**Master's thesis**

# "Fair value accounting and pro-cyclicality"
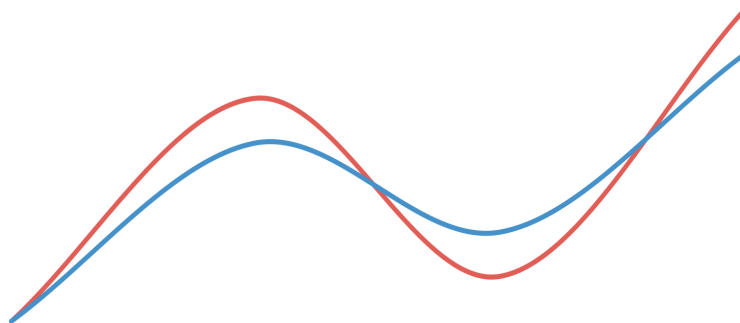
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**ABSTRACT –** This study investigates whether fair value accounting introduced pro-cyclicality in financial statements of financial institutions in Europe, before and during the current financial crisis. Fair value accounting received considerable criticism over the past few years. Critics argued that fair value accounting would have aggravated the financial crisis, because it would increase volatility of earnings and balance sheets, and led to undervaluation of assets below their 'fundamental value', amplifying negative growth in inactive markets, thus introducing pro-cyclicality into the financial statements. This paper investigates the validity of this criticism, since existing researches on the topic did not provide consistent findings. This research empirically investigated pro-cyclicality of net-income and equity at 55 European financial institutions using two developed models that isolate the impact of unrealized fair value gains and losses on net-income and equity. From the results is concluded that fair value accounting has introduced pro-cyclicality into the financial statements of financial institutions. The pro-cyclical impact on equity was found larger compared to the pro-cyclical impact on net-income. The pro-cyclical effects on net-income were especially present during the years before the financial crisis, however this effect was lower in 2008 and 2009, due to a more conservative application of fair value accounting. The pro-cyclical effects on equity are considered to have aggravated the financial crisis, endangering equity positions of financial institutions. An additional finding concerned the low disclosure quality and low disclosure adoption rates of fair value related disclosures. This research delivers insight to financial statements' users in analyzing the effects of unrealized gains and losses on net-income and equity to base their investment decisions on. This research contributes insight for financial institutions to limit pro-cyclical effects in the future, in order to show a more stable progression of growth and to better withstand a financial crisis in the future. Also standard setters and the accounting profession could benefit from the findings in this research, in order to improve standards surrounding fair value accounting and the disclosure quality of fair value related disclosures.

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# 1. Introduction

The merits of fair value accounting have been studied extensively over the past 20 years (Magnan 2009). Consistent empirical research evidence has shown that assets or liabilities valued at market value provide more relevant information to users of financial statements (i.e. investors, regulators) (Barth et al. 2001). The alleged advantage of fair value accounting is the increase in value relevance of financial statements for investors because assets or liabilities valued at market value are considered to be more strongly associated with stock prices than when valued at historical costs (Barth et al. 2001). Despite fair value accounting's perceived merits, since the anticipation of the (current) financial crisis, fair value accounting has been subject to severe criticism, as noted in the report on global financial stability by the International Monetary Fund (2008): "*Since the 2007 market turmoil surrounding complex structured market products, fair value accounting and its application through the business cycle has been a topic of considerable debate*" (IMF 2008).

The reason for this debate and severe criticism on fair value accounting during the financial crisis lies with the alleged pro-cyclical effect fair value accounting could introduce in firms' financial statements. Pro-cyclicality (later defined) implies that a firm's economic lifecycle increases in amplitude, both in times of economic growth and economic downturn (Bout et al. 2010). The use of fair value accounting would have caused a pro-cyclical impact on firm's balance sheets, amplifying negative growth and decreasing financial stability during the financial crisis.

With markets becoming increasingly more volatile and illiquid (mid-2007), the valuations of complex financial instruments became more volatile and inaccurate. Since most financial instruments were valuated at fair value (IMF 2008), also the firm's value on the balance sheet and reported earnings were subject to growing volatility, therefore distorting investors view on financial performance and stability (Magnan 2009). Questions arose whether market valued financial instruments still reflected their underlying cash flows or the price at which instruments could eventually be sold (their theoretical or fundamental value) (IMF 2008). With ever falling market prices, financial instruments were sold below 'theoretical valuation' in order to meet regulatory capital requirements, causing market prices to fall even more. Further falling market prices resulted in further devaluations of financial instruments, contributing to the downward spiral.

The role of fair value accounting in causing the financial crisis has not been researched extensively, though the overall consensus is that not fair value accounting, but bad credit grant decisions and weak risk management are the cause of the financial crisis (among

others, FSF 2009, IMF 2008, Ryan 2008, SEC 2008). Despite some acknowledged weaknesses, fair value accounting still receives broad support from financial institutions, the accounting profession and standard setters (Magnan 2009). However, this does not imply, that the role of fair value accounting is negligible. It remains uncertain, whether the alleged pro-cyclical effect of fair value accounting could have played a role in aggravating the financial crisis. Above-mentioned issue results in the following main question of this research:

**Does fair value accounting incorporate a pro-cyclical effect on financial institutions' financial statements?**

This research consists of a literature study that examines the (empirical) studies on the influence of fair value accounting on the financial system and its alleged pro-cyclicality. Further more, this research empirically investigates pro-cyclicality of financial statements among the 55 largest financial institutions in Europe. Chapter 2 and 3 provide the theoretical background of fair value accounting and pro-cyclicality. Chapter 4 discusses the present issues surrounding fair value accounting and its (potential) impact on the financial system. Chapter 5 reviews five conceptual and four empirical studies that examined pro-cyclicality. Chapter 6 summarizes the conclusions drawn from the literature and provides the main hypothesis for the empirical study. Chapter 7 presents the sub-hypotheses that are tested and the methodologies used in the empirical study. Chapter 8 provides the results and analysis from the empirical study, followed by the conclusions, limitations and future research recommendations in chapter 9.

## 2. Definition of fair value and accompanying IFRS regulations

IFRS defines fair value as; *the amount for which an asset could be exchanged, or a liability be settled, between knowledgeable, willing parties, in an arm's length, orderly transaction* (IFRS 7).

U.S. GAAP defines fair value as; *the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date* (SFAS 157 / ASC 820).

Though both definitions are consistent for most parts, the U.S. GAAP definition includes 'the measurement date', emphasizing that fair value is measured at a particular moment in time, and is subject to changes from day to day, as market prices can change daily. The word 'orderly' has been added in the IASB Exposure Draft Fair Value Measurement (May, 2009a), to emphasize that a forced transaction can not be used as a basis to determine the fair value (Bout et al. 2010). The exchange price of an asset in a forced transaction is normally lower than the underlying cash flows of the asset or when sold in an orderly or normal transaction.

