevant influence on the dependent and the independent variables to avoid "hidden" effects not specified in the model. This is a matter of statistical cross correlation between the variables influencing the reliability of the results. If an explanatory variable with large correlation to the other variables is omitted there will be traces of this cross correlation hidden in the coefficients of the remaining explanatory variables causing the test statistics to be biased. This is referred to the omitted variable bias. Simply speaking, an omitted variable bias will create biased estimators.

The obvious way to handle this issue is to specify the model in such a manner that there are no omitted variables. In this study, the assumption of unbiased estimators is believed to hold, at least in theory, motivated by the discussion in (A4a) and (A4b).

Table 6 summarizes the models and Table 7 summarizes the underlying assumptions made in deriving the models and the potential measurement errors.

TABLE 6 SUMMARY OF ALL MODELS TESTED

Model	
The redefined RIV model	
$P_t = \alpha_0 + \beta_1 BV_t + \beta_2 NI_t + \beta_3 OCI_t + \varepsilon_t$	(M1)
$P_t = \alpha_0 + \beta_2 NI_t + \beta_3 OCI_t + \varepsilon_t$	(M2)
The five factor model	
$r_{i,t} - r_{f,t} = \alpha_0 + \beta_1 r_{m,t} + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 HRMLR_t + \beta_5 HOMLO_t + \varepsilon_t$	(M3)

Description: model (M1) and (M2) are derived from the redefined RIV model, model (M3) use the Fama French three factor model extended with return on equity (HRMLR) and OCI-return (HOMLO). BV represent book value of equity per share, NI net income per share and OCI other comprehensive income per share. The explanatory variables r_m, SMB and HML in (M3) represent market excess return, small minus big (size) and high minus low (book-to-market), regressed against portfolio excess return $r_i - r_f$ at time t.

TABLE 7 ASSUMPTIONS AND POTENTIAL MEASUREMENT ERRORS

Assumptions in the redefined RIV model		*Assumption in the five factor model*	
The PVED model holds	(A1)	The arbitrary split of ranked companies don't affect the results	(A7)
The clean surplus relation holds	(A2)		
MM dividend irrelevance proposition holds	(A3)		
The series $\{RI_\tau\}_{\tau \geq 1}$ satisfy an AR process	(A4)		
Adding risk, $r_E > r_f$, don't break the previous assumptions	(A5)		
The choice of accounting standard don't affect the redefined RIV model	(A6)		
Potential errors in the redefined RIV model		*Potential errors in the five factor model*	
- The approximation in (7) might be too simplistic, increasing the models' sensitivity to extreme values.		- Other common risk factors, such as momentum (Carhart, 1997), not accounted for will decrease the overall robustness of the model and the estimated coefficients.	
- Ignored autocorrelation can cause the standard errors to be underestimated (and the t-scores overestimated) leading to overestimated significance levels.			

4 DATA

This section is structured as follows. First, the method described in the previous section requires a large amount of data to be collected and analyzed. Several criteria for this data need to be fulfilled in order to qualify for the final sample. These criteria are presented in Table 8. In this section the data collection process and data quality are also discussed. Second, descriptive statistics of the final sample are presented for the two markets, Europe and America. Last, potential biases in the data are reviewed.

TABLE 8 DATA SELECTION CRITERIA

	Criteria
(1)	Accounting and market data must be available in Compustat, Datastream and financial reports.
(2)	Comprehensive income must be reported quarterly or every 6 months since June 2009.
(3)	The firm must be listed throughout the whole time period:
	- For the European data between June 2009 until December 2013
	- For the American data between June 2009 until March 2014.
(4)	No negative book value of equity.
(5)	Market-to-Book ratio between $0.8 \leq MEBE \leq 10.0$ throughout the whole time period.

In order to increase the number of observations, quarterly or half-year reports are used. Only large cap companies are included to ensure good quality and availability of quarterly reports. Further on, no restriction on industry is made.

4.1 DATA COLLECTION PROCESS AND DATA QUALITY

Constituents from the market indices S&P Europe 350 and S&P 500 are used. In Table 9 the number of companies sorted out in the data collection process is presented.

TABLE 9 DATA COLLECTION PROCESS FOR THE EUROPEAN AND THE AMERICAN DATA

Data criteria	*No. of companies*					
	S&P Euro 350		**S&P 500**		**Total**	
1. Full list of constituents	350	100%	500	100%	850	100%
2. Missing observations or inconsistencies in the reported accounting data	-109	-31%	-80	-16%	-189	-22%
3. No reported CI	-20	-6%	0	0%	-20	-2%
4. Negative book value of equity	-4	-1%	-1	0%	-5	-1%
5. Market-to-Book ratio between $0.8 \leq MEBE \leq 10.0$	-91	-26%	-137	-27%	-228	-27%
Total	126	36%	282	56%	408	48%

Description: the table illustrates the data loss from the original constituents of S&P Europe 350 and S&P 500 based on the data criteria imposed in Table 8.

The S&P Europe 350 is a value weighted equity index drawn from 17 major European markets, covering approximately 70% of the region's market capitalization. The quarterly data range between 30th of June 2009 and 31st of December 2013. The final sample consists of 126 companies. This adds up to 19 observations per firm. A few companies have broken fiscal year which results in 18 observations. For companies only reporting on a half-year basis, the quarterly number is approximated by taking the mean of the half-year number. 13 companies report their accounting numbers in a different currency than their quoted stock price and have been translated to the reporting currency using daily FX spot rates.

The S&P 500, also value weighted, consist of the 500 leading large cap companies listed on the NYSE and the NASDAQ covering approximately 75% of the total market capitalization. The sample consists of quarterly data between 30th of June 2009 and 31st of March 2014. The final sample consists of 282 companies. This adds up to 20 observations per firm. A few companies have broken fiscal year which results in 19 observations.

Data sources

The European accounting data is collected from Compustat Global - Fundamentals Quarterly and CRSP/Compustat Merged (CCM) Database - Fundamentals Quarterly. The Compustat database does not include any reported numbers of CI or OCI. Instead, this data is manually gathered from each firm's quarterly or half-year financial report.[12] The American accounting data, including CI, are collected from CRSP/Compustat Merged (CCM) Database - Fundamentals Quarterly.

Stock prices have been retrieved from Datastream using daily closing prices adjusted for any capital action such as stock splits. Companies that report their accounting numbers in a different currency than their quoted stock price have been translated to the reporting currency using daily FX spot rates from Datastream and Worldscope. The S&P Europe 350 is used as a proxy for the market portfolio for the European data whereas S&P 500 is used for the American data. The national risk free rates are also retrieved from Datastream and Worldscope.

Compustat, Datastream and Worldscope are considered very reliable and regularly used data sources in accounting research. The European CI data has been gathered manually and the risk of input errors is a factor to be considered. However, diligent review using Stata (a statistical software program) of the final sample has been done to reduce any data errors. Thus, the quality of the data is considered high.

4.2 DESCRIPTIVE STATISTICS

This section presents the data characteristics of the sample. More detailed statistics of the overall distribution among countries, industries and specific OCI items can be found in Exhibit 1 to 6.

4.2.1 S&P EUROPE 350

The European sample (126 companies) has a country bias towards UK companies (29%) and an industry bias towards industrial companies (85%). Companies in the Bank/Savings & Loans, Insurance and Other financials industry have been sorted out completely, decreasing from 9%, 5% and 5% in the original list of 350 companies to 0% in the reduced sample (see Exhibit 1). In section 4.3 the effects from these biases will be discussed further.

[12] This database is available for anyone interested, please send an email inquiry to the authors for access.

TABLE 10 DESCRIPTIVE STATISTICS FOR THE EUROPEAN DATA (EUR)

Variable	*Mean*	*Standard deviation*	*Min*	*1st Quartile*	*Median*	*3rd Quartile*	*Max*
Price	47	142	0.4	9	19	40	1,915
BV	7,738	11,498	209	1,847	3,589	8,086	86,723
NI	280	547	-3,339	56	118	317	6,602
CI	242	592	-3,759	35	95	263	10,152
OCI	-38	417	-4,918	-76	-11	37	6,588
CSO	927	1,194	8	211	436	1,190	8,086
EPS	0.64	1.73	-13.28	0.11	0.30	0.64	17.89
CPS	0.54	1.72	-12.87	0.06	0.24	0.58	20.91
Market beta	0.96	0.50	-0.40	0.57	0.91	1.28	3.66
r_f	0.75%	0.63%	0.05%	0.29%	0.53%	1.03%	3.03%
r_M	8.00%	0.00%	8.00%	8.00%	8.00%	8.00%	8.00%
r_E	8.40%	4.18%	-2.96%	5.06%	8.12%	11.18%	30.94%

Description: Price (share price in EUR), BV (book value of equity adjusted for deferred taxes and preferred stocks in mEUR), NI (net income in mEUR), CI (comprehensive income in mEUR), OCI (other comprehensive income in mEUR), CSO (common shares outstanding in millions), EPS (earnings/net income per share in EUR), CPS (comprehensive income per share in EUR), Market beta is calculated as a 3-year rolling beta against S&P Europe 350 using CAPM, r_f (risk free rate), r_M (historical market risk premium), r_E (required return on equity).

The average beta value is around 1, consistent with using large mature companies. The risk free rate (r_f) is an equally weighted average of all the national 3-month T-bill rates and the market risk premium (r_M) is set to a value of 8%, based on a historical mean (Damodaran, 2014). The required return on equity (r_E), derived from CAPM[13], is 8.40%. Worth noting is the unusually low interest rate throughout the period, which can be attributable to the governmental efforts to handle the effects of the financial crisis in 2008 followed by the dip in 2011.

The average OCI has for the most part been negative. Thus, in order to understand the drivers for OCI, and which item that are the most influential in our sample, we examine the distribution among all the OCI items (see Exhibit 2 and Exhibit 3). Translation differences (48% and on average negative) and cash flow hedges (14% and on average positive) added together account for more than half of the total OCI. According to the discussion in section 3.2.1, this will likely affect the magnitude of the estimated coefficient of OCI to be below the expected value of $1/r_E$ as well as the sign.

4.2.2 S&P 500

The American sample (282 companies) also consists of a majority industrial companies (81%) and minor part financial companies (10%, see Exhibit 4). In section 4.3 the effects from the industry bias are discussed in more detail.

[13] A 3-year rolling beta against S&P Europe 350 or S&P 500 is calculated for each company.

TABLE 11 DESCRIPTIVE STATISTICS FOR THE AMERICAN DATA (USD)

Variable	*Mean*	*Standard deviation*	*Min*	*1st Quartile*	*Median*	*3rd Quartile*	*Max*
Price	53	42	3.7	30	44	64	561
BV	12,144	22,814	200	2,527	5,235	11,113	279,332
NI	450	984	-6,645	84	175	416	15,877
CI	492	1,169	-6,534	78	176	447	14,225
OCI	41	529	-10,232	-17	5	49	9,244
CSO	659	1,222	27	158	293	570	10,685
EPS	0.79	0.93	-7.16	0.37	0.65	1.05	16.49
CPS	0.83	1.10	-9.49	0.34	0.66	1.15	16.91
Market beta	1.10	0.51	-0.09	0.74	1.03	1.41	3.67
r_f	0.09%	0.05%	0.01%	0.04%	0.07%	0.13%	0.19%
r_M	8.00%	0.00%	8.00%	8.00%	8.00%	8.00%	8.00%
r_E	8.86%	4.07%	-0.63%	5.96%	8.35%	11.36%	29.58%

Description: Price (share price in USD), BV (book value of equity adjusted for deferred taxes and preferred stocks in mUSD), NI (net income in mUSD), CI (comprehensive income in mUSD), OCI (other comprehensive income in mUSD), CSO (common shares outstanding in millions), EPS (earnings/net income per share in USD), CPS (comprehensive income per share in USD), Market beta is calculated as a 3-year rolling beta against S&P 500 using CAPM, r_f (risk free rate), r_M (historical market risk premium), r_E (required return on equity).

Consistent with the logic previously discussed, the average beta is as expected around 1. The risk free rate (r_f) is the national 3-month T-bill and the market risk premium (r_M) is set to a value of 8%, based on a historical mean (Damodaran, 2014). The required return on equity (r_E), derived from CAPM, is 8.86%, marginally higher than the European data.

The average OCI in this sample is positive unlike the European data which is negative. Regarding the distribution of specific OCI items (see Exhibit 5 and Exhibit 6), two interesting comparisons with the European data can be made. First, the translation differences (29%) are less influential and have on average been positive. Second, gains and losses for the defined benefit plans (39%) are negative and more influential than in the European case. According to the discussion in section 3.2.1, these differences will likely affect the magnitude of the estimated coefficients of OCI, for the American data, to be closer to the expected value of $1/r_E$ and consequently higher than for the European data with a positive sign. This difference opens up for an interesting comparison of OCI.

4.3 DATA BIASES

To summarize the data section, a short discussion about potential data biases now follows. When selecting a subsample out of a larger population it is essential for this sample to be free from any variable characteristics due to the selection process itself. Acknowledging these data selection biases can permit us to control for the effects in a proper manner in order to improve the overall robustness.

Selection biases

Excluding companies not quoted during the whole period or companies with negative book value of equity can cause a survivorship bias and skew the average performance. For example, excluding distressed companies will positively skew the mean market performance when calculating r_E and, thus, underestimate the expected coefficients of the NI and OCI given by $1/r_E$. However, in terms of actual results this will not affect our study since the models (M1) and (M2) do not depend on us calculating the required return on equity.

The fact that only large cap companies are included can cause heteroscedasticity in the data, an issue noticed by Tsalavoutas, André & Evans (2012). Using the Huber/White sandwich estimator in the regressions will mitigate this issue.

Market inefficiency bias

The discussion in section 3.3 concludes that market inefficiencies can cause the coefficients to be underestimated (Aboody, Hughes, & Liu, 2002). The effects are most pronounced in return regressions where the mean estimated regression coefficients can be approximately 90% lower if price drifts are not adjusted for. When the RIV model is used, the mean estimated regression coefficients can be approximately 24% lower. Since no adjustments are made for this in the redefined RIV model it is reasonable to expect that any market inefficiencies will cause the magnitude of the estimated coefficients to be lower than the "true" values. However, in the five factor model we correct for possible autocorrelation by allowing for time lags which might mitigate these negative effects to some extent.