As the definitions of fair value describe, fair value is measured as the price or amount received as if the asset or liability would be sold or settled/transferred. In active markets the market value of an asset or liability can be determined relatively easy since potential 'willing parties' or 'market participants' are available.

However, in the 2007 inactive, illiquid market, measurements of fair value became more difficult, because of the absence of observable market prices and trading activity for complex financial products. Products, for which markets became illiquid, could still be valued at fair value using hypothetical market values and valuation models (Bout et al. 2010). As also noted in the IMF report (2008): "*Fair value can be estimated when a market does not exist, as fair value valuation models comprise the expected, risk-discounted cash flows that market participants could obtain from a financial instrument at a certain point in time*".

Both IFRS and U.S. GAAP adopted a three level fair-value-hierarchy framework to distinguish between market-to-market valuations and model-based valuations of assets and liabilities (IMF 2008). In March 2009, the IASB amended IFRS 7 to correspond with the American standard SFAS 157. The hierarchy prescribes that level 3 valuations are only permitted, when level 1 or level 2 requirements can not be met. IFRS 7 requires all financial products to be classified in one of the three levels. The framework is structured as follows:

| Level 1 Valuations | Also known as market-to-market valuations, using only observable prices for equal products in active markets. |
| --- | --- |
| Level 2 Valuations | Movement to using observable prices for similar products or using valuations models with only observable inputs. |
| Level 3 Valuations | Movement to mark-to-model approach. Neither prices for similar products nor inputs for valuation models are observable in the market. Usage of model input assumptions. |

**Table 1:** IFRS fair value hierarchy framework **Source:** Bout et al. (2010), IFRS 7/IAS 39.

As observed in table 1, valuations decrease in verifiability when moving towards level 3. The amended IFRS 7 therefore requires new disclosure requirements about classifications in the proper level, movements of products between levels and about the size and characteristics of each product. The level 3, more subjective valuations require various disclosures by both IFRS and U.S. GAAP, for instance, about the methodologies used, the sensitivity of the measurement and explanations of using certain assumptions (IMF 2008). The amended IFRS 7 is applicable from the 1st of January 2009, though some financial institutions have voluntarily applied the announced amendments earlier (Bout et al. 2010). American financial institutions were already subject to a similar three-level hierarchy prescribed by SFAS 157.

Apart from classifying assets and liabilities in the different hierarchy levels, IFRS also requires assets and liabilities to be classified into different categories. A classification in a certain category, determines the method of valuation (fair value or historical cost) and how changes in value are being recognized (through equity or through the P&L) (IAS 39/IFRS 7) (Bout et al. 2010).

Assets are classified in one of four main categories. Furthermore, the first category is divided into four more sub-categories. The four main categories are the following (IAS 30.25, IAS 39.9):

1) **Financial assets at fair value through profit and loss**
   - Trading assets
   - Investments for risk of policyholders
   - Non-trading assets
   - Designated at fair value trough profit and loss
2) **Held-to-maturity investments**
3) **Loans and receivables**
4) **Available-for-sale assets**

The first category refers to 'short term held' financial instruments that are held for trading, such as securities and derivatives (IAS 39.9). Investments for risk of policyholders are investments for which the risk is largely transferred to the investment holder. Non-trading assets comprise for instance derivates used for hedging purposes. All other assets at fair value, which cannot be classified in one of the three before-mentioned categories, are classified as 'designated at fair value through profit and loss' (IAS 39.9).

Held-to-maturity assets are assets that are not intended for trading purposes and are considered to be held until maturity of the asset (IAS 30.25). Assets that are not traded on capital markets and are intended to be hold for a longer period are classified under 'loans and receivables' (IAS39.9). As the name implies it, 'available-for-sale' assets are assets that can or need to be sold on a short notice (IAS39.9). It is noticeable that there exists some degree of subjectivity in classifying an asset in a certain level. An overview of the different classification categories and valuation regulations are presented in the table below:

| Category | Valuation method | Recognition method of revaluations/impairments |
|---|---|---|
| **Financial assets at fair value through profit and loss** | Fair value | Changes in fair value (unrealized gains/losses) are recognized in the profit and loss account. |
| **Held-to-maturity assets** | (amortized) cost | Impairment test based on expected present value of future cash flows. Impairment recognized in the profit and loss account. |
| **Loans and receivables** | (amortized) cost | Impairment test based on expected present value of future cash flows. Impairment recognized in the profit and loss account. |
| **Available-for-sale assets** | Fair value | Changes in fair value (unrealized gains/losses) are recognized in equity |

**Table 2:** Overview of asset categories and valuation and recognition methods. **Source:** Bout et al. (2010), IFRS 7/ IAS 39.

IFRS 7 requires quantitative disclosures about above-mentioned categories in the balance sheet. Further more, IFRS 7/IAS39 requires disclosure about all changes in fair value (all unrealized gains and losses) over the reporting period for each sub-category that affects income (IAS 39 GI.G1, IAS 32.94 (f)). As well, disclosures about the changes in fair value that affect equity are required ('available for sale assets') (IAS 32.94 (h) (ii)).

Liabilities valued at fair value are subject to similar classification requirements. The only difference is that IFRS 7 does not allow changes in fair value to be recognized in equity. This implies that every change in fair value of liabilities only affects income. The classification categories for liabilities are the following (IAS 32.94):

- Financial liabilities at fair value through profit and loss
  - Trading liabilities
  - Non-trading derivatives
  - Designated as at fair value through profit and loss

Trading liabilities are for instance shares, derivatives and securities that are held, intended for trading purposes. Non-trading derivatives comprise for instance hedging instruments and other liabilities that are not intended for trading purposes. All other liabilities, which cannot be classified in one of the other two classes, are classified as 'designated at fair value through profit and loss' (IAS32.94).

All other liabilities not valued at fair value, are classified in another category. Other categories are for instance 'insurance and investments contracts', 'subordinated loans' and 'other liabilities'. Liabilities that are not classified in the category 'financial liabilities at fair value through profit and loss', are valued at amortized cost.

Because of political pressure from the European Union, the IASB introduced another important amendment to IFRS 7, which allows certain assets valued at fair value to be reclassified to historical costs (IASB 2008b). Reclassifications to historical costs mitigates the problem that fair value valuations might fall below the 'fundamental value' and can dampen negative effects on income during times of economic downturn due to different impairment regulations related to historical cost accounting, compared to fair value accounting. For instance, as observed in table 2, under amortized cost, the valuation of assets is based on the expected present value of future cash flows rather than (un)observable market prices which are the proxies for valuations under the fair value approach. When markets became illiquid in 2007, the number of transactions and prices fell. The relatively low prices had to be used as benchmarks for determining the fair value of companies' assets. However, under historical costs these assets would have to be based on the net present value of future cash flows which, most likely would result in a higher value then the fair value, thus reducing the negative effect on income. For this reason, it can be attractive for companies to reclassify some assets to historical costs, for this could introduce a dampened effect on income in comparison to fair value accounting. U.S. GAAP already allowed U.S. financial institutions to reclassify certain assets to historical cost accounting, thus creating political pressure from the European Union to plead for consistency between IFRS and U.S.GAAP regulations (Bout & Ter Hoeven 2010).

Similar to U.S. GAAP, IFRS prescribes several requirements and restrictions concerning reclassifications (IFRS 7). Only certain assets (trading assets) can be considered for reclassification and the occurrence of an exceptional event is an additional prerequisite for reclassification. For instance, the current financial crisis is considered to be such an exceptional event that allows reclassification for certain assets.

It would be attractive for financial institutions to reclassify assets back to fair value, as soon as markets improve, and reclassify assets to historical costs when markets become illiquid. This however could be considered a form of earnings management. The IASB implemented certain restrictions, which prescribe that the amendment is only applicable for reclassifying assets *out of* the 'assets at fair value through profit or los' class. It is not allowed to reclassify assets *to* this class. The IASB implemented this last restriction to limit the possibility to use reclassifications to historical costs as an earnings management tool.

## 3. Definition of pro-cyclicality

The Financial Stability Forum[1] describes pro-cyclicality as *"the dynamic interactions (positive feedback mechanisms) between financial and the real sectors of the economy"* (FSF report 2008). Interactions between financial sectors and real sectors tend to amplify economic business cycle peaks and troughs and decrease financial stability.

The SEC describes pro-cyclicality as *"the amplification of otherwise normal cyclical business fluctuations"* (SEC 2008).

According to the Financial Stability Forum (2008), there are two main sources of potential pro-cyclicality. The first source is limitations in risk management. Risk management measurement inputs, such as probabilities of default and loss given defaults (parameters for risk models relating complex financial products) tend to move pro-cyclical. For instance, credit risks were underestimated during economic growth before the financial crisis, but during the market turmoil of 2007, prices of complex financial products tended to fall faster, because of adjusted underestimated risk parameters, thus creating a pro-cyclical effect (FSF 2008).

The second source is distortions of incentives between individual agents (managers/traders) and the system as a whole. For instance, in the late expansion phase before the crisis, from an individual agent's perspective it may have been difficult to refrain from engaging in risky investments because of short-term profit objectives and fear for diminishing market share. Short-term horizons for risk measurement add to pro-cyclicality by creating a distorted view for investors, encouraging them to invest, even when the downward trend was already anticipated (FSF 2008). These actions of agents may have been rational from an individual perspective but proved devastating for the financial system as whole.

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[1] Currently: Financial Stability Board

## 4. Issues surrounding fair value accounting and pro-cyclicality

As described in the introduction, fair value accounting has been topic of considerable debate among regulators, standard setters, investors and accounting professionals (IMF 2008). Four main areas of concern have been topic of this debate and will be discussed below (SEC 2008).

*1). "Fair value accounting is potentially unreliable in the absence of quoted market prices, resulting in a reduction of comparability and reliability of financial statements."*

As discussed in the introduction, solid empirical evidence exists about the increase in value relevance that fair value accounting provides for users of financial statements, in comparison to historical cost accounting (among others, Barth 2001, 2004, SEC 2008). However, some of these studies also indicate that fair value valuations are more strongly associated with share prices in active markets than in inactive, illiquid markets. A recent empirical study from Song (et al. 2008) indicated that level 1 and level 2 valuations (based on more active markets) provide higher value relevance to financial statements users than level 3 valuations (for products where no active market exist). The overall consensus is that fair value valuations provide useful information but that additional disclosures are needed, especially regarding level 3 valuations, to provide additional helpful information (SEC 2008).

Comparability issues also arise in the absence of observable market prices. Though this is of concern, the alternative of going back to historical cost accounting, accompanies an even greater lack of comparability, since similar assets valuated upon different purchase prices, result in identical assets assigned with different values (SEC 2008).

*2). "Fair value accounting will increase volatility in reported income."*

Another topic of debate, considering the impact of fair value accounting on financial institutions and in general on the financial system, is that fair value accounting would increase volatility in reported income (SEC 2008). Barth (1995) examined the impact of fair value accounting on banks' financial statements and found an increase in volatility in earnings and regulatory capital. In a more recent study, Barth (2004) has identified three sources of financial statement volatility that are associated with using fair values in financial reporting; estimation-error volatility, inherent volatility, and mixed-measurement volatility.

Barth developed the following model for determining the fair value that is recognized in the financial statements, which incorporates the estimation-error-volatility and the inherent volatility:

$X = x + ε$

Where,

$X =$      the recognized fair value in the financial statements with variance $\sigma_x^2 = \sigma_x^2 + \sigma_\varepsilon^2$

$x =$      the fair value of an asset or liability with variance $\sigma_x^2$ as its inherent volatility.

$ε =$      the estimation-error with variance $\sigma_\varepsilon^2$

Estimation-error-volatility is mostly associated with product valuations for which no active market exists (level 2 and level 3 valuations). In absence of active markets, values are estimated and accompanied by a certain estimation error ε. The predicted present value of future cash flows of certain products will likely differ from the actual realized cash flows. Barth argues that estimation errors are a natural and unavoidable byproduct of the estimation process.

Inherent volatility refers to 'normal' economic volatility. As market prices change over time, so do fair value valuations. These fluctuations are inherent to the market and are not a result of the accounting process. Inherent volatility is volatility that financial statements should reflect (Barth 2004). However, Barth argues that additional information (disclosures) about the mean and variance of x could provide useful information for financial statements' users to predict the value of x with more certainty in the next period. However, as the model indicates, the reported value is still subject to estimation errors.

The third source of volatility is the mixed-measurement volatility. Mixed measurement volatility arises from the fact that not all assets and liabilities are valued at fair value. Some assets or liabilities are valued at historical costs or are not recognized at all (Barth 2004). Therefore, economic effects do not influence every valuation of assets and liabilities in the financial statements. Barth provides the example where assets are valued at fair value and fixed rate liabilities at historical costs. An increase in market interest rates decreases the value of assets and liabilities, but the decrease in liabilities is not recognized in the financial statements, since liabilities are valued at historical costs. An increase in interest rates therefore has a larger negative effect on income and value of assets then if either only fair value, or only historical cost based accounting is used. Barth states that "*the increase of volatility is a direct result of* a *mixed-measurement accounting system*". Above-mentioned issue implies that a mixed-measurement accounting system can incorporate pro-cyclicality.

*3). "There is an inconsistency between measuring assets and liabilities at current values (especially at a current exit value) when it is expected that a company will continue its operations as an ongoing entity".*

The definition of fair value states that the fair value of an asset or liability is the amount or price that would be received or transferred when sold or settled at measurement date. The definition implicitly assumes that at the end of each reporting period, the company prepares a liquidation balance sheet, to the extend for which assets and liabilities are valuated at fair value (Magnan 2009). This however, is not in line with a company's going concern assumption, which is needed for the preparation of financial statements.