Accounting standard bias

Clarkson, Hanna, Richardson & Thompson (2011) and Gjerde & Sættem (2008) conclude that the influence from national accounting standards can cause the appearance of unrealistic asset value changes if a company moves from a national and more conservative accounting into fair value accounting (IASB or FASB). This issue is mitigated by excluding all companies that do not report CI in the beginning of 2009 (or later), ensuring that no such transitions between accounting methods takes place.

Country and industry bias

In the European sample UK companies dominate. A possible data bias that can arise from this is if different countries apply different accounting standards, however, as concluded above this is not a problem in our sample. Any issue with potential UK specific fixed effects will be controlled for in the regression using a fixed effect correction.

The majority of industrial companies in the sample will most likely affect which components of OCI have the most influence on the generalized results. For example, translation differences and cash flow hedges ought to be more common in industrial companies than in e.g. financial companies and based on the discussion in section 3.2.1 the coefficient for OCI will decrease due to this; $\beta_3 < 1/r_E$. Fortunately the two samples have an almost identical distribution across industries with over 80% industrial companies which will allow for a fair comparison.

5 EMPIRICAL RESULTS AND INTERPRETATIONS

This part is structured in two main sections. First, the results from the redefined RIV model, (M1) and (M2), are presented and analyzed for the European and the American data. Second, the result from the five factor model (M3) is presented and analyzed. The discussion in each part will focus on the economic interpretation, the differences between the models and the differences between the two samples.

5.1 THE REDEFINED RIV MODEL

The results from models (M1) and (M2) for the European and the American data is presented in Table 12.

TABLE 12 REGRESSION RESULTS FROM THE REDEFINED RIV MODEL (M1) AND (M2)

Model		Market-to-Book	α Intercept *(t-Stat)*	β1 BV *(t-Stat)*	β2 NI *(t-Stat)*	β3 OCI *(t-Stat)*	N	R^2 (overall)
RIV *S&P Euro 350*	M1	0.8 ≤ M/B ≤ 5.0	-1.329 *(-0.43)*	2.197*** *(11.04)*	4.156 *(1.02)*	-0.895 *(-1.05)*	2,065	0.882
RIV *S&P Euro 350*	M2	0.8 ≤ M/B ≤ 5.0	34.132*** *(11.55)*		7.671 *(1.46)*	-0.510 *(-0.45)*	2,065	0.586
RIV *S&P Euro 350*	M1	0.8 ≤ M/B ≤ 10.0	-13.767 *(-0.74)*	3.373*** *(2.91)*	4.493 *(1.06)*	-1.551* *(-1.89)*	2,388	0.761
RIV *S&P Euro 350*	M2	0.8 ≤ M/B ≤ 10.0	39.409*** *(9.55)*		11.334* *(1.76)*	-0.653 *(-0.64)*	2,388	0.785
RIV *S&P 500*	M1	0.8 ≤ M/B ≤ 5.0	11.949*** *(4.22)*	1.448*** *(11.39)*	2.904*** *(3.34)*	1.522*** *(4.22)*	4,183	0.718
RIV *S&P 500*	M2	0.8 ≤ M/B ≤ 5.0	43.350*** *(27.04)*		8.279*** *(4.00)*	2.579*** *(4.74)*	4,183	0.455
RIV *S&P 500*	M1	0.8 ≤ M/B ≤ 10.0	15.369*** *(4.75)*	1.587*** *(10.48)*	4.099*** *(4.72)*	1.311*** *(3.22)*	5,615	0.529
RIV *S&P 500*	M2	0.8 ≤ M/B ≤ 10.0	46.049*** *(32.24)*		9.266*** *(5.14)*	2.407*** *(4.91)*	5,615	0.388

Description: the below defined models are tested on European companies (denoted S&P Euro 350) between Jun 2009 – Dec 2013 and American companies (denoted S&P 500) between Jun 2009 – Mar 2014. Two sets of data for each market are tested based on different Market-to-Book ratios. The interval between 0.8≤M/B≤5.0 is an attempt to only include companies close to steady state whereas the interval between 0.8≤M/B≤10.0 also allow for growth companies. Quarterly time periods are used. BV (book value of equity per share adjusted for deferred taxes and preferred stocks in EUR/USD), NI (net income in per share in EUR/USD), OCI (other comprehensive income per share in EUR/USD). The symbols ***, **, and * indicates the statistical significance at 1%-, 5%- and 10%-confidence level. Model (M1): $P_t = \alpha_0 + \beta_1 BV_t + \beta_2 NI_t + \beta_3 OCI_t + \varepsilon_t$,
Model (M2): $P_t = \alpha_0 + \beta_2 NI_t + \beta_3 OCI_t + \varepsilon_t$.

R-square values, market-to-book ratio and robustness

The first thing to determine is whether the models and the data are robust enough in order to make reliable interpretations of the results. The R-square values tell us how much explanatory power the explanatory variables have in the different models. The European data shows satisfactory R-square values between 0.6 and 0.9 and the American data a bit less satisfactory values between 0.4 and 0.7. These values are consistent with similar studies (Barth, Landsman, & Wahlen, 1995; Hodder, Hopkins, & Wahlen, 2006; Khan & Bradbury, 2014) which produce values between 0.7 and 0.9. Based on this, the models can indeed be considered reliable. The average market-to-book ratio is between 2.5 and 2.9 (Table 13) indicating that most of our companies are within a reasonable interval of market-to-book considering the q-values from Runsten (1998). Allowing for a higher upper bound, i.e. adding growth companies with a market-to-book between 5.0 and 10.0, three out of the four models decrease significantly in R-square. The sought effect appears more evident when limiting the companies to those assumed to be close to steady state, as were expected.

TABLE 13 DESCRIPTIVE STATISTICS OF THE VARIABLES IN THE REDEFINED RIV MODEL

Variable (per share in EUR/USD)	*Mean*	*Standard deviation*	*Min*	*1st Quartile*	*Median*	*3rd Quartile*	*Max*
S&P Euro 350							
Stock price	47	142	0.4	9	19	40	1,915
BV	17	34	0.1	3	9	18	347
NI	0.63	1.71	-13.28	0.11	0.30	0.63	17.89
OCI	-0.09	1.07	-15.81	-0.16	-0.03	0.08	11.44
Market-to-Book	2.54	1.32	0.84	1.64	2.25	3.02	9.11
S&P 500							
Stock price	53	42	4	30	44	64	561
BV	22	19	3	11	17	26	278
NI	0.79	0.93	-7.16	0.37	0.65	1.05	16.49
OCI	0.04	0.57	-8.40	-0.06	0.02	0.15	7.07
Market-to-Book	2.86	1.55	0.84	1.69	2.47	3.60	9.98

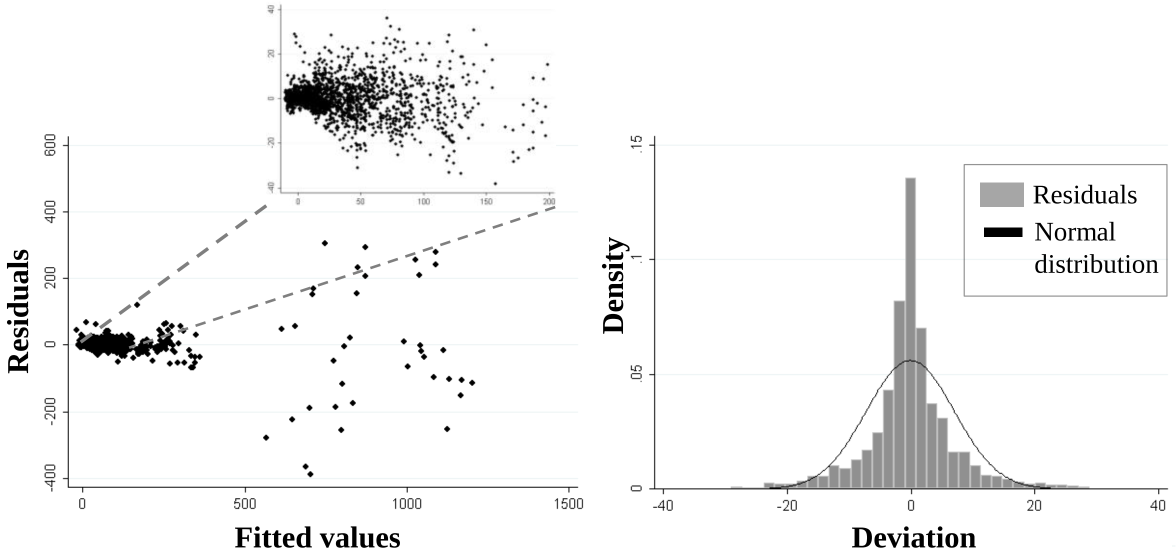
Description: Stock price in EUR/USD, BV (book value of equity per share adjusted for deferred taxes and preferred stocks in EUR/USD), NI (net income in per share in EUR/USD), OCI (other comprehensive income per share in EUR/USD), Market-to-Book is calculated by Stock price divided by BV.

The regression residuals from model (M1) and (M2), using companies with a market-to-book ratio between 0.8 and 10.0, are examined for heteroscedasticity and non-linearity in Graph 1 and 2. A stochastic error term free from heteroscedasticity and non-linearity will ensure a well specified model. This is done by analyzing the residuals in the traditional sense by plotting the residuals against the fitted values and looking at the residual distribution. Since the residuals and the fitted values are not standardized (which turned out to be very difficult to do for panel data), a scale effect due to the underlying absolute values (i.e. not returns) in the data will create larger magnitudes of differences and decrease the objectiveness in interpreting the plots.

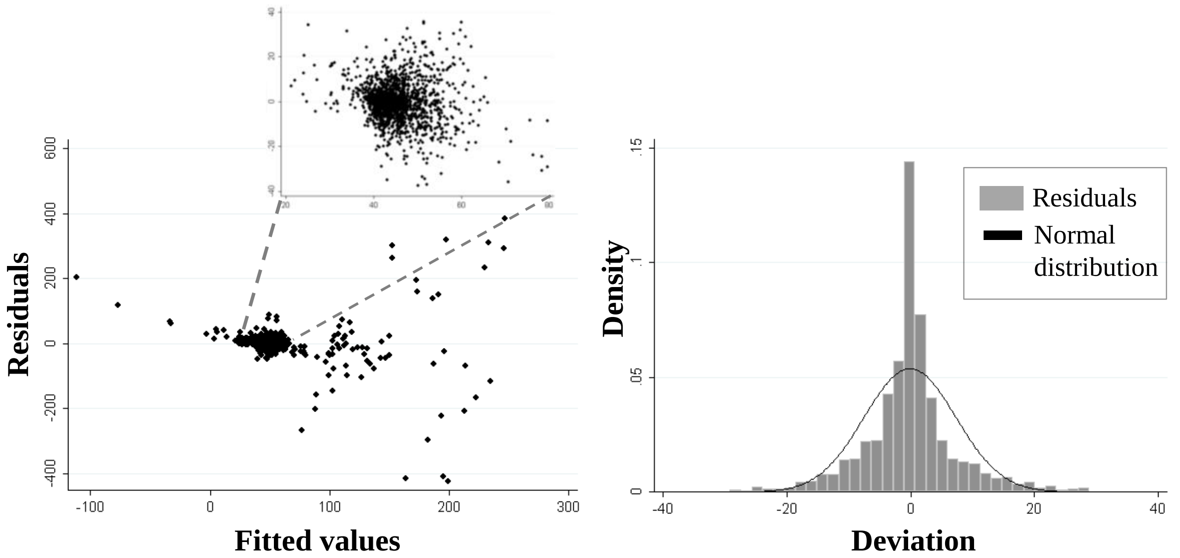
In the left hand plot we seek a pattern where the residuals roughly form a “horizontal band” around the zero line indicating a homoscedastic linear model. Any undesired correlation between the residuals and the fitted values will show a different pattern and indicate heteroscedasticity or non-linearity. Due to the above mentioned scale effect the density will not indicate any heteroscedasticity or non-linearity. In the right hand plot we seek a distribution close to the normal distribution with zero mean.

GRAPH 1 RESIDUALS VS. FITTED VALUES AND RESIDUAL DISTRIBUTION, EUROPEAN DATA

Model (M1)



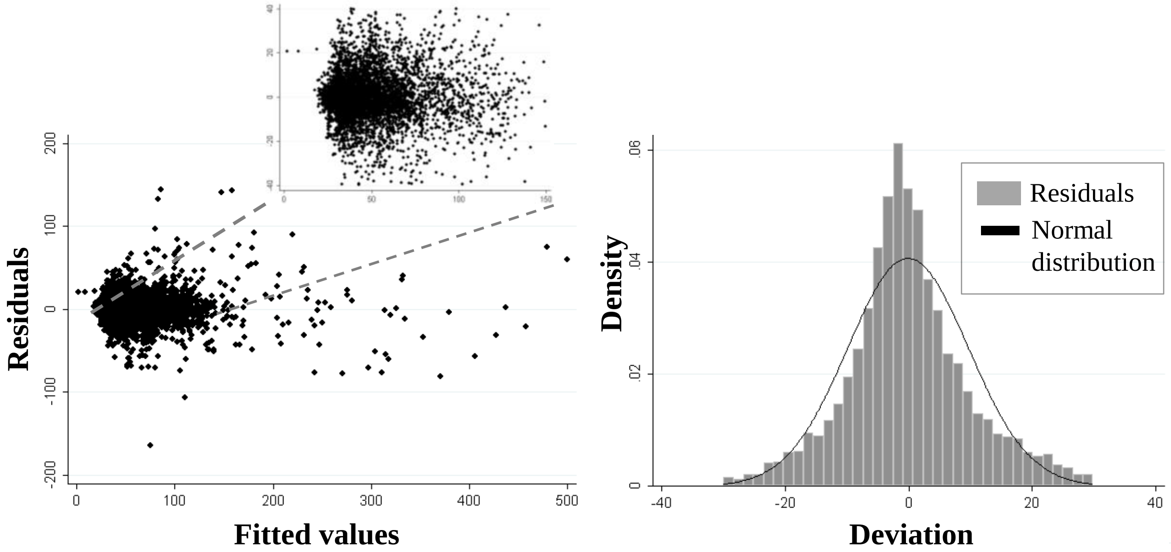
Model (M2)