The American Bankers Association has strongly opposed fair value accounting for years, arguing that the fair value accounting model is inconsistent with how most financial institutions manage their business model for assets and liabilities. Current (fair) values would not properly reflect contracted future cash flows of investments that are intended to be hold until maturity (SEC 2008). The American Bankers association stated, "*fair value would actually mislead users of bank's financial statements" (ABA 2008).*

*4). "Fair value understates the "true economic value" of financial instruments when markets are depressed, leading to concerns regarding fair value accounting resulting in "pro-cyclicality".*

Significant concerns have come forward about the pro-cyclical effect fair value accounting could have on firms' balance sheets and on the financial system in general (SEC 2008). In the illiquid market of 2007, financial instruments valued at fair value would be what some believed, valued below their "fundamental value" (their underlying future cash flows or amount for which they would eventually be sold) (SEC 2008). Because of the decreasing prices and thus, decreasing value of firm's financial instruments in combination with regulatory capital requirements, companies may have been compelled to sell securities in illiquid markets. These forced sales may have made the market even more illiquid and volatile, resulting in further price falls. Additionally, increased volatility led to more uncertainty for investors, decreasing investors' confidence in the market. Further more, unrealized losses, which due to fair value accounting where recognized in the financial statements, could have decreased investors' confidence even more, resulting in further market illiquidity, decreased financial stability, price falls and decreased value of firm's assets.

Some researchers acknowledge the concerns surrounding fair value accounting and its potential pro-cyclical effect (among others, Barth 1995, FSF 2009, IMF 2008, SEC 2008). Though, others consider pro-cyclicality to be associated with the use of financial statements for regulatory capital requirements and argue that fair value accounting is neither the underlying cause of the economic crisis nor pro-cyclical. (FCAG 2009, Ryan 2008). Regulatory capital standards would be the area of concern, not accounting standards.

Despite some accounting professionals, standard setters and regulators reject the concerns regarding pro-cyclicality of fair value accounting, it remains an area of concern until counter proof is provided. Though not many, some researchers have started to examine the potential pro-cyclical effects of fair value accounting. The next chapter will address these studies.

## 5. Literature study

This chapter discusses (empirical) studies that examined whether fair value accounting incorporates pro-cyclicality. First, five conceptual studies will be discussed, which assessed whether a potential for a pro-cyclical effect of fair value accounting exists. Also four empirical studies will be discussed that tested pro-cyclicality at both U.S. and European financial institutions.

### 5.1 Conceptual studies

The upcoming debate surrounding fair value and the economic crisis has led researchers and regulatory institutions to form opinions about a potential for pro-cyclicality of fair value accounting. Though not empirical, these studies can provide the necessary insight for further research and assess critically whether a potential for pro-cyclicality of fair value accounting exists.

**Magnan (2009)**

In this conceptual research, Magnan provides examples where fair value accounting possibly led to increased volatility and a negative amplification of some financial institutions' business cycles during the financial crisis. For instance, an example from Lehman Brothers is provided, where a $U.S. 4.8 billion difference (decrease) in net income between 2007 and 2008, was largely explained by unrealized losses of $U.S. 1.6 billion in the first semester of 2008 and unrealized gains of $ U.S. 200 million in the first semester of 2007. Magnan states that, *"accounting at fair value for some financial assets amplified Lehman's downward earnings performance"*. However, Magnan does not go into details with respect to what extend these financial products that resulted in $U.S. 1.6 billion unrealized losses, were valued under their 'fundamental value'. To actually 'blame' fair value accounting, an assessment must be made of this, since normal economic volatility is natural and should be reflected in financial statements (Barth 2004). On the other hand, if historical cost accounting methods were applied to these products, this would have dampened negative growth. The unrealized gains in 2007 for instance, would not have been recognized under historical cost accounting in 2007, resulting in more financial stability in 2008.

Magnan's main argument is that fair value accounting created incentives for management to engage risk-full investments. The unrealized gains of these investments were recognized and have amplified economic growth, but led to amplification of negative growth in times of economic downturn, when these unrealized gains turned into losses. Further more, Magnan expects future empirical evidence will indicate overstatements and purposely shifts to level 2 and level 3 valuations, which covered-up developing losses and provided unrealized gains,

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but caused significant losses when the crisis begun.

**Financial Stability Forum Report (2009)**

This conceptual research provides an analytical assessment of pro-cyclicality of fair value accounting and recommendations to mitigate pro-cyclicality. The FSF concludes, similar to Magnan (2009), that in comparison to historical cost accounting, fair value accounting accompanies valuations that are more sensitive to economic lifecycles and therefore incorporate pro-cyclicality. Furthermore, the pro-cyclical effect of fair value accounting, would create an additional pro-cyclical effect on investment decisions. Fair value accounting would have created a distorted view for investors because unrealized gains of complex financial products were recognized and not sufficiently corrected downwards for risk factors.

To mitigate pro-cyclicality, the FSF recommends the adoption of 'the expected loss model' instead of the 'incurred loss model'. The present application of fair value implies that losses are recognized when an actual loss event incurred. With the 'expected loss model' losses are recognized when losses are expected, by introducing provisions that can cover for expected volatility in economic downturns. This however, requires careful standardization to prevent income smoothing activities. Another measure suggested by the FSF is the adoption of capital buffers, build up in times of economic growth, that function as a safety net in times of economic downturn.

**Financial Crisis Advisory Group, Report (2009)**

The FCAG conducted a research about the impact of accounting standards on the current financial crisis. In this research, the FCAG assesses the role of fair value accounting and its potential pro-cyclical effect shortly. The FCAG assessed that a potential for pro-cyclicality does not exist, but acknowledges shortcomings in standards and guidance tools concerning fair value accounting. The FCAG believes that overall, financial assets have not been valued below their 'fundamental value' during the financial crisis. This is because in most countries, a majority of banks' assets are still valued at historical cost, being less sensitive for market fluctuations. Those assets would have been overstated during the financial crisis, creating a counter-cyclical effect. However, empirical research (IMF 2008, Bout et al. 2010) discussed in the next section, provides evidence that both in Europe and in the U.S. the majority of assets were valued at fair value for many financial institutions.

**Ryan (2008)**

In this article, Ryan analyses certain accounting standards in relation to the financial crisis, including fair value accounting and pro-cyclicality. Some parties 'blame' fair value accounting for causing the crisis because fair value losses in illiquid markets did not reflect expected payoffs, resulting in pro-cyclicality. Ryan does not support this opinion. However, Ryan does acknowledge, the issue implies a set of hypotheses that are amenable to test. Ryan states these issues will be difficult to test empirically because of data unavailability and selection/control problems and therefore proposes experimental-behavioral research to address the issue. Careful analyses of individual firm's financial reporting decisions could possibly provide better insight in valuation decisions of financial institutions then empirical-archival studies.

Though Ryan doesn't substantiate his opinion extensively, he does provide useful methodologies for future research on the issue. Investigating firms individually could provide new insights regarding fair value valuation decisions of financial institutions.

**Barth (2004)**

This conceptual study, though partly based on earlier empirical findings (Barth 1995, discussed later), provides the three sources of volatility. The earlier empirical study from Barth already indicated an increase of volatility in earnings with the use of fair value accounting in comparison to historical cost accounting.

Recall the example discussed earlier (on page 13) provided by Barth where assets are valued at fair value and fixed rate liabilities at historical costs and there is an increase in market interest rates. This example can also be applied to the financial crisis; a mixed-measurement accounting system could have amplified negative growth and thus, caused a pro-cyclical effect as indicated in the example.

On the other hand, depending on the applied distribution of fair value valuations and historical-cost based valuations of assets and liabilities (different at every company), a mixed-measurement accounting system could have dampened the economic business cycle of financial institutions as well. The IMF (2008) provides the example of some U.S. investment banks that valued all its liabilities at fair value, but used mixed-attribute measurements for assets. In this case, a weakening of economic activity, can introduce counter cyclicality into the balance sheets (IMF 2008). If we apply this to the example from Barth, an increase in interest rates causes a decrease in value of assets and liabilities. When liabilities are valued at fair value fully, the decrease in value of liabilities is recognized

fully as well, causing a counter balancing effect. Hence, it depends on the distribution applied, between assets and liabilities at fair value and historical cost, whether a mixed-measurement accounting system may accompany a pro-cyclical effect, for it can incorporate a counter-cyclical effect as well.

Barth does not explicitly use the term pro-cyclicality in her research, but states that a mixed-measurement accounting system can introduce volatility that is a direct result of fair value accounting and can 'amplify negative growth', thus implying there can be a pro-cyclical effect as a result of fair value accounting.

## 5.2 Empirical studies

Due to its actuality and unavailability of data, pro-cyclicality of fair value accounting has not been studied extensively. This section discusses the few empirical researches that address pro-cyclicality of fair value accounting.

### SEC-report: Study on Market-to-Market Accounting (2008)

In the report of Section 133 of the Emergency Economic Stabilization Act of 2008, the SEC states that they were unable to find any publicly available research that provides large-empirical evidence on a possible pro-cyclical effect of fair value accounting. In response to the upcoming debate concerning fair value accounting in relation to the financial crisis and the unavailability of academic research, the SEC has examined the potential of pro-cyclicality of fair value accounting.

The empirical research is based on a sample of 50 financial institutions active in the United States. The sample included banks, broker-dealers, insurance companies, credit institutions and government sponsored entities (GSE's). The sample was ranked by total reported value of assets at most recent fiscal year end. The sample included 30 large financial institutions covering 75% of all financial institutions' assets, and 20 smaller issuers. The study analyzed to what extend, financial institutions' assets and liabilities were valued at fair value and what the impact is of fair value on equity and income statements. Also the change in classification between the three hierarchy-levels prescribed by SFAS 157, were measured over 2008 (shifts between levels: a shift to level 3 valuations indicates pro-cyclicality).

The study found that, overall, financial institutions valued 45% of their assets at fair value and 15% of all liabilities at the first quarter-end of 2008. Insurance companies represented the largest part; 71% of assets were valued at fair value. Roughly 25% of total assets were valued at fair value and affected the income statement. The change in classifications of

assets and liabilities valued at fair value was measured over time, from the first quarter-end to the third quarter-end of 2008. Found was, that the classification of both assets and liabilities was fairly consistent over time. Although, classifications remained consistent over time and the percentage of level 3 classifications was relatively low, changes in level 3 fair value valuations had a significant impact on firms' equity. Institutions with the highest percentage of level 3 liabilities, reported the highest losses in equity.

The net-portion of fair value was calculated at 30% (45% assets - 15% liabilities), indicating the net-effect of fair value, which could have negatively affected the balance sheet and income, as a result of falling market prices.

The SEC concluded that, especially at banks and broker-dealers, income statements were negatively influenced through the use of fair value accounting. The total sum of all fair value gains and losses for the first three quarters of 2008, related to recurring fair value adjustments, was approximately 56.5 billion dollars.

The SEC acknowledged that fair value accounting can negatively influence equity and income and therefore, can incorporate pro-cyclicality. However, the SEC has not concluded that fair value accounting played a significant role in causing the financial crisis but, that inadequate credit grant decisions and weak risk management concerning regulatory capital requirements are the main areas of concern in relation to the financial crisis.

Further more, a survey under investors, indicated that fair value accounting is still the preferred accounting method and provides the most relevant information to users of financial statements. However, the surveyed investors suggested the adoption of more relevant disclosures, especially concerning level 3 valuations and exceptional devaluations. The SEC recommends the adjustments of standards and more detailed and explicit guidance to fair value accounting and its applications, to mitigate the issues surrounding fair value accounting. According to the SEC, historical cost based accounting is not an option to mitigate those issues, stating that historical cost based accounting incorporates more limitations, such as lower value relevance.

**Bout, Ter Hoeven & Langendijk (2010)**
This research investigates the influence of market inactivity on the way financial instruments have been valued and the potential pro-cyclicality of fair value accounting. This research has adopted a methodology similar to the SEC research. The main difference is that this research focuses on financial institutions active in Europe.

The research is based on a sample of 55 European banks and insurance companies. Similar to the SEC report, this research investigated to what extend financial institutions valued their assets and liabilities at fair value or historical costs.

The study detected a small increase of financial assets at fair value between 2007 and 2008. At year-end 2007, 51% of all assets were valued at fair value and was increased at year-end 2008 to 53%. Bout et al. (2010), expected an opposite outcome because of the in 2008 amended IFRS 7, allowing assets valued at fair value to be reclassified to historical costs (Bout & Ter Hoeven 2010).

In total, 30% of all liabilities were valued at fair value at year-end 2007 compared to 40% at year-end 2008. The net-effect of fair value for banks, at year-end 2007 was 12%, compared to 11% at year-end 2008. The outcomes are considerably lower compared to the 30% net-effect detected at American institutions by the SEC. Bout et al. (2010) states that European banks value both a substantial proportion of assets, as liabilities at fair value, creating a hedge, resulting in a dampened effect on pro-cyclicality of a company's balance sheet. Hence, Bout et al. (2010) concludes that fair value accounting accompanied only a minimal pro-cyclical effect on the investigated financial institutions' balance sheets and income statements.