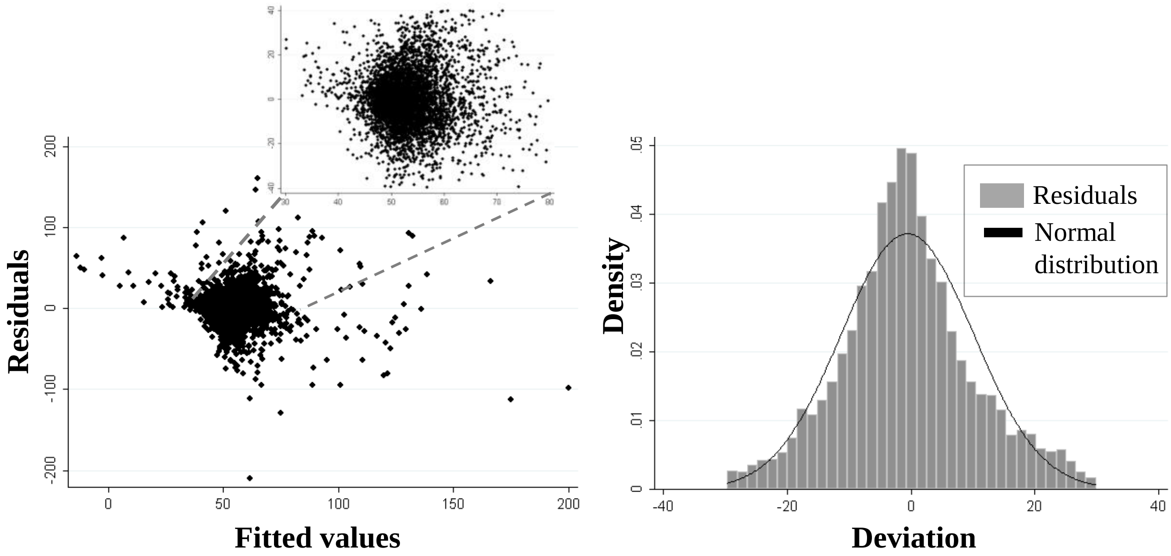
Description: The left hand rvf plots (residuals vs. fitted values) illustrate visually the characteristics of the models error terms for the European data. A uniform pattern around the zero line indicates a stochastic distribution free from heteroscedasticity or non-linearity. The right hand histogram shows the density around zero, here we seek a pattern close to the normal distribution with mean zero.

GRAPH 2 RESIDUALS VS. FITTED VALUES AND RESIDUAL DISTRIBUTION, AMERICAN DATA

Model (M1)



Model (M2)



Description: The left hand rvf plots (residuals vs. fitted values) illustrate visually the characteristics of the models error terms for the American data. A uniform pattern around the zero line indicates a stochastic distribution free from heteroscedasticity or non-linearity. The right hand histogram shows the density around zero, here we seek a pattern close to the normal distribution with mean zero.

Looking at the left hand plot of residuals vs. fitted values it is clear that all the data regardless of model is free from non-linearity. However, both the European and the American data seem to have weak signs of heteroscedasticity for model (M1), indicated by the increased spread of the residuals in a cone-shaped pattern as the fitted values increases. A side note to be made from this is that the Huber/White sandwich estimator which is supposed to mitigate heteroscedasticity seems to work better for model (M2). Considering the residual distribution all the models show a randomly distributed residual close to the normal distribution with zero mean. This confirms no major statistical interference and well specified models.

Using the Wooldridge (2002) test for autocorrelation in panel data, both models show strong signs of autocorrelation[14]. An important note is that we use panel data depending on both time- and company variations compared to autocorrelation in a simple time dependent regression for one company. Kothari & Shanken (2003) examines the factors behind this and conclude that autocorrelation in the estimated coefficients is expected because *"...successive cross-sections of the levels of prices, earnings, and book values are correlated due to both persistent macro-economic and firm-specific factors. The residuals of the model capture the measurement errors in the proxies for expected future cash flows as well as discount rate effects, and are thus likely to be positively autocorrelated."* This effect can be adjusted by introducing lagged effects in the model specification. However, the focus remains on keeping the models simple and therefore no adjustments are made. We acknowledge that this decision might cause the significant levels to be overestimated.

In conclusion, the overall assessment is that the results are robust enough and free from any major statistical biases in order to continue with the analysis in a proper manner.

Value relevance of other comprehensive income

The European data shows negative OCI coefficients, however, in general not significantly different from 0. The negative coefficients can be explained by the characteristics of the data. The OCI is on average negative compared to an underlying positive stock market (Exhibit 7). A negative OCI in a positive stock market will show a negative association between OCI and stock price, thus, negative coefficients. The American data shows positive and significant OCI coefficients between 1.3 and 1.5 when BV is included and between 2.4 and 2.6 when BV is omitted. By the same logic the positive coefficients can be explained by the on average positive OCI. For the American data there is also a consistent increase, in the order of 10%, of the coefficients when companies with a market-to-book ratio above 5.0 are excluded. Arguably, the sought effect appears to become more apparent when limiting the sample to low market-to-book. However, this change is too small to draw any further conclusions from.

The results show a small and significant association between OCI and stock price in the American data. However, no such association can be found for the European data. A reasonable explanation for these differences rely on the assumption that some OCI components are less value relevant than other. Comparing the different compositions of OCI items (Exhibit 2 and Exhibit 5) and relating this to the discussion made in section 3.2.1, under *expected estimates*, European companies carry a larger fraction of translation differences, cash flow hedges and changes in revaluation surplus (65% compared to 42% for the American data), which are assumed to possess little or no value relevance and thus lowering the estimated coefficients. This reasoning can also explain the relative low magnitudes of OCI. The expected value of $\beta_3 \leq 1/r_E$ with an upper bound between 9 and 20 (corresponding to an implicit r_E between 5% and 11%) is considerably larger than the interval between 1.3 and 2.6. Thus, it seems reasonable to conclude that translation differences, cash flow hedges and changes in revaluation surplus will drastically lower the coefficient magnitudes and consequently lower the overall value relevance of OCI.

[14] Using companies with a market-to-book ratio between 0.8 and 10.0.

There are two other aspects worth acknowledging that might affect the results. First, in section 4.3 Aboody, Hughes & Liu (2002) argue that the effects from a potential market inefficiency bias can create underestimated coefficients when applying the RIV model. If the American market is more efficient than the European market, that is, if prices adjust faster to accounting information, this bias might affect the results. However, according to Aboody, Hughes & Liu (2002) this should not affect the statistical significance. Second, the effects from the crude approximation of residual income remain uncertain and might affect the results differently for the two markets. But with a solid statistical analysis and overall good R-square values our conclusion is that these effects are rather small and not very influential on the end results.

Value relevance of net income and book value of equity

Overall, net income and book value of equity deliver no surprises and are in line with the expectations. The second model (M2) shows NI coefficients between 7.7 and 11.3 (corresponding to an implicit r_E between 8.8% and 13.0%). Based on the calculated r_E (Table 10 and 11) these estimated coefficients are marginally lower than predicted, but still within a reasonable level considering the low interest rates in calculating r_E and the overall uncertainty added from the approximations made. Model (M1) shows BV coefficients between 1.5 and 3.4. These values are considerably higher than expected, which is unlikely the effect from off-balance-sheet net asset as previously discussed. A notable observation is when BV is added in model (M1). In general this causes the R-square to increase while the NI coefficients (and OCI coefficients) decrease by more than half. There is no reasonable explanation for these changes (and the large differences in BV) other than by statistical construction caused by an omitted variable bias. If a cross correlated variable is added/omitted in the model the already included variables' coefficients will change due to the statistical methods applied when running the regressions. A test for correlation shows that the average correlation for BV and NI is 0.32 for the European data and 0.36 for the American data. The average correlation for BV and OCI is 0.03 and 0.04 respectively and for NI and OCI -0.17 and -0.02 accordingly. The estimated coefficients of NI and OCI will change when BV is added as a function of these correlations. The change is somewhat larger for NI rationally from a higher correlation.

There is little point in arguing about the implications of the magnitudes of change since this is simply a statistical function of the magnitudes of the correlations between BV, NI and OCI. Arguably, the coefficients of NI for model (M1) is considerably lower than expected, but since both models are highly simplified there is little possibility to draw any useful conclusion about which values are more accurate. Rather, the important conclusion here is that the NI and BV coefficients are consistently higher and more significant than OCI for both models and both datasets illustrating an important distinction in the relative value relevance.

Modelling with other comprehensive income

The main conclusion so far is that the overall value relevance of OCI is small. And considering the fundamental importance of net income and book value of equity in financial analysis it is no surprise that BV and NI shows better significance and larger coefficients compared to OCI. Parsimonious valuation models are an important part of the financial markets and in order to evaluate the practical usefulness of other comprehensive income in financial modelling it is vital to understand each measure's individual impact on the models in use. This is done by comparing the change in explanatory power, R-square, of (M1) and (M2) when adding on each explanatory variable in a step-wise manner. Doing this both BV and NI proves to add a significant increase (>0.5) to R-square. OCI on the other hand add little explanatory power (<0.01 for the European data and <0.05 for the American). Hence, from a practitioner's point of view, creating a parsimonious valuation model based on the RIV model and adding on OCI only adds a small improvement. In the backlight of the approximations made to derive the model, these effects do not yield any relevant impact on the end results.

In conclusion from the redefined RIV model, the results show that other comprehensive income has a negligible positive effect on a company's market value. This effect appears to diminish rapidly if the company carries a large portion of translation differences, cash flow hedges and/or changes in revaluation surplus as a consequence of the mean reverting characteristics of these items. Compared to net income and book value of equity, other comprehensive income is not a particularly important measure and the overall usefulness in financial analysis and company valuation seem to be very limited.

5.2 THE FIVE FACTOR MODEL

The five factor model add the return measures ROE and R_OCI to the Fama French three factor model to determine if changes in these return measures are reflected in value changes after the conventional risk factors have been included. The excess return of 16 portfolios formed on ROE and R_OCI are the dependent variables. Table 14 presents the results from model (M3) for the four extreme portfolios HRHO, LRHO, HRLO and LRLO. Table 15 presents the return statistics for the explanatory variables.

TABLE 14 REGRESSION RESULTS FROM THE FIVE FACTOR MODEL (M3)

S&P Euro 350	α Intercept *(t-Stat)*	β1 Rm - Rf *(t-Stat)*	β2 SMB *(t-Stat)*	β3 HML *(t-Stat)*	β4 HRMLR *(t-Stat)*	β5 HOMLO *(t-Stat)*	N	Adj. R^2
HR HO	0.004	0.857***	-0.608**	-0.044	0.269	0.599***	54	0.569
	(1.00)	*(4.16)*	*(-2.09)*	*(-0.17)*	*(1.17)*	*(2.73)*		
LR HO	0.005	1.097***	-1.129**	-0.149	-0.333*	1.237***	54	0.706
	(0.81)	*(6.71)*	*(-2.62)*	*(-0.55)*	*(-1.79)*	*(3.71)*		
HR LO	0.011**	0.716***	-0.530*	-0.119	0.253	-0.137	54	0.390
	(2.41)	*(4.78)*	*(-1.74)*	*(-0.62)*	*(1.30)*	*(-0.71)*		
LR LO	0.013***	0.720***	0.012	-0.342	-0.509***	-0.043	54	0.285
	(2.71)	*(3.61)*	*(0.03)*	*(-1.24)*	*(-3.44)*	*(-0.22)*		

S&P 500	α Intercept *(t-Stat)*	β1 Rm - Rf *(t-Stat)*	β2 SMB *(t-Stat)*	β3 HML *(t-Stat)*	β4 HRMLR *(t-Stat)*	β5 HOMLO *(t-Stat)*	N	Adj. R^2
HR HO	0.004	0.874***	-0.258*	-0.154	0.278*	0.533**	58	0.847
	(1.66)	*(16.98)*	*(-1.96)*	*(-1.45)*	*(1.80)*	*(2.46)*		
LR HO	0.005*	1.029***	0.062	0.110	-0.396	0.438**	58	0.840
	(1.85)	*(12.91)*	*(0.36)*	*(1.02)*	*(-1.60)*	*(2.19)*		
HR LO	0.003	0.870***	-0.117	-0.252**	0.169	-0.436**	58	0.845
	(1.42)	*(19.02)*	*(-1.08)*	*(-2.00)*	*(1.26)*	*(-2.56)*		
LR LO	0.003	0.882***	-0.300**	0.144	-0.469**	-0.738**	58	0.747
	(0.81)	*(11.11)*	*(-2.29)*	*(0.80)*	*(-2.52)*	*(-2.46)*		

Description: the below defined model are tested on European companies (denoted S&P Euro 350) between Jun 2009 – Dec 2013 and American companies (denoted S&P 500) between Jun 2009 – Mar 2014. Monthly excess returns from the dependent portfolios (HRHO, LRHO, HRLO and LRLO) are regressed against Rm-Rf (market excess return), SMB (small minus big, size), HML (high minus low, book-to-market), HRMLR (high ROE minus low ROE) and HOMLO (high OCI-return minus low OCI-return). Model (M3): $r_{i,t} - r_{f,t} = \alpha_0 + \beta_1 r_{m,t} + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 HRMLR_t + \beta_5 HOMLO_t + \varepsilon_t$. The symbols ***, **, and * indicates the statistical significance at 1%-, 5%- and 10%-confidence level.

TABLE 15 RETURN STATISTICS FOR THE EXPLANATORY VARIABLES IN THE FIVE FACTOR MODEL

	Mean		*Median*		
Portfolio	*Monthly*	*Yearly*	*Monthly*	*Yearly*	*Standard deviation*
S&P Euro 350					
Rm - Rf	0.0%	-0.2%	0.7%	8.9%	3.9%
SMB	-0.6%	-6.9%	-0.7%	-8.1%	1.3%
HML	-0.2%	-2.5%	0.2%	1.9%	2.8%
HRMLR	0.4%	4.4%	0.4%	4.3%	2.0%
HOMLO	0.0%	-0.5%	-0.2%	-1.9%	2.0%
S&P 500					
Rm - Rf	1.1%	13.8%	1.7%	20.9%	4.1%
SMB	0.0%	-0.1%	-0.1%	-1.7%	1.6%
HML	-0.9%	-10.6%	-0.8%	-9.2%	1.6%
HRMLR	-0.2%	-2.5%	-0.4%	-5.0%	1.3%
HOMLO	-0.2%	-2.0%	-0.1%	-1.0%	1.2%

Description: Rm-Rf (market excess return), SMB (small minus big, size), HML (high minus low, book-to-market), HRMLR (high ROE minus low ROE) and HOMLO (high OCI-return minus low OCI-return).