**International Monetary Fund, Global Financial Stability Report (2008)**

In this research, the pro-cyclical effect of fair value accounting is tested with the use of economical lifecycle simulations based on empirical data collected from U.S. commercial banks, U.S. investment banks and European banks. The IMF comes to the conclusion that fair value accounting is the most used valuation method for financial assets and liabilities. The simulation indicated that weak risk management and bad investment decisions based on fair value accounting, could amplify cyclical movements both in times of economic growth and economic downturn, thus creating a pro-cyclical effect. The simulation illustrates how a change in liquidity conditions in securities markets, can exacerbate cyclical fluctuations, under certain risk management frameworks. As stated in the IMF report: *"Exaggerated profits in good times create the wrong incentives. Conversely, more uncertainty surrounding valuation in downturns may translate into overly tight credit conditions, and negatively affect growth at a time when credit expansion is most needed"*. However, the IMF emphasizes that not fair value itself, but risk management and investment decision rules using fair values are the main cause of pro-cyclical effects, but does acknowledge fair value accounting contributed to pro-cyclicality.

The IMF provides three main findings in their end-conclusion. 1) Fair value accounting has a pro-cyclical effect in illiquid financial markets on balance sheets of banks. 2) Strong capital buffers build up in business cycle peaks are needed to withstand pro-cyclical effects in balance sheets in times of economic downturn. 3) Assigning fair value accounting to a larger percentage of liabilities than the assets can dampen the pro-cyclical effect.

Further more, similar to the FSF, the IMF recommends the adoption of the 'expected loss model instead of the 'incurred loss model'.

**Barth (1995)**

This empirical research provides evidence for increased earnings volatility as a result of fair value accounting for banks in the U.S. The research consists of a sample of 137 banks and analyzes the period 1971-1990. Though this research is relatively out of date and doesn't actually uses the term pro-cyclicality in its research, it provides evidence for pro-cyclicality, as Barth states: "*fair value based earnings are more volatile than historical cost earnings but share prices do not reflect this incremental volatility*". Further more, Barth found that banks' regulatory capital requirements are more frequently violated under fair value accounting than under historical cost accounting. This can be applied to the current crisis, where financial institutions were 'forced' to sell assets in distressed markets because of regulatory capital requirements, resulting in further price falls and destabilization of the financial market. If fair value accounting leads to more violations of regulatory capital requirements, fair value accounting indirectly incorporates pro-cyclicality. The SEC-, FSF- and IMF-report, all acknowledge that regulatory capital requirements in combination with fair value accounting amplify negative growth in illiquid markets.

| Empirical Studies | | | | |
|---|---|---|---|---|
| Author(s) | Object of Study | Sample | Methodology | Outcome |
| SEC. (2008) | Study on market-to-market accounting and pro-cyclicality. | Sample size: 50 U.S. financial institutions. 1$^{st}$ – 3$^{rd}$ quarter of 2008. | Analysis of impact of FVA: To what extend Financial Institutions used FVA. Change in distribution between FV-levels over time | Acknowledges pro-cyclical effects of FVA, but bad credit grant decisions and weak risk-management are considered the cause of the crisis. |
| Bout, B.J., Hoeven, R.L. ter & Langendijk H. (2010). | Study on FVA, inactive markets and pro-cyclicality. | Sample size: 55 European financial institutions. 2007 and 2008. | Analysis of impact of FVA: To what extend Financial Institutions used FVA. Change in distribution between FV-levels over time. | Minimal-to-no pro-cyclical effect of FVA, due to a large part of liabilities valued at FV, creating a dampened effect. |
| International Monetary Fund (2008), | Report on Global Financial Stability, study on pro-cyclicality of FVA. | Sample of 'representative' U.S and European banks' balance sheets of end-2006 provided the basis for the simulations. | Simulation of impact of changes in valuations on bank's equity capital. | FVA has a pro-cyclical effect in illiquid financial markets on balance sheets of banks, but bad credit grant decisions and weak risk-management are considered the cause of the crisis. |
| Barth M.E. (1995). | Study on earnings volatility as a result of FVA. | Sample of 137 U.S. banks (largest sample) 1971-1990. | Statistical analysis on use of FVA by banks. | Increased volatility and violations of capital requirements as result of FVA, compared to HCA. |
| Conceptual Studies | | | | |
| Author(s) | Object of Study | Sample | Methodology | Outcome |
| Magnan M. (2009) | Impact of FVA on financial system/crisis and pro-cyclicality | No sample, Case study of some U.S. financial institutions 2007/2008 | Case study examining indicators of increased volatility | Increased volatility due to FVA, led to pro-cyclical effects. |
| Financial Stability Forum (2009) | Pro-cyclicality in the financial system | No Sample | Analysis based on conceptual framework | Acknowledges pro-cyclical effects of FVA. |
| Financial Crisis Advisory Group, (2009) | Impact of accounting standards on the current financial crisis, including FVA and pro-cyclicality | No Sample | Critical analysis based on conceptual framework | No pro-cyclical effect of FVA. Acknowledgement of some weaknesses of standards and guidelines concerning FVA |
| Ryan S.G. (2009) | Impact of accounting standards on the current financial crisis, including FVA and pro-cyclicality | No Sample | Theoretical analysis | No pro-cyclical effect of FVA. Ryan suggests hypotheses for future research to test FVA issues. |
| Barth M.E. 2004 | Study of fair value and financial statement volatility | No sample | Theoretical analysis, partly based on earlier empirical research (Barth 1995) | Mixed-measurement accounting system can incorporate pro-cyclicality. |

**Table 3:** Summary of reviewed literature concerning FVA and pro-cyclicality. FVA = fair value accounting. HCA = historical cost accounting

## 6. Hypotheses development

The main question of this research is whether fair value accounting incorporates a pro-cyclical effect on financial institutions' financial statements? The discussed researches delivered insight, but did not provide a consistent answer to the issue.

The main sub-conclusion drawn from all researches is that not fair value accounting, but bad credit grant decisions and weak risk management are considered the main causes of the current financial crisis. This does not imply that fair value accounting could not have played a role in aggravating the financial crisis, by introducing pro-cyclical effects in financial institutions' financial statements.

The discussed conceptual studies did not yield consistent opinions relating to this issue. Neither the empirical studies provided consistent evidence on the topic. Both the IMF and the SEC detected a pro-cyclical effect of fair value accounting, however Bout et al. (2010) did not come to this conclusion in their empirical research. More empirical evidence is needed to determine whether fair value accounting incorporates pro-cyclicality.

**Main hypothesis**

Since the discussed studies could not provide consistent evidence about the pro-cyclicality of fair value accounting, additional research addressing the issue is necessary. To research pro-cyclicality the following main hypothesis will be tested in this research:

***Fair value accounting incorporated a pro-cyclical effect on financial institutions' financial statements before and during the (current) financial crisis (2005-2009).***

For this research similar methodologies as used by the SEC (2008) and Bout et al. (2010) will be applied in this research. To distinguish from earlier research, a larger time span is examined (2005-2009) than researched by the SEC (2008) and Bout et al. (2010) (Time span SEC: 2008, time span Bout et al: 2007-2008). Examining the extent to which fair value accounting was used the years before the financial crisis, could provide a different view on the issue. Based on the discussed researches in this literature study, I expect extensive usage of fair value accounting in the years before the crisis could have led to a large amount of unrealized earnings based on risk-full investments recognized in the financial statements. Unrealized earnings of risk-full investments could have led to amplification of business cycles in the expansion phase, but could have amplified negative growth when market became illiquid and unrealized earnings converted into losses.