R-square values, portfolio diversification and robustness

The HOMLO coefficients are significant for six out of the eight extreme portfolios. Compared to the benchmark R-square values of 0.9 in Fama & French (1993) the European data shows significantly lower values between 0.3 and 0.7 while the American data shows more stable values between 0.7 and 0.8. A rational explanation for the low significance and the low explanatory power for the European data is the amount of companies in the dependent portfolios. Elton & Gruber (1977) conclude that in order to have a properly diversified portfolio there should at least be between 15 and 20 stocks in that portfolio. As seen in Table 18 the European data can only produce an average of 6 to 10 stocks in any of the four extreme portfolios (descriptive statistics for all 16 portfolios can be found in Exhibit 8). This low amount of companies drastically reduces the validity of the European results. In terms of industry distribution, all portfolios consist on average of a majority of industrial companies. This limits the possibility to draw any relevant conclusions based on specific industry characteristics other than for industrial companies.

The regression residuals for the four extreme portfolios HRHO, LRHO, HRLO and LRLO show no signs of heteroscedasticity or non-linearity (See Exhibit 9). A more thorough analysis of autocorrelation will follow later in this section.

Considering the critique against the methods applied in Hodder, Hopkins & Wahlen (2006) and Khan & Bradbury (2014) the correlation among the explanatory variables are presented in Table 16. The cross correlation is in general small, but not negligible. Considering the harmful effects from biased estimators it appears that the five factor model successfully mitigates this.

TABLE 16 CORRELATION AMONG THE EXPLANATORY VARIABLES IN THE FIVE FACTOR MODEL

S&P Euro 350	Rm - Rf	SMB	HML	HRMLR	HOMLO
Rm - Rf	1.00				
SMB	-0.07	1.00			
HML	0.77	-0.06	1.00		
HRMLR	0.06	-0.05	0.05	1.00	
HOMLO	-0.02	-0.20	0.07	0.16	1.00

S&P 500	Rm - Rf	SMB	HML	HRMLR	HOMLO
Rm - Rf	1.00				
SMB	0.30	1.00			
HML	0.09	0.09	1.00		
HRMLR	0.02	0.03	-0.17	1.00	
HOMLO	0.09	-0.01	0.00	0.15	1.00

Description: Rm-Rf (market excess return), SMB (small minus big, size), HML (high minus low, book-to-market), HRMLR (high ROE minus low ROE) and HOMLO (high OCI-return minus low OCI-return).

The value relevance of other comprehensive income return

Table 15 illustrates the risk premiums for Rm-Rf, SMB and HML and the return premiums for HRMLR and HOMLO. These risk and return measures are created from highly diversified portfolios for which the beta becomes close to 1, $\beta_{4,5} \approx 1.0$. This permits us to compare the absolute return of HOMLO to HRMLR which turns out to be consistently lower for HOMLO. Hence, a company with a high return on equity will on average yield a higher stock return compared to a company with a high OCI-return on equity. This conclusion is reasonable considering that changes in net income are realized value changes directly attributable to the shareholders whereas any changes in other comprehensive income is unrealized value changes not directly attributable the shareholders and by definition more uncertain.

As previously argued, the absolute magnitude of the coefficients indicates the persistence of OCI's value effect on stock returns. In general the HOMLO coefficients are within unity indicating a mean reverting characteristics and value effects that are not persistent over time. Turning the focus to the change in portfolio returns and the relative performance of R_OCI compared to ROE. The aim is to construct 16 portfolios with different mixtures of ROE and R_OCI[15]. The logical pattern for these portfolios would be a lower return for those portfolios with a mixture of low ROE and low R_OCI gradually increasing in portfolio return when the ROE and/or R_OCI increase. For ROE, most portfolios see an increase in return when ROE increases (horizontal change in Table 17), however, no such pattern can be seen when R_OCI increases (vertical change in Table 17). This lack of change indicates an important distinction between the value relevance of R_OCI compared to ROE. R_OCI appears to add no effect to stock return. Further on, by comparing the R-square values from a step-wise regression (see Exhibit 10), Rm-Rf is the only variable adding a satisfactory amount of explanatory power to the model, on average 0.3 for the European data and 0.8 for the American data. HOMLO add on average 0.06 for the European data and 0.02 for the American data, a negligible amount.

In conclusion from the five factor model, the results show no clear signs of any association between OCI-return and stock return. This is an interesting observation which adds some

[15] If these portfolios are fully diversified the portfolio beta should be close to 1.0 and the portfolio returns should then be proportional to the market portfolio return. Both the European and the American market have been characterized by a strong bull market between 2009 and 2013 which explains the high portfolio returns.

arguments against the small effect seen in the redefined RIV model. Even if we cannot produce conclusive results for if the association between OCI and stock price is either small or zero, we can for certain say that OCI is much less value relevant compared to NI and BV. From a practitioners perspective this also supports the conclusion that the usefulness of OCI in financial analysis and company valuation modelling is indeed limited.

Market excess return, SMB and HML

A short review of the other parameters in Table 14 shows no major surprises. The coefficients for the market excess return, β_1, is significant close to 1. The small deviations are likely due to not fully diversified portfolios. The intercepts are as expected either indistinguishable from 0 or significant close to 0 indicating a well specified model. The HML is not significant for most portfolios which is expected from a sample consisting of only large cap companies. However, SMB adds a significant influence for five out of the eight portfolios which is an unexpected. The rationale behind this is not investigated further.

TABLE 17 PERFORMANCE OF HOMLO FOR THE 16 DEPENDENT PORTFOLIOS IN THE FIVE FACTOR MODEL

Yearly average return

S&P Euro 350	*ROE quartile*			
R_OCI quartile	*LR*	*2*	*3*	*HR*
LO	13.4%	12.1%	18.2%	17.9%
2	15.4%	2.8%	22.9%	26.7%
3	9.9%	15.3%	12.8%	22.9%
HO	11.6%	12.1%	17.4%	10.4%

S&P 500	*ROE quartile*			
R_OCI quartile	*LR*	*2*	*3*	*HR*
LO	17.1%	16.6%	16.7%	19.4%
2	19.1%	13.6%	21.3%	21.9%
3	17.4%	20.2%	16.6%	13.4%
HO	18.8%	17.6%	13.7%	16.4%

Yearly median return

S&P Euro 350	*ROE quartile*			
R_OCI quartile	*LR*	*2*	*3*	*HR*
LO	9.9%	19.2%	22.6%	19.5%
2	20.6%	12.3%	20.7%	29.4%
3	13.0%	10.6%	11.9%	23.3%
HO	20.0%	8.8%	15.1%	21.3%

S&P 500	*ROE quartile*			
R_OCI quartile	*LR*	*2*	*3*	*HR*
LO	15.4%	25.3%	26.0%	26.9%
2	7.4%	24.2%	18.6%	28.4%
3	17.5%	25.0%	24.2%	18.9%
HO	24.4%	20.0%	16.4%	24.7%

S&P Euro 350 market return	
2009/07 - 2013/12	
CAGR	10.3%
Yearly average return	10.6%
Yearly median return	9.9%

S&P 500 market return	
2009/07 - 2014/03	
CAGR	15.9%
Yearly average return	15.7%
Yearly median return	23.7%

Description: this table illustrates the average and median excess portfolio returns for the 16 dependent portfolios created from low ROE to high ROE companies (LR to HR) and low OCI-return, R_OCI, to high OCI-return companies (LO to HO). The returns are yearly returns calculated by multiplying the monthly returns by 12. The change in portfolio returns with changing ROE can be seen by following each row horizontally from LR to HR. The corresponding change in portfolio returns with changing R_OCI can be seen by following each column vertically from LO to HO. These returns should be in parity with the market returns found in the boxes to the right. CAGR represents compound annual growth rate.

TABLE 18 DESCRIPTIVE STATISTICS FOR THE FOUR EXTREME PORTFOLIOS IN THE FIVE FACTOR MODEL

	No. of companies in portfolio			*Industry (Average %)*					
Portfolio	*Average*	*Max*	*Min*	*Industrial*	*Utility*	*Transport-ation*	*Bank/ Savings & Loan*	*Insurance*	*Other Financial*
S&P Euro 350									
HR HO	8	15	1	73%	22%	6%	0%	0%	0%
LR HO	7	12	2	74%	23%	3%	0%	0%	0%
HR LO	10	14	6	77%	20%	3%	0%	0%	0%
LR LO	6	10	3	90%	8%	1%	0%	0%	0%
S&P 500									
HR HO	24	60	12	95%	1%	0%	0%	3%	1%
LR HO	15	22	10	66%	17%	3%	5%	4%	5%
HR LO	19	31	13	97%	0%	0%	0%	1%	2%
LR LO	18	25	13	72%	22%	1%	1%	2%	3%

Description: each portfolio corresponds to different mixtures of the bottom 25% and top 25% ROE and R_OCI (OCI-return) with HRHO (high ROE and high R_OCI), LRHO (low ROE and high R_OCI), HRLO (high ROE and low R_OCI) and LRLO (low ROE and low R_OCI).

Autocorrelation

As a final remark, the problem of autocorrelation discussed in section 3.2.2 need to be examined to ensure correct inference from the results and to improve the overall robustness. In general, by controlling for autocorrelation we remove statistical noise to get more accurate results, especially in an attempt to see if this improves the R-square values or changes the significance levels.

Table 19 goes through the procedures to control for autocorrelation. The Ljung-Box white noise test (Ljung & Box, 1978) is used in order to test for autocorrelation. Next, by adding on the best-fit ARMA model extension to (M3) the results might show to improve in significance levels and R-square values. The best-fit ARMA model is found by examining the ACF and PACF for the affected explanatory variable (see Exhibit 11).

After testing each ARMA extension to model (M3), only the AR(1) lag in the HRLO return series for the European data and the AR(2) lag in the LRLO return series for the American data add any notable difference to the original results, however no major surprises. Table 20 presents the regression results for these extensions of (M3). The fact that only a limited amount of autocorrelation exists and the effect from this is small confirms that the original model (M3) works well in explaining price changes.

The main conclusion from these tests is that both ROE and R_OCI shows no autocorrelation, i.e. there is no evidence of any lagged value effects in the stock price connected to these return measures. Thus, the conclusions previously drawn are still valid.

5.3 EMPIRICAL RESULTS COMPARED TO PREVIOUS STUDIES

Given the results from the redefined RIV model it is of interest to compare these findings to previous studies in order to verify or contradict previous conclusions. Three major topics are of interest to compare; (i) methods, statistical robustness and data, (ii) the value relevance of OCI, (iii) the predictive ability of OCI.

(i) The major contribution in this study is the focus on robustness and the development of more correct specified models. Compared to Dhaliwal, Subramanyam & Trezevant (1999), Biddle & Choi (2006) and Kanagaretnam, Mathieu & Shehata (2009) we use models that regress returns against returns and accounting values against accounting values which makes more sense than regressing returns against accoutning values. Our conclusions also focus on the relative differences in coefficients between NI and OCI rather than pure changes in R-square. Considering that R-square only acts as a sanitary check for statistical robustness we argue that our conclusions are based on differences better connected to the true underlying economic impact.

    In terms of data (using the analogy of firm-years) we cover 670 firm-years compared to 11,425 in the study by Dhaliwal, Subramanyam & Trezevant (1999) and 23,427 in the study by Biddle & Choi (2006). Considering this big difference in observations our models still produce better R-square values which indicates that our models appears to perform better. Another important factor to consider is the different distribution among industries. Our data consist of over 80% industrial companies whereas the data of Dhaliwal, Subramanyam & Trezevant (1999) and Biddle & Choi (2006) only consist of 40%. This will likely change the underlying composition of OCI which makes a direct comparison of "total" OCI difficult.

(ii) The results found in the redefined RIV model and the five factor model contrast to the results in Kanagaretnam, Mathieu & Shehata (2009) and Biddle & Choi (2006), however, verify the conclusions made by Dhaliwal, Subramanyam & Trezevant (1999) which also concluded that OCI is not associated to stock price. Due to the somewhat different model specifications and the differences in sample industry distribution, we see little use of comparing coefficients. However, if we narrow down the discussion to specific OCI items, the conclusions appears to be more unanimous. In line with most previous studies our results support that pension liabilities appears to be more value relevant than translation differences and cash flow hedges. Due to the low number of financial companies in our sample we cannot draw any reliable conclusions about the value relevance of marketable securities.

(iii) In line with Dhaliwal, Subramanyam & Trezevant (1999), Biddle & Choi (2006) and Kanagaretnam, Mathieu & Shehata (2009) our results also verify that the usefulness of OCI in financial analysis seems to be limited compared to net income.

TABLE 19 AUTOCORRELATION PROCEDURE, LJUNG-BOX TEST AND ARMA FOR THE FIVE FACTOR MODEL

Variable	S&P Euro 350					S&P 500				
	Q-statistics *(Prob)*	Conclusion	ARMA extension	Post Q-statistics *(Prob)*	Post conclusion	Q-statistics *(Prob)*	Conclusion	ARMA extension	Post Q-statistics *(Prob)*	Post conclusion
Rm - Rf (return series)	22.097 *(0.630)*	White noise				29.809 *(0.323)*	White noise			
SMB (return series)	38.064** *(0.046)*	Autocorrelation ➡	AR (1)	17.708 *(0.855)*	White noise	18.143 *(0.899)*	White noise			
HML (return series)	35.180* *(0.085)*	Autocorrelation ➡	ARMA (1,1)	27.967 *(0.309)*	White noise	15.698 *(0.956)*	White noise			
HRMLR (return series)	34.163 *(0.105)*	White noise				31.494 *(0.251)*	White noise			
HOMLO (return series)	21.355 *(0.673)*	White noise				16.892 *(0.934)*	White noise			
HR HO (post regression residual)	42.878** *(0.014)*	Autocorrelation ➡	ARMA (2,1)	26.115 *(0.347)*	White noise	26.133 *(0.511)*	White noise			
LR HO (post regression residual)	11.583 *(0.990)*	White noise				19.647 *(0.845)*	White noise			
HR LO (post regression residual)	34.577* *(0.096)*	Autocorrelation ➡	AR (1)	29.524 *(0.201)*	White noise	20.901 *(0.791)*	White noise			
LR LO (post regression residual)	11.329 *(0.991)*	White noise				47.293*** *(0.009)*	Autocorrelation ➡	AR (2)	31.178 *(0.222)*	White noise

Description: the Ljung-Box test for autocorrelation show if the residuals of each return series are white noise, i.e. random with mean zero. It is a portmanteau test where H_0: independently distributed residuals and H_1: not independently distributed residuals evaluated by the Q test statistics (chi-squared distribution). The symbols ***, **, and * indicates the statistical significance at 1%-, 5%- and 10%-confidence level. The ACF and PACF are used in order to determine the proper ARMA extension such that the autocorrelation are included in the model specification.