Besides using the methodology used in studies from the SEC (2008) and Bout et al. (2010), I will propose two developed models that provides a more thorough investigation of companies' unrealized gains and losses as a result of fair value accounting before and during the crisis. The methodologies from the SEC (2008) and Bout et al. (2010) and the own constructed models will be presented in the next chapter.

# 7. Research methodology and sub-hypotheses development

## 7.1 Time-span

For this research I will investigate pro-cyclicality of fair value accounting over the years 2005-2009. As noted earlier, the SEC (2010) tested pro-cyclicality of fair value accounting over the first three quarters of 2008 and Bout et al. (2010) over end 2007 till end 2008. The reason for investigating pro-cyclicality also before 2007 is that I expect that the alleged negative effects of fair value accounting have their roots in the expansion phase of companies' business cycles. During the expansion phase, large amounts of unrealized gains could have led to large amounts of unrealized losses in times of negative growth. To illustrate this, I present an example of a hypothetical scenario below:

Assume a company obtained a portfolio of assets at 'fair value through profit and loss' at the beginning of 2006, worth € 200 million at historical costs (acquisition price) and valued at fair value € 200 million. 'Through profit and loss' refers to assets and liabilities valued at fair value that affect the income statement of a company (i.e. assets and liabilities designated at fair through profit and loss) (IAS 39.9). Other assets valued at fair value only affect equity ('available for sale' assets) (IAS 39.94). IAS 39 does not allow liabilities to be recognized 'through equity'. As a result of rising market prices, the value of the assets increases. Assume that the company recognized € 100 million of unrealized gains as a result of revaluations of the assets at end 2006, now worth € 300 million at fair value. The effect on the income statement in this case is + € 100 million, amplifying positive growth, since the € 100 million would not have been recognized under historical costs. Assume further, that when in 2007 the market became inactive, the value of the assets fell below their historical costs, now worth € 150 million at fair value end 2007. Under historical costs, the effect on the income statement is - US$ 50 million and for example € -50 million at largest for amortization, which makes a total of € -100 million. However under fair value, the effect on the income statement is - € 150 million, thus amplifying negative growth.

Above-mentioned issue describes a scenario of how fair value accounting could have caused pro-cyclical effects. To examine the validity of this scenario, a broader time-span compared to the SEC (2008) study and the study from Bout et al. (2010) is needed.

## 7.2 Sample

The sample is based on the research conducted by Bout et al. (2010). The sample consists of 55 European financial institutions and comprises the largest stock exchange listed banks and insurance companies in Europe, of which 38 banks and 17 insurance companies (Bout et al. 2010). This sample is chosen because it enables to compare the findings from this research with the findings from the research from Bout et al. (2010). Furthermore, this sample is chosen because it includes the largest banks and insurance companies in Europe and therefore represents those banks and insurance companies that have the largest influence and impact on the economy and on society in Europe. The insurance companies are less represented in the total sample however, the sample of 17 insurance companies is considered representative for the insurance industry of Europe. If the smaller insurance companies, which are not included in the sample, would show different results, this would not influence the results from the tested population largely. This is because the larger companies receive a larger weight when calculating the results from the total sample. Furthermore, later in this research is determined that the smaller insurance companies apply fair value accounting similarly compared to the larger insurance firms (page 54). This indicates that the smaller insurance companies would show similar results. Therefore it can be expected that the smaller insurance firms, which are not included in the sample, would not have a large impact on the results from the tested sample and that the 17 insurance companies from the tested sample are representative for the insurance industry in Europe. Also the 38 banks are considered representative for the banking industry, also because these banks comprise the largest banks in Europe. The 55 tested companies are disclosed in appendix 4.

## 7.3 Methodologies and sub-hypotheses development

To examine pro-cyclicality of fair value accounting I will use different approaches. The first two approaches are derived from the methodologies used by the SEC (2008) and Bout et al. (2010). The third and fourth approach consists of two developed model. The SEC (2008) and Bout et al. (2010) obtained a methodology that measures pro-cyclicality by the extent to which assets and liabilities are valued at fair value and the net-effect of assets and liabilities valued at fair value (percentage of assets – percentage of liabilities valued at fair value). The net-effect indicates the volatility introduced in the financial statements. A positive net-effect causes pro-cyclicality (Bout et al. 2010). The sub-hypothesis that will be tested will be:

**Sub-hypothesis 1:** *financial institutions' financial statements show a significant positive net-effect of fair value accounting, resulting in pro-cyclicality before and during the (current) financial crisis*.

To calculate the net effect, the following variables need to be collected from the annual reports from financial institutions over the years 2005-2009:

1) Balance totals
2) Total financial assets at fair value
3) Total financial liabilities at fair value
4) Percentage financial assets valued at fair value of balance total
5) Percentage financial liabilities valued at fair value of balance total

A data example obtained from the annual report from ING Bank over the years 2005 – 2009 is presented in following table:

| | 31-12-2005 | 31-12-2006 | 31-12-2007 | 31-12-2008 | 31-12-2009 |
|---|---|---|---|---|---|
| Balance total | 834,035 | 894,985 | 994,113 | 1,034,689 | 882,219 |
| FA at FV | 326,238 | 357,070 | 351,777 | 308,387 | 214,951 |
| FL at FV | 109,212 | 145,923 | 168,338 | 183,670 | 126,496 |
| % FA at FV of balance total | 39% | 40% | 35% | 30% | 24% |
| % FL at FV of balance total | 13% | 16% | 17% | 18% | 14% |
| Net-effect of fair value | 26% | 24% | 18% | 12% | 10% |

**Table 4:** Amounts in millions of Euros. Data example from ING Bank (2005-2009). Example calculation of the net effect of fair value accounting. FA = Financial Assets, FL = Financial Liabilities, FV = Fair value.

As observable in this example, the net-effect of fair value accounting decreases over time. This is mainly the result of a reduction in assets at fair value in the years 2007, 2008 and 2009. An explanation for this can be the amended IFRS 7 discussed earlier, that allows companies to reclassify financial assets back to historical costs. As far as ING Bank is concerned, fair value accounting did not introduce pro-cyclicality in the balance sheet in 2008, as Bout et al. (2010) consider a 12% net-effect insignificant in their research. Though, it is observable, that the net effect was higher in the years before the crisis. Bout et al. (2010) do not disclose in their research which level of the net-effect of fair value accounting would be considered significant. Bout et al. (2010) consider 12% insignificant, though considers 30% significant. Changes concerning the portion of assets and liabilities between years, will be tested for significance using a paired samples t-test. Since the same population is tested twice, only in different years, this significance test is considered appropriate (Field 2009).