TABLE 20 REGRESSION RESULTS FROM THE ARMA EXTENSIONS TO THE FIVE FACTOR MODEL

S&P Euro 350	α Intercept *(t-Stat)*	β_1 Rm - Rf *(t-Stat)*	β_2 SMB *(t-Stat)*	β_3 HML *(t-Stat)*	β_4 HRMLR *(t-Stat)*	β_5 HOMLO *(t-Stat)*	β_6 HRLO, t-1 *(t-Stat)*		N	Adj. R^2	Δ Adj. R^2 compared to M4
HR LO	0.015**	0.736***	-0.435	-0.037	0.259	-0.167	-0.177*		53	0.419	0.029
	(2.40)	*(4.83)*	*(-1.38)*	*(-0.18)*	*(1.33)*	*(-0.85)*	*(-1.78)*				

S&P 500	α Intercept *(t-Stat)*	β_1 Rm - Rf *(t-Stat)*	β_2 SMB *(t-Stat)*	β_3 HML *(t-Stat)*	β_4 HRMLR *(t-Stat)*	β_5 HOMLO *(t-Stat)*	β_6 LRLO, t-1 *(t-Stat)*	β_7 LRLO, t-2 *(t-Stat)*	N	Adj. R^2	Δ Adj. R^2 compared to M4
LR LO	0.007	0.845***	-0.287**	0.142	-0.438**	-0.772***	-0.163**	-0.128**			
	(1.59)	*(11.43)*	*(-2.09)*	*(0.78)*	*(-2.29)*	*(-2.79)*	*(-2.04)*	*(-2.22)*	56	0.784	0.036

Description: two ARMA extensions to (M3) are tested for those portfolios showing signs of autocorrelation.
For the European data: $r_{HRLO,t} - r_{f,t} = \alpha_0 + \beta_1 r_{m,t} + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 HRMLR_t + \beta_5 HOMLO_t + \beta_6 r_{HRLO,t-1} + \varepsilon_t$.
For the American data: $r_{LRLO,t} - r_{f,t} = \alpha_0 + \beta_1 r_{m,t} + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 HRMLR_t + \beta_5 HOMLO_t + \beta_6 r_{LRLO,t-1} + \beta_7 r_{LRLO,t-2} + \varepsilon_t$.

6 SUMMARY AND CONCLUSION

Based on the past years development in European and American accounting standards surrounding a company's disclosure of fair value changes in other comprehensive income the aim of this thesis has been to contribute to the existing research in the value relevance of other comprehensive income. By studying the association between OCI and stock price for both European and American data since 2009 the following research question was studied:

Is there any association between Other Comprehensive Income and Stock Price?

The research question was operationalized by developing an extension of the RIV model to also include other comprehensive income. The redefined RIV model showed the association between other comprehensive income and stock price. Additionally, a five factor regression model was developed by extending the Fama French three factor model with return on equity (ROE) and OCI-return on equity (R_OCI) which showed the association between other comprehensive income return and stock return controlling for the standard risk factors.

The redefined RIV model showed a small and significant association between OCI and stock price. However, this effect seems to depend a lot on the composition of OCI items. A large share of OCI items with a mean reverting characteristic, such as translation differences and cash flow hedges appears to decrease the overall value relevance of OCI. The five factor model showed no signs of an increased portfolio return from an increase in OCI-return, a pattern that was much more apparent for an increase in ROE. However, the inferences from the five factor model are less reliable for the European data due to the low amount of European companies included in the portfolios. A summary of the empirical results can be found below in Table 21.

The overall conclusion, weighting these results together, is that there is no clear sign of association between other comprehensive income and stock price. In order to gain a more detailed answer to if this association is truly zero or just small one would have to extend the time period going forward, i.e. replicate the study in a couple of years' time, in order to obtain more data for an increased resolution in the results.

An important implication from these results is the seemingly low usefulness of other comprehensive income for practical use in financial analysis, especially when it comes to creating parsimonious valuation models. In this sense net income and book value of equity prove to perform much better.

This study adds several important contributions to previous studies. First, in an effort to improve the models and the overall robustness of the results our method produce significantly better R-square values despite a relative low number of observations. Second, our results appear to verify that pension liabilities are more value relevant than translation differences and cash flow hedges. Last, our results can also verify the low usefulness of OCI in financial analysis previously concluded by Dhaliwal, Subramanyam & Trezevant (1999), Biddle & Choi (2006) and Kanagaretnam, Mathieu & Shehata (2009).

TABLE 21 SUMMARY OF THE EMPIRICAL RESULTS

	Redefined RIV model			
	OCI coefficient	*R^2 (overall)*	*Most influencial OCI components*	
S&P Euro 350			**S&P Euro 350**	
(M1)	-0.895	0.882	- Translation differences	48%
(M2)	-0.510	0.586	- Actuarial gains and losses on defined benefit plans	23%
			- Cash flow hedges	14%
S&P 500			**S&P 500**	
(M1)	1.522***	0.718	- Actuarial gains and losses on defined benefit plans	39%
(M2)	2.579***	0.455	- Translation differences	29%
			- Gains and losses from investments in equity inst.	14%

	Five factor model		Yearly portfolio return		Return premiums (Yearly return)		
	HOMLO coefficient	*Adj. R^2*	*Average*	*Median*		*Average*	*Median*
S&P Euro 350					**S&P Euro 350**		
HR HO	0.599***	0.569	10.4%	21.3%	HRMLR	4.4%	4.3%
LR HO	1.237***	0.706	11.6%	20.0%	HOMLO	-0.5%	-1.9%
HR LO	-0.137	0.390	17.9%	19.5%			
LR LO	-0.043	0.285	13.4%	9.9%			
S&P 500					**S&P 500**		
HR HO	0.533**	0.847	16.4%	24.7%	HRMLR	-2.5%	-5.0%
LR HO	0.438**	0.840	18.8%	24.4%	HOMLO	-2.0%	-1.0%
HR LO	-0.436**	0.845	19.4%	26.9%			
LR LO	-0.738**	0.747	17.1%	15.4%			

Description: the below defined models are tested on 126 European companies (denoted S&P Euro 350) between Jun 2009 – Dec 2013 and 282 American companies (denoted S&P 500) between Jun 2009 – Mar 2014. The companies in the redefined RIV model have a Market-to-Book ratio between 0.8≤M/B≤5.0, the companies in the five factor model between 0.8≤M/B≤10.0. The symbols ***, **, and * indicates the statistical significance at 1%-, 5%- and 10%-confidence level.
Model (M1): $P_t = \alpha_0 + \beta_1 BV_t + \beta_2 NI_t + \beta_3 OCI_t + \varepsilon_t$.
Model (M2): $P_t = \alpha_0 + \beta_2 NI_t + \beta_3 OCI_t + \varepsilon_t$.
The five factor model (M3): $r_{i,t} - r_{f,t} = \alpha_0 + \beta_1 r_{m,t} + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 HRMLR_t + \beta_5 HOMLO_t + \varepsilon_t$.

6.1 RECENT DEVELOPMENT IN THE DEBATE ABOUT OTHER COMPREHENSIVE INCOME

In June 2014, the IASB changed its position regarding OCI. From earlier promoting OCI as an additional statement to the P&L, where there is no clear hierarchy between the two, to defining P&L as the "primary source of information about the return an entity has made on its economic resources in a period" (Hoogervorst, 2014). By stating P&L the most relevant source of information on a company's performance, IASB has taken a standpoint in the debate. The IASB argued that the statement regarding P&L was a result of market preference. Both professional and unsophisticated users focus on the P&L when making investment decisions. Therefore, P&L should be made the primary source of information in order to adapt to the users. Furthermore, the IASB has suggested that there should be a rebuttable presumption that all items of income and expense should be included in P&L. OCI should only be used to a limited extent in the unique case that IASB explicitly concludes that an item should either be included in OCI to enhance the relevance of NI or removed from NI into OCI if this item might harm the credibility of NI. With IASB's changed standpoint, the credibility of other comprehensive income has weakened further.

6.2 Reliability and validity

An important aspect of the operationalization of the research question is the reliability of the results and the possibility to replicate the study. The method is rigorously explained and motivated from a well-accepted theoretical foundation. Further on, the developments of the redefined RIV model and the five factor model are based on models generally accepted as good and viable models in value relevance studies. The raw data is publicly available information and the data selection process is based on clearly defined criteria (a list of all the companies included can be found in Exhibit 12). Considering these efforts the reliability is considered high.

Concerning the validity of the results, it is important to conclude whether the method is actually capturing what is supposed to be measured, i.e. if the models truly measure the association between other comprehensive income and stock price. In order to evaluate this, we need to assess the complete picture of whether the assumptions made actually hold and if all the potential data biases are controlled for in a proper manner.

In the redefined RIV model the main concern is that the assumption about unbiased estimators does not hold. There are two potential factors that increase the risk of biased estimators; (i) the approximation made in (7) where the notion of an infinite time series of estimated residual income is approximated to an expression of current values, (ii) cross correlation from omitted variables relating to industry, country and/or firm specific effects. Firstly, the approximation in (7) favors simplicity before accuracy. There is most likely a correlation between current values of residual income and future estimates of residual income reflected in the share price that is not included in our model in an accurate way. Secondly, considering the big change in coefficients between models (M1) and (M2) it is fair to assume that cross correlation between BV, NI and OCI affect the results, i.e. there is a strong case for an omitted variable bias in (M2). The risk of additional unknown omitted variables related to the broad data sample of different companies in different countries and industries adds to the belief that the estimators might not be truly unbiased.

In the five factor model the main concern is the low amount of European companies included in the portfolios. This will increase the noise due to undiversified portfolios and reduce the possibility to infer any reliable conclusions from the results of the European data. However, the risk of an omitted variable bias is assumed to be small due to incorporation of the standard risk factors and ROE into the model.

Considering the statistical tests for non-linearity, heteroscedasticity and autocorrelation the data is considered reliable and free from any major biases not controlled for.

The overall conclusion is that the validity of the method and the results is limited, primarily due to the risk of biased estimators in the redefined RIV model and the low number of European companies in the five factor model. However, in light of this our interpretations have focused on the relative differences between net income and other comprehensive income rather than the absolute values of each measure. If we assume that the effects from these biases affect each measure equally much we can still draw many useful and interesting conclusions about the relative value relevance of other comprehensive income compared to net income and book value of equity.

6.3 GENERALIZATION OF THE RESULTS

The possibility to generalize our results is a way to question whether our results also hold true for other data, e.g. other markets or other company sizes. This will depend on two factors; (i) is the data in our sample a representative sample for the whole population of companies and (ii) does the results depend on the time period?

Considering the data sample, the exclusion of small cap companies does not necessary mean that there are observable size related effects missed out on, we would rather argue the opposite. It is likely that including small cap companies will increase the noise in the data to such an extent that no statistically significant inference can be drawn what so ever. Thus, isolating the sample to large cap companies close to steady state will, arguably, permit us to measure the only effects that are observable. In terms of sample size, both indices represent over 70% of the total market cap in each market. After sorting out companies in each sample according to our criteria the European data consist of 36% of the total amount of companies corresponding to roughly 25% of the total market cap in Europe. The same figure for the American data is roughly 40% of the total market cap in America. Hence, the sample is definitely large enough to be representative for these two markets in general. In section 4.3 we also concluded that both samples are in general free from any major data biases.

Considering the time period, even if the European data consist of all the available time periods available up to date, four and a half years are too few years to draw any general conclusions from. This is especially a factor to consider since previous studies (Dhaliwal, Subramanyam, & Trezevant, 1999; Biddle & Choi, 2006) appear to reach different results depending on which time period that is used. Thus, in total, the possibility to generalize the results is considered limited and the need for a replicated study in a few years' time is necessary for a broader and more conclusive generalization.

6.4 SUGGESTIONS FOR FUTURE STUDIES

This study has deliberately chosen not to look into specific items of OCI but instead to examine OCI as a holistic measure of performance. Nevertheless, individual components should not be neglected, especially since our results indicate that there are quite large differences in value relevance between these. Previous studies on specific OCI items have focused on financial companies. One of the reasons is because of the large possession of securities and financial investments held at market values. This study contains few financial companies, but to a large extent industrial companies. We believe that there are industrial and non-financial companies that meet the criteria like the financial companies, i.e. some companies might possess a great amount of assets valued at fair value. Examples of such companies could be real estate companies or forest companies both holding a large asset base of marketable assets in a (semi) active market. Thus, there could be value-adding insights by replicating this study using a different set of data focusing on more specific OCI items.

Another area that might be interesting in a few years' time, when more data points exists, is to replicate and also include small and medium cap companies in this study. A theoretical argument for doing so is that growth companies tend to be traded at higher P/E-ratios and rely more on future prospects, rationally, if OCI increase transparency to make better judgments of a company's future profitability then OCI should be very useful and value relevant. However, in practice it might be difficult to extract any significant and useful information due to the potential noise added from smaller companies.

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8 APPENDIX

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EXHIBIT 1 COUNTRY AND INDUSTRY STATISTICS FOR THE EUROPEAN DATA

Country	*No. of companies*	
United Kingdom	37	29%
France	17	13%
Germany	16	13%
Sweden	14	11%
Switzerland	11	9%
Netherlands	8	6%
Finland	5	4%
Norway	5	4%
Belgium	4	3%
Italy	3	2%
Ireland	2	2%
Luxembourg	2	2%
Spain	1	1%
Portugal	1	1%
Total	126	100%

Industry	*No. of companies*	
Industrial	107	85%
Utility	16	13%
Transportation	3	2%
Total	126	100%

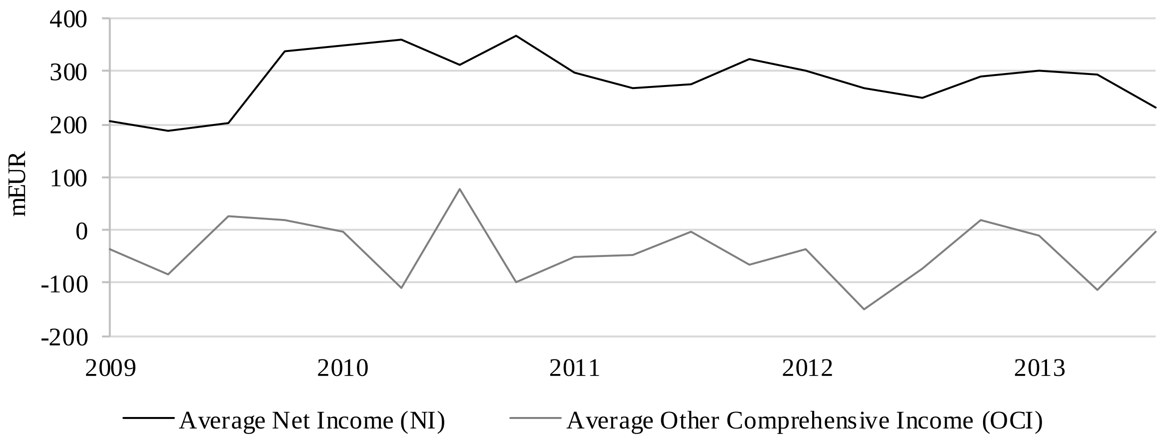
Description: the table illustrates the final European sample after the original constituents of S&P Euro 350 have been reduced based on the data criteria in Table 8.

EXHIBIT 2 OCI COMPONENTS FOR THE EUROPEAN DATA

OCI component	*Average % of total OCI*	*Average sign*	*N*
Translation differences	48%	NEG	80
Actuarial gains and losses on defined benefit plans	23%	POS	80
Cash flow hedges	14%	POS	80
Tax effects	8%	POS	80
Gains and losses from investments in equity instruments	4%	POS	80
Revaluation surplus	2%	POS	80
Changes in the fair value of liabilities due to change in risk	0%	POS	80

Description: this table illustrates the distribution among different OCI items for the European data. During two separate times, 40 out of the 126 companies are selected based on a stratified sampling method[16]. The average percentage of total OCI is calculated as the absolute value of the specific item divided by the total amount of all the absolute values added together. The average sign illustrates if the specific item on average is negative or positive. This is decided based on the following rule: NEG (more than 50% of the items have a negative value), POS (more than 50% of the items have a positive value).
Source: company quarterly reports.

EXHIBIT 3 EUROPEAN NET INCOME AND OTHER COMPREHENSIVE INCOME, JUN 2009 – DEC 2013



Source: Compustat Global - Fundamentals Quarterly and CRSP/Compustat Merged (CCM) Database - Fundamentals Quarterly and company quarterly reports.

[16] The members of the population are divided into subgroups of country and industry. A random sample of 40 companies are then drawn from these subgroups with equally weights as the total populations' distribution.

EXHIBIT 4 COUNTRY AND INDUSTRY STATISTICS FOR THE AMERICAN DATA

Country	*No. of companies*		*Industry*	*No. of companies*	
North America	282	100%	Industrial	228	81%
			Utility	20	7%
			Other Financial	18	6%
			Insurance	7	2%
			Bank/Savings & Loan	6	2%
			Transportation	3	1%
			Total	282	100%

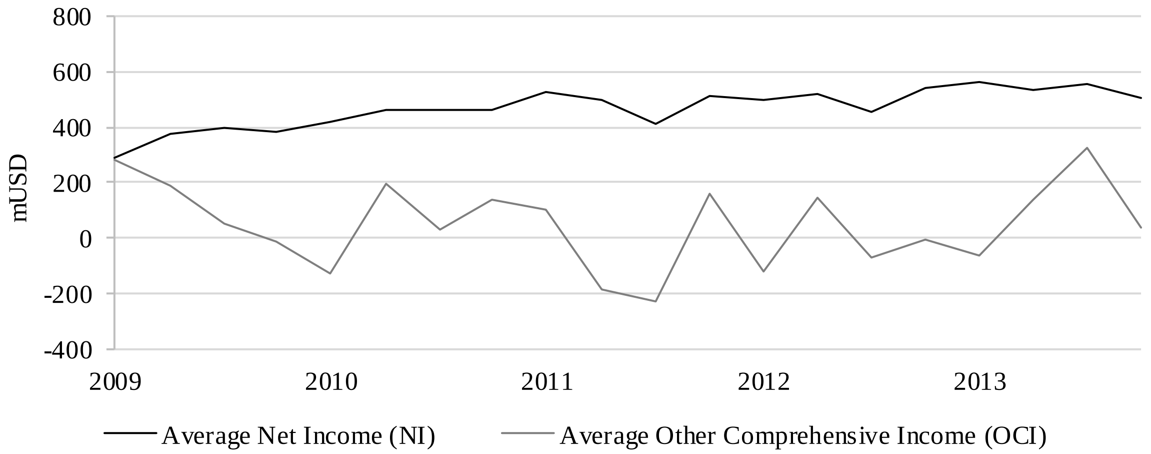
Description: the table illustrates the final American sample after the original constituents of S&P 500 have been reduced based on the data criteria in Table 8.

EXHIBIT 5 OCI COMPONENTS FOR THE AMERICAN DATA

OCI component	*Average % of total OCI*	*Average sign*	*N*
Actuarial gains and losses on defined benefit plans	39%	NEG	5,615
Translation differences	29%	POS	5,615
Gains and losses from investments in equity instruments	14%	POS	5,615
Cash flow hedges	12%	POS	5,615
Other adjustments (Tax effects, revaluation surplus, changes in the fair value of liabilities due to change in risk)	6%	POS	5,615

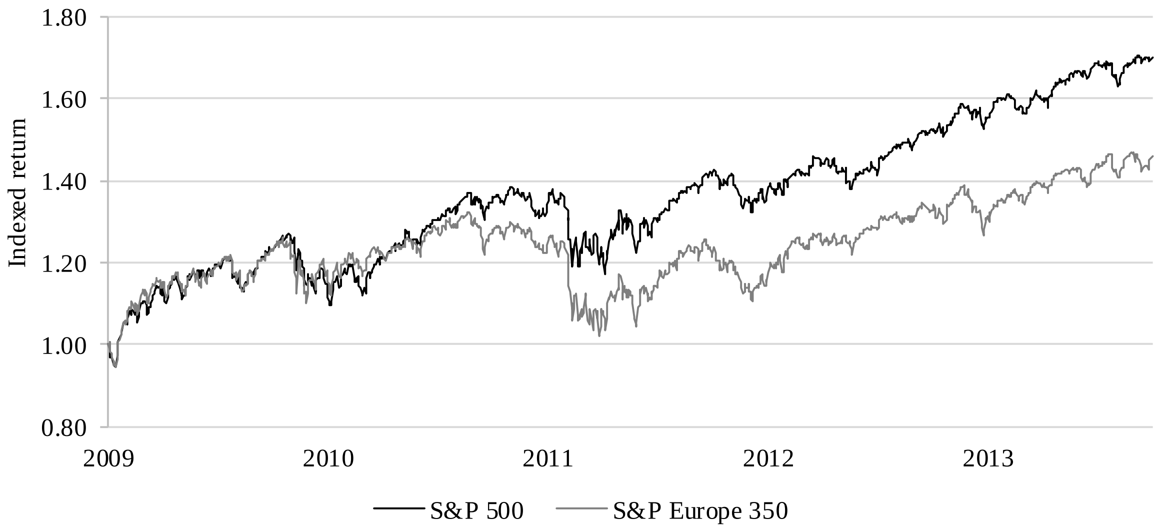
Description: this table illustrates the distribution among different OCI items for the American data. The average percentage of total OCI is calculated as the absolute value of the specific item divided by the total amount of all the absolute values added together. The average sign illustrates if the specific item on average is negative or positive. This is decided based on the following rule: NEG (more than 50% of the items have a negative value), POS (more than 50% of the items have a positive value).
Source: CRSP/Compustat Merged (CCM) Database - Fundamentals Quarterly.

EXHIBIT 6 AMERICAN NET INCOME AND OTHER COMPREHENSIVE INCOME, JUN 2009 – MAR 2014



Source: CRSP/Compustat Merged (CCM) Database - Fundamentals Quarterly.

EXHIBIT 7 INDEXED RETURN FOR S&P 500 AND S&P EUROPE 350, JUNE 2009 – MARCH 2014



Source: Thomson Reuters, Datastream.

EXHIBIT 8 DESCRIPTIVE STATISTICS OF THE 16 DEPENDENT PORTFOLIOS IN THE FIVE FACTOR MODEL

These 16 dependent portfolios are constructed based on four cutoff points (quartiles) on ROE and R_OCI. The excess return from these portfolios act as the dependent variables when running$r_{i,t} - r_{f,t} = \alpha_0 + \beta_1 r_{m,t} + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 HRMLR_t + \beta_5 HOMLO_t + \varepsilon_t$, named model (M3). In order to draw correct conclusions it is essential that these portfolios are well diversified. Elton & Gruber (1977) conclude that at least between 15 and 20 stocks should form a portfolio to be considered enough diversified such that all the company specific risk is reduced to approximately zero. As can be seen most of the portfolios formed on American companies satisfy this condition on average, however, none of the portfolios formed on European companies does this. This is a major issue and will drastically decrease the validity of the results from the European data.

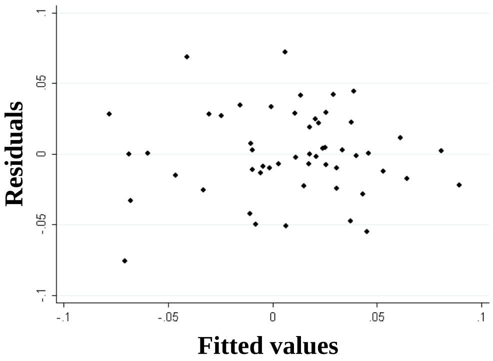
Portfolio	No. of companies in portfolio: Average	Max	Min	Industry (Average %): Industrial	Utility	Transport-ation	Bank/Savings & Loan	Insurance	Other Financial
S&P Euro 350									
HR HO	8	15	1	73%	22%	6%	0%	0%	0%
3R HO	7	10	3	93%	7%	1%	0%	0%	0%
2R HO	7	11	2	88%	11%	1%	0%	0%	0%
LR HO	10	14	5	83%	13%	4%	0%	0%	0%
HR 3O	7	12	2	74%	23%	3%	0%	0%	0%
3R 3O	8	14	4	88%	12%	0%	0%	0%	0%
2R 3O	8	12	4	91%	9%	0%	0%	0%	0%
LR 3O	8	12	4	87%	10%	3%	0%	0%	0%
HR 2O	7	10	4	79%	16%	5%	0%	0%	0%
3R 2O	7	12	4	94%	4%	2%	0%	0%	0%
2R 2O	10	14	8	91%	9%	0%	0%	0%	0%
LR 2O	7	12	5	86%	10%	4%	0%	0%	0%
HR LO	10	14	6	77%	20%	3%	0%	0%	0%
3R LO	10	14	6	79%	17%	3%	0%	0%	0%
2R LO	6	11	2	80%	15%	6%	0%	0%	0%
LR LO	6	10	3	90%	8%	1%	0%	0%	0%
S&P 500									
HR HO	24	60	12	95%	1%	0%	0%	3%	1%
3R HO	17	25	11	88%	1%	1%	2%	7%	1%
2R HO	16	24	11	68%	10%	3%	11%	7%	1%
LR HO	15	22	10	66%	17%	3%	5%	4%	5%
HR 3O	16	20	10	94%	0%	0%	0%	1%	5%
3R 3O	18	24	9	91%	0%	2%	4%	3%	0%
2R 3O	18	25	13	76%	12%	3%	7%	2%	0%
LR 3O	18	29	10	63%	27%	1%	1%	0%	8%
HR 2O	13	19	6	94%	2%	0%	0%	0%	3%
3R 2O	19	27	13	84%	3%	8%	1%	3%	0%
2R 2O	20	26	12	79%	7%	5%	5%	1%	2%
LR 2O	18	25	11	62%	27%	2%	1%	0%	8%
HR LO	19	31	13	97%	0%	0%	0%	1%	2%
3R LO	16	24	11	86%	4%	1%	4%	4%	1%
2R LO	16	21	12	74%	12%	4%	4%	5%	1%
LR LO	18	25	13	72%	22%	1%	1%	2%	3%

EXHIBIT 9 RESIDUALS VS. FITTED VALUES PLOTS FROM THE FOUR EXTREME PORTFOLIOS

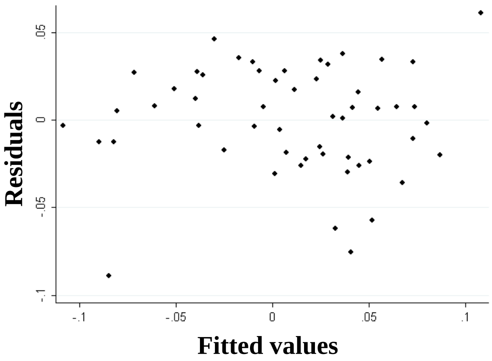
These plots show the regression residuals against the fitted values of the five factor model. In order to ensure that all the residuals are stochastic a visual analysis can be done. We focus on the four extreme portfolios since these should in theory consist of the strongest sought effects. A stochastic error term is indicated by a pattern where the residuals roughly form a "horizontal band" around the zero line indicating a homoscedastic linear model. Any undesired correlation between the residuals and the fitted values will show a different pattern, such as a cone-shaped pattern for heteroscedasticity or a wave-shaped pattern for non-linearity. Based on these somewhat subjective evaluation criteria, no portfolios appears to suffer from either heteroscedasticity or non-linearity which is as desired from a well specified model.