Another method used by the SEC (2008) and Bout et al. (2010) to determine pro-cyclicality is an analysis of shifts between the three fair value hierarchy levels (discussed earlier on page 7). An increase in level three classifications as a result of markets becoming illiquid

indicates increased volatility, and thus increased pro-cyclicality. To test this, the second sub-hypothesis will be:

**Sub-hypothesis 2:** *Financial institutions' financial statements show a significant increase of level three valuations as a result of markets becoming illiquid.*

The following table presents an example of the shifts between fair value hierarchy levels for ING Bank. Data for the year 2005 is not available for ING bank.

| Fair value hierarchy | 31-12-2006 | 31-12-2007 | 31-12-2008 | 31-12-2009 |
|---|---|---|---|---|
| **Financial assets** | | | | |
| Level 1 | 59% | 63% | 55% | 43% |
| Level 2 | 30% | 36% | 38% | 56% |
| Level 3 | **11%** | **1%** | **7%** | **1%** |
| **Financial liabilities** | | | | |
| Level 1 | 69% | 52% | 61% | 25% |
| Level 2 | 31% | 47% | 39% | 75% |
| Level 3 | - | 1% | - | - |

**Table 5:** Amounts in millions of Euros. Shifts between fair value hierarchy levels over the years 2006-2008.

Overall, ING Bank did not value a large part of its assets and liabilities based on unobservable inputs (level 3 valuations) however, in the year 2008 the increase of level three valuations for assets is due to reclassifications of subprime positions (most risk-full positions) from level one to level three valuations, as markets became inactive and observable market prices where unavailable. Although only a small percentage of assets are classified as 'level three' valuations, volatility and related devaluations of these assets proved to have a significant impact on income. ING Bank discloses € 8,5 billion of unrealized losses recognized in income as a result of revaluations of these subprime positions. As the net result of ING Bank in 2008 was € 703 million, the revaluation of level three assets had a significant impact on income. However, due to a large amount of liabilities that were valued at fair value, this effect was largely mitigated.

*Limitations of the methodology used by the SEC (2008) and Bout et al. (2010)*

The methodology from the SEC (2008) and Bout et al. (2010) incorporate two major limitations. The first limitation is that the net-effect only provides an indication of the volatility impact on financial statements. A large net-effect would introduce volatility and would therefore indicate pro-cyclicality, but doesn't actually measure the increased volatility and pro-cyclicality.

The second limitation is that impairments of assets are not taken into consideration if assets would have been valued at historical costs. As noted in the example from ING Bank, revaluations of subprime level three valuation caused € 8,5 billion of unrealized losses and negatively affected income. However, if these assets would have been valued at historical costs, and prices fell significantly below their historical costs, it is certain that these assets would have been impaired. The question is, whether the impairment would have resulted in a similar loss as in the actual situation under fair value accounting. This depends on the historical costs of the assets and the fair value of those assets prior to 2008. The following two examples demonstrate how historical costs and fair value changes could have affected net-income differently in 2008:

| | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|
| HC of assets | 400 | 400 | 400 | 400 |
| Change in value of assets | 0 | +50 | +50 | -300 |
| **Fair value accounting** | | | | |
| BS value of assets at FV | 400 | 450 | 500 | 200 |
| Effect on income using FVA | 0 | +50 | +50 | **_-300_** |
| **Historical cost accounting** | | | | |
| BS value of assets at amortized cost (amortization 50/year) | 400 | 350 | 300 | 200 |
| Effect on income using HCA | - | -50 | -50 | **_-100*_** |

**Table 6:** Example scenario 1: pro-cyclical effect end-2008 as a result of FVA.
* -100 = -50 amortized cost and -50 impairment as a result of the drop of fair value below historical costs. BS = Balance sheet, FVA = fair value accounting, HCA = historical cost accounting

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| | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|
| HC of assets | 400 | 400 | 400 | 400 |
| Change in value of assets | 0 | +50 | -150 | -200 |
| **Fair value accounting** | | | | |
| BS value of assets at FV | 400 | 450 | 300 | 100 |
| Effect on income using FVA | 0 | +50 | -150 | **_-200_** |
| **Historical cost accounting** | | | | |
| BS value of assets at amortized cost (amortization 50/year) | 400 | 350 | 300 | 100 |
| Effect on income using HCA | - | -50 | -50 | **_-200*_** |

**Table 7:** Example scenario 2: no pro-cyclical effect end-2008 as a result of FVA
* -200 = -50 amortized cost and -150 impairment as a result of the drop in fair value below historical costs.

The first scenario demonstrates that the effect on income can differ between historical costs accounting and fair value accounting end-2008. In scenario 1 it is observable that fair value accounting incorporated pro-cyclical effects, amplifying growth in the years 2005-2007, but amplified negative growth in 2008. However, the second scenario demonstrates that, depending on the historical costs of the assets and the fair value changes prior to 2008, the impairment at historical costs and the devaluation at fair value can be of equal size. In the second scenario, fair value accounting did not cause a pro-cyclical effect in 2008 (though it

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did introduce volatility in the years before 2008).

In this example was assumed that if the assets had been valued at historical costs, they would have been impaired for the full difference between historical costs and fair value of the asset, if the fair value fell below historical costs. However, as discussed earlier, critics of fair value accounting argue that assets wouldn't be impaired under historical cost accounting as much as the assets are devaluated under fair value accounting (below their 'fundamental value'). If this is true, than this could indeed introduce pro-cyclical effects, but it is impossible to determine what the amount of all impairments of a company would have actually been if the assets would have been valued at historical costs.

An important conclusion that can be drawn from above-mentioned examples is that fair value accounting introduced pro-cyclicality during the financial crisis (2008) most probably if, prior to the crisis the net result of revaluations of fair value valued assets and liabilities is significantly positive. Though, one last example indicates that a positive revaluation result prior to 2008 is not necessarily a prerequisite for causing a pro-cyclical effect in 2008 (during the crisis).

| | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|
| HC of assets | 400 | 400 | 400 | 400 |
| Change in value of assets | 0 | 0 | 0 | -200 |
| **Fair value accounting** | | | | |
| BS value of assets at FV | 400 | 400 | 400 | 200 |
| Effect on income using FVA | 0 | 0 | 0 | **-200** |
| **Historical cost accounting** | | | | |
| BS value of assets at amortized cost (amortization 50/year) | 400 | 350 | 300 | 200 |
| Effect on income using HCA | - | -50 | -50 | **-100\*** |

**Table 8:** Example scenario 3. Pro-cyclical effect without positive net valuation results in the years prior to 2008.
 \* -100 = -50 amortized cost and -50 impairment as a result of the drop of fair value below amortized costs.

As observable in table 7, the fair value of the assets remained constant over the year 2005-2007 (no positive net valuation result), though a pro-cyclical effect is created in 2008, because under historical costs, these assets would have been amortized over the years 2005-2007 and recognized in income.

The methodology of the SEC (2008) and Bout et al. (2010) ignores unrealized gains, unrealized losses, and amortization and the potential impairments if the financial instruments would have been valued