European data

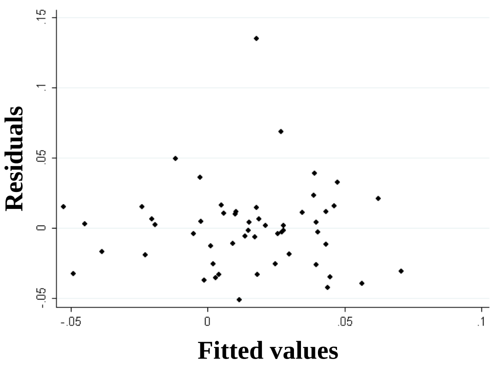
HRHO



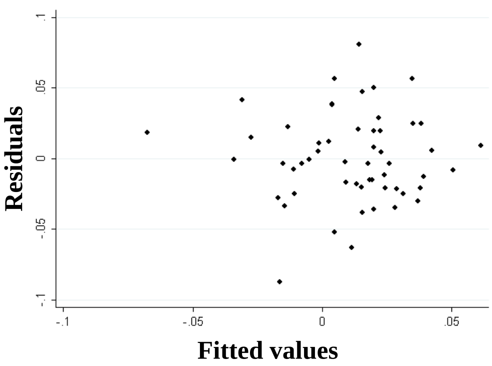
LRHO



HRLO

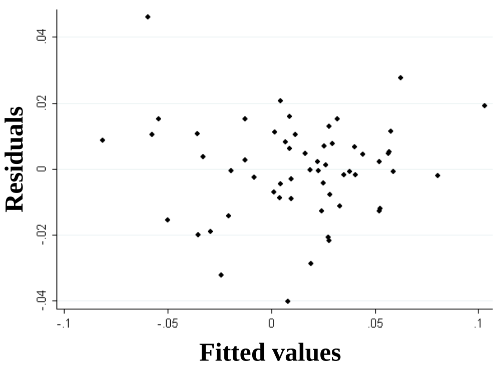


LRLO

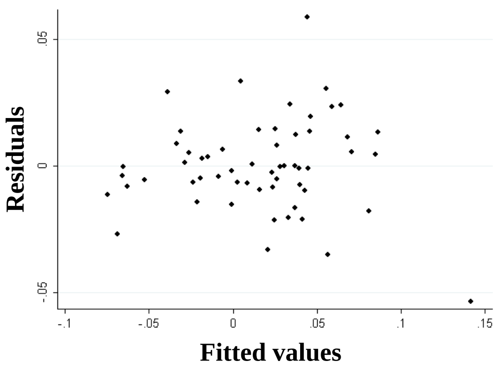


American data

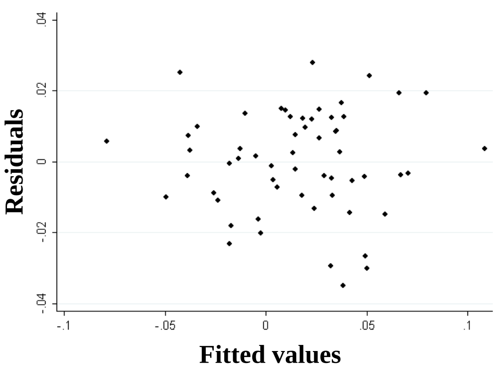
HRHO



LRHO



HRLO



LRLO

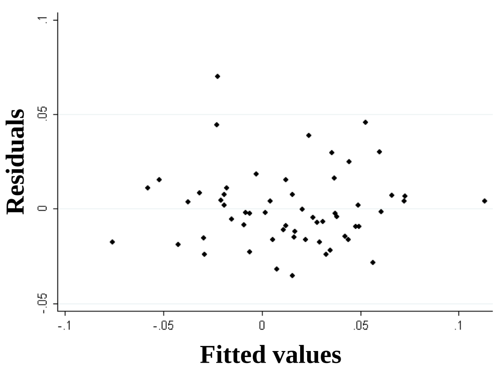


EXHIBIT 10 FIVE FACTOR MODEL ADJUSTED R-SQUARE VALUES IN A STEP-WISE REGRESSION

Model (M3), $r_{i,t} - r_{f,t} = \alpha_0 + \beta_1 r_{m,t} + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 HRMLR_t + \beta_5 HOMLO_t + \varepsilon_t$, can be tested in a step-wise manner where each explanatory variable is added on in turns. This will illustrate which of the five explanatory variables actually adds the most explanatory power, R-square, to the model. If a variable only adds a negligible amount this variable is in a strict sense redundant and adds little to the economic interpretation of the results. However, such a variable could still be included as a control variable if it is strongly correlated with the other variables preventing biased estimators.

The table below presents the results from this procedure. The main conclusion is that Rm-Rf is the variable that in general adds the most, as expected. The HOMLO variable, which consists of OCI-return, adds a limited impact on the model. Worth noting is that the same is also true for HOMLO which consist of ROE. Thus, these results have to be assessed together with the other aspects of this study to build a conclusive interpretation of the usefulness of OCI and NI.

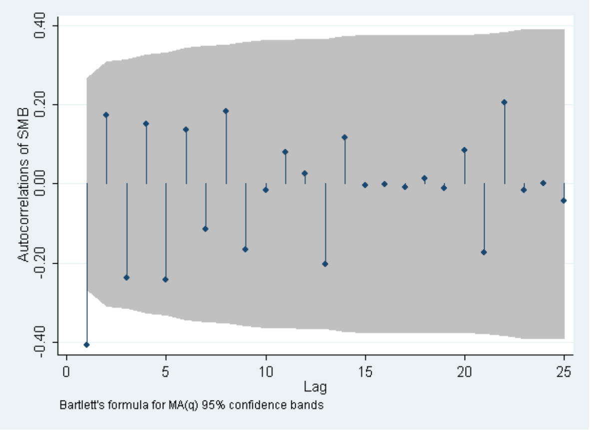
S&P Euro 350	Adj. R^2				Δ Adj. R^2			
	HR HO	LR HO	HR LO	LR LO	HR HO	LR HO	HR LO	LR LO
Rm - Rf	0.467	0.441	0.389	0.241				
+ SMB	0.508	0.546	0.405	0.227	0.042	0.105	0.015	-0.014
+ HML	0.499	0.537	0.397	0.239	-0.010	-0.009	-0.008	0.013
+ HRMLR	0.513	0.530	0.398	0.299	0.015	-0.007	0.001	0.059
+ HOMLO	0.569	0.706	0.390	0.285	0.056	0.176	-0.008	-0.014
HOMLO	0.068	0.180	0.000	0.000				
+ HRMLR	0.076	0.168	0.000	0.021	0.008	-0.012	0.000	0.021
+ HML	0.346	0.418	0.185	0.100	0.270	0.250	0.185	0.079
+ SMB	0.372	0.489	0.209	0.082	0.027	0.071	0.024	-0.018
+ Rm - Rf	0.569	0.706	0.390	0.285	0.197	0.217	0.182	0.202

S&P 500	Adj. R^2				Δ Adj. R^2			
	HR HO	LR HO	HR LO	LR LO	HR HO	LR HO	HR LO	LR LO
Rm - Rf	0.800	0.828	0.819	0.672				
+ SMB	0.809	0.825	0.818	0.678	0.009	-0.003	-0.001	0.006
+ HML	0.813	0.826	0.832	0.680	0.004	0.000	0.014	0.002
+ HRMLR	0.824	0.832	0.830	0.708	0.011	0.006	-0.002	0.028
+ HOMLO	0.847	0.840	0.845	0.747	0.023	0.009	0.016	0.039
HOMLO	0.047	0.011	0.000	0.006				
+ HRMLR	0.041	0.005	0.000	0.013	-0.006	-0.005	0.000	0.007
+ HML	0.023	0.004	0.000	0.013	-0.018	-0.001	0.000	0.000
+ SMB	0.034	0.074	0.000	0.016	0.011	0.070	0.000	0.003
+ Rm - Rf	0.847	0.840	0.845	0.747	0.813	0.766	0.845	0.732

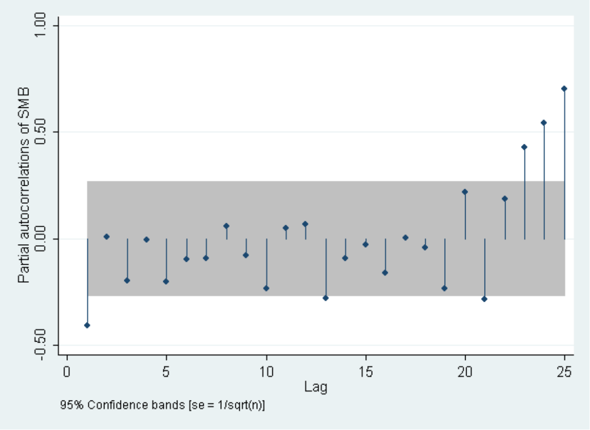
EXHIBIT 11 ACF AND PACF TESTING FOR AUTOCORRELATION IN THE FIVE FACTOR MODEL

The general interpretation of the autocorrelation function (ACF) and the partial autocorrelation function (PACF) is the foundation for deciding which ARMA extension is the most likely to give results. The gray area in the graph represents a 95% confidence interval and any points inside this interval are neglected. As an example, if the ACF shows a distinct point outside the gray area and then a decay towards zero in the PACF the proper extension would be a MA(q). If the ACF show no such points, but the PACF do, a better model would then be a AR(p) with the number of points outside the gray area as a rough measure of the number of lags, p. The graphs below show all the ACF and PACF for those residuals that showed signs of autocorrelation in Table 19.

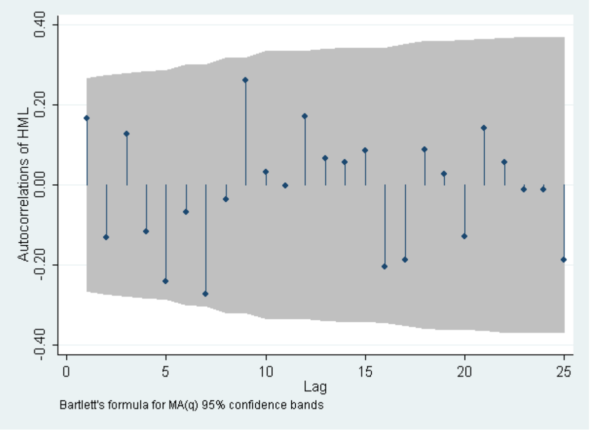
S&P Euro 350
ACF SMB



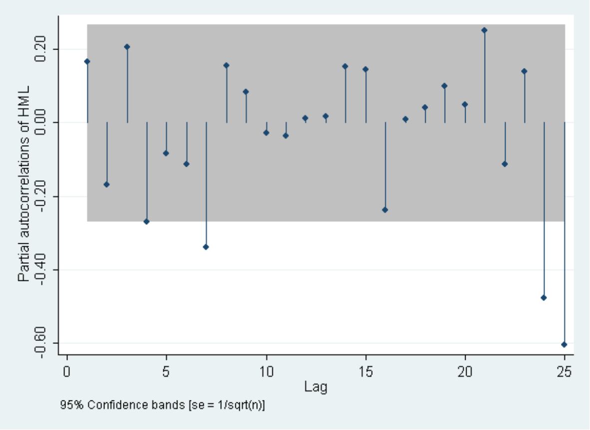
S&P Euro 350
PACF SMB



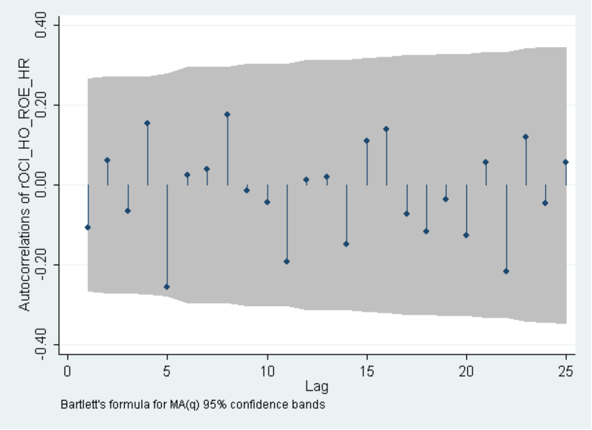
S&P Euro 350
ACF HML



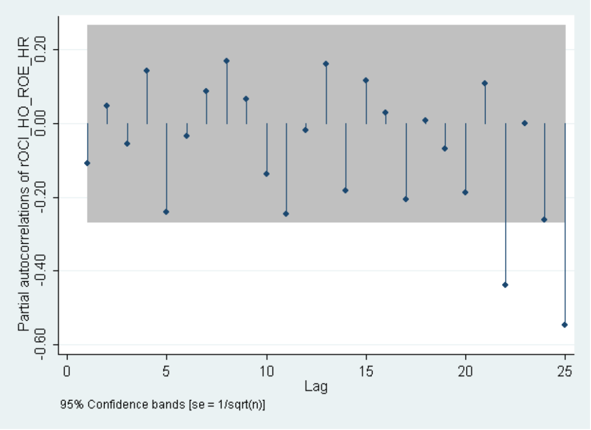
S&P Euro 350
PACF HML



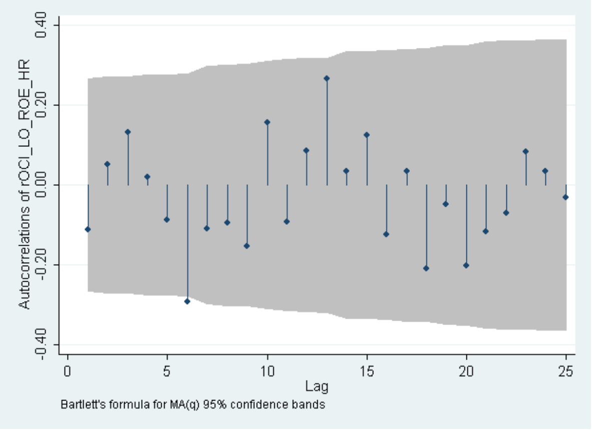
S&P Euro 350
ACF HRHO



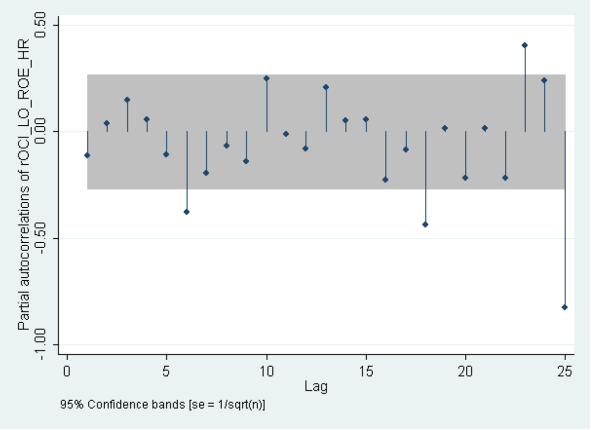
S&P Euro 350
PACF HRHO



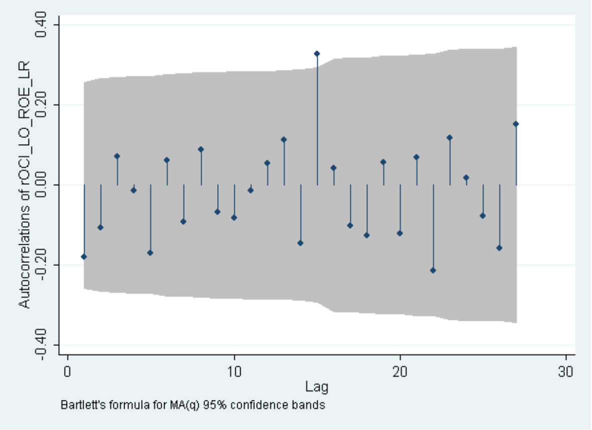
S&P Euro 350
ACF HRLO



S&P Euro 350
PACF HRLO



S&P 500
ACF LRLO



S&P 500
PACF LRLO

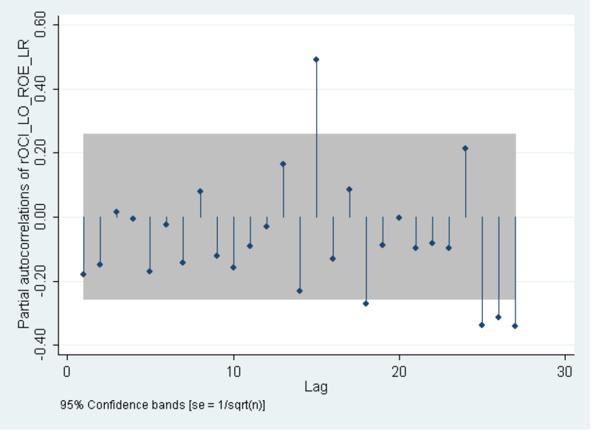


EXHIBIT 12 COMPANIES INCLUDED IN THE STUDY

In order to further increase the transparency of our study design all the companies included are listed below.

S&P Euro 350	CAP GEMINI	ITV	ORKLA	SKF	WILLIAM HILL
ACCOR	CENTRICA	JOHNSON MATTHEY	PEARSON	SMITHS GROUP	VINCI
ACTELION	COBHAM	KERRY GROUP	PORTUGAL TELECOM SGPS	SODEXO	VIVENDI
ADECCO	COMPASS GROUP	KINGFISHER	PUBLICIS GROUPE	STATOIL	WOLTERS KLUWER
ADIDAS	DANONE	KONE	QIAGEN	SWISSCOM	VOLVO
AGGREKO	DASSAULT SYSTEMES	KPN KON	RANDSTAD HOLDING	SYNGENTA	WPP
AHOLD KON.	DEUTSCHE POST	KUEHNE+NAGEL INTL.	REXAM	TATE & LYLE	YARA INTERNATIONAL
AIR LIQUIDE	DIAGEO	LANXESS	RICHEMONT N	TECHNIP	
AKZO NOBEL	DRAX GROUP	LEGRAND	ROLLS-ROYCE HOLDINGS	TELE2	
ALFA LAVAL	ELECTROLUX	LINDE	RWE	TELEFONICA	
ALSTOM	ERICSSON	L'OREAL	RYANAIR HOLDINGS	TELENOR	
AMEC	FORTUM	LUXOTTICA	SAGE GROUP	TELIASONERA	
ANHEUSER-BUSCH INBEV	FRESENIUS MED.CARE	LVMH	SAINSBURY (J)	TENARIS	
ASSA ABLOY	G4S	MAN	SAIPEM	TESCO	
ATLANTIA	GEA GROUP	MARKS & SPENCER GROUP	SANDVIK	THALES	
ATLAS COPCO	GEMALTO	METRO	SANOFI	THYSSENKRUPP	
BAE SYSTEMS	GIVAUDAN	METSO	SAP	TOTAL	
BASF	GKN	MILLICOM INTL.CELU.SDR	SEADRILL	UBM	
BAYER	HEINEKEN	MORRISON(WM)SPMKTS.	SECURITAS	UCB	
BEIERSDORF	HEXAGON	NATIONAL GRID	SERCO GROUP	UMICORE	
BELGACOM	IMI	NESTLE	SEVERN TRENT	UNITED UTILITIES GROUP	
BOLIDEN	IMPERIAL TOBACCO GP.	NOBEL BIOCARE HOLDING	SGS	WARTSILA	
BUNZL	INFINEON TECHS.	NOKIAN RENKAAT	SIEMENS	WEIR GROUP	
BURBERRY GROUP	INTERTEK GROUP	NOVARTIS	SKANSKA	WHITBREAD	

S&P 500	APPLIED MATERIALS INC	CATERPILLAR INC	D R HORTON INC	EQT CORP	HARLEY-DAVIDSON INC
3M CO	AT&T INC	CELGENE CORP	DANAHER CORP	EQUIFAX INC	HARMAN INTERNATIONAL
ABBOTT LABORATORIES	AUTODESK INC	CENTURYLINK INC	DARDEN RESTAURANTS INC	EQUITY RESIDENTIAL	HARRIS CORP
ACCENTURE PLC	AUTOMATIC DATA PROCESSING	CERNER CORP	DAVITA HEALTHCARE PART.	ESSEX PROPERTY TRUST	HASBRO INC
ACTAVIS PLC	AVALONBAY COMMUNITIES INC	CF INDUSTRIES HOLDINGS	DEERE & CO	EXPEDITORS INTL WASH	HCP INC
ADOBE SYSTEMS INC	BAKER HUGHES INC	CHEVRON CORP	DENTSPLY INTERNATL INC	EXXON MOBIL CORP	HEALTH CARE REIT INC
AES CORP	BALL CORP	CHUBB CORP	DIAMOND OFFSHRE DRILLING	F5 NETWORKS INC	HELMERICH & PAYNE
AETNA INC	BARD (C.R.) INC	CIGNA CORP	DISCOVER FINANCIAL SVCS	FAMILY DOLLAR STORES	HOME DEPOT INC
AFLAC INC	BAXTER INTERNATIONAL INC	CINCINNATI FINANCIAL	DISCOVERY COMMUNICATIONS	FEDEX CORP	HONEYWELL INTERNATIONAL
AGILENT TECHNOLOGIES	BB&T CORP	CINTAS CORP	DISNEY (WALT) CO	FIDELITY NATIONAL INFO	HOSPIRA INC
AIR PRODUCTS & CHEMICALS	BECTON DICKINSON & CO	CISCO SYSTEMS INC	DOMINION RESOURCES INC	FISERV INC	HUMANA INC
AIRGAS INC	BEMIS CO INC	CITRIX SYSTEMS INC	DOW CHEMICAL	FLIR SYSTEMS INC	HUNTINGTON BANCSHARES
AKAMAI TECHNOLOGIES	BERKSHIRE HATHAWAY	CMS ENERGY CORP	DOVER CORP	FLUOR CORP	ILLINOIS TOOL WORKS
ALLEGHENY TECHNOLOGIES	BIOGEN IDEC INC	COCA-COLA CO	DR PEPPER SNAPPLE GROUP	FMC CORP	INTEL CORP
ALLERGAN INC	BLACKROCK INC	COGNIZANT TECH SOLUTIONS	DU PONT (E I) DE NEMOURS	FMC TECHNOLOGIES INC	INTERCONTINENTAL EXCHANGE
ALTERA CORP	BOSTON PROPERTIES INC	COMCAST CORP	DUKE ENERGY CORP	FOREST LABORATORIES	INTERPUBLIC GROUP OF COS
AMERICAN EXPRESS CO	BRISTOL-MYERS SQUIBB CO	CONAGRA FOODS INC	EASTMAN CHEMICAL CO	FOSSIL GROUP INC	INTL FLAVORS & FRAGRANCES
AMERICAN TOWER CORP	BROADCOM CORP	CONSOL ENERGY INC	EBAY INC	GARMIN LTD	INTL GAME TECHNOLOGY
AMERISOURCEBERGEN	BROWN-FORMAN -CL B	CONSTELLATION BRANDS	ECOLAB INC	GENERAL ELECTRIC CO	INTL PAPER CO
AMETEK INC	CA INC	CORNING INC	EDWARDS LIFESCIENCES CORP	GENERAL MILLS INC	INTUIT INC
AMPHENOL CORP	CAMERON INTERNATIONAL	COVIDIEN PLC	ELECTRONIC ARTS INC	GENUINE PARTS CO	INTUITIVE SURGICAL INC
ANADARKO PETROLEUM	CARDINAL HEALTH INC	CROWN CASTLE INTL CORP	EMC CORP/MA	GOOGLE INC	INVESCO LTD
ANALOG DEVICES	CARMAX INC	CUMMINS INC	EMERSON ELECTRIC CO	GRAINGER (W W) INC	IRON MOUNTAIN INC
AON PLC	CARNIVAL CORP/PLC (USA)	CVS CAREMARK CORP	ENSCO PLC	HALLIBURTON CO	JABIL CIRCUIT INC

S&P 500 cont.	MCKESSON CORP	O'REILLY AUTOMOTIVE INC	QUEST DIAGNOSTICS INC	SOUTHWESTERN ENERGY	U S BANCORP
JACOBS ENGINEERING	MERCK & CO	OWENS-ILLINOIS INC	RALPH LAUREN CORP	SPECTRA ENERGY CORP	UNITED TECHNOLOGIES CORP
JOHNSON & JOHNSON	MICROCHIP TECHNOLOGY INC	PACCAR INC	RANGE RESOURCES CORP	ST JUDE MEDICAL INC	UNITEDHEALTH GROUP INC
JOHNSON CONTROLS INC	MICROSOFT CORP	PALL CORP	RAYTHEON CO	STANLEY BLACK&DECKER	VARIAN MEDICAL SYSTEMS
JOY GLOBAL INC	MOLSON COORS BREWING CO	PARKER-HANNIFIN CORP	RED HAT INC	STAPLES INC	WASTE MANAGEMENT INC
JUNIPER NETWORKS INC	MONDELEZ INTERNATIONAL	PAYCHEX INC	REPUBLIC SERVICES INC	STARWOOD HOTELS&RES.	WATERS CORP
KEURIG GREEN MOUNTAIN	MONSANTO CO	PEABODY ENERGY CORP	REYNOLDS AMERICAN INC	STATE STREET CORP	WELLS FARGO & CO
KIMBERLY-CLARK CORP	MOTOROLA SOLUTIONS INC	PEPSICO INC	ROBERT HALF INTL INC	STERICYCLE INC	VENTAS INC
KLA-TENCOR CORP	MYLAN INC	PERKINELMER INC	ROCKWELL AUTOMATION	STRYKER CORP	VERIZON COMMUNICATIONS
KROGER CO	NATIONAL OILWELL VARCO INC	PERRIGO CO PLC	ROCKWELL COLLINS INC	SYMANTEC CORP	WHIRLPOOL CORP
L-3 COMMUNICATIONS HLD.	NEWELL RUBBERMAID INC	PETSMART INC	ROPER INDUSTRIES INC/DE	SYSCO CORP	WHOLE FOODS MARKET INC
LABORATORY CP OF AMER	NEWMONT MINING CORP	PFIZER INC	SAFEWAY INC	TARGET CORP	VIACOM INC
LAM RESEARCH CORP	NEXTERA ENERGY INC	PLUM CREEK TIMBER CO INC	SANDISK CORP	TE CONNECTIVITY LTD	VISA INC
LAUDER (ESTEE) COS INC	NIKE INC	PPG INDUSTRIES INC	SCANA CORP	TECO ENERGY INC	VORNADO REALTY TRUST
LEGGETT & PLATT INC	NOBLE CORP PLC	PPL CORP	SCHLUMBERGER LTD	TERADATA CORP	VULCAN MATERIALS CO
LENNAR CORP	NORDSTROM INC	PRAXAIR INC	SCHWAB (CHARLES) CORP	TEXAS INSTRUMENTS INC	WYNDHAM WORLDWIDE CORP
LILLY (ELI) & CO	NORFOLK SOUTHERN CORP	PRECISION CASTPARTS CORP	SCRIPPS NETWORKS INTER.	TEXTRON INC	XCEL ENERGY INC
LOWE'S COMPANIES INC	NORTHERN TRUST CORP	PRICE (T. ROWE) GROUP	SEAGATE TECHNOLOGY PLC	THERMO FISHER SCIENT.	XILINX INC
M & T BANK CORP	NORTHROP GRUMMAN CORP	PROGRESSIVE CORP-OHIO	SEALED AIR CORP	TIFFANY & CO	YAHOO INC
MACERICH CO	NUCOR CORP	PROLOGIS INC	SEMPRA ENERGY	TIME WARNER CABLE INC	ZIMMER HOLDINGS INC
MARSH & MCLENNAN COS	NVIDIA CORP	PUBLIC SERVICE ENTRP GRP	SIMON PROPERTY GROUP INC	TJX COMPANIES INC	
MATTEL INC	OCCIDENTAL PETROLEUM CORP	PVH CORP	SMUCKER (JM) CO	TOTAL SYSTEM SERVICES	
MCCORMICK & CO INC	OMNICOM GROUP	QUALCOMM INC	SNAP-ON INC	21st CENTURY FOX	
MCDONALD'S CORP	ORACLE CORP	QUANTA SERVICES INC	SOUTHERN CO	TYSON FOODS INC -CL A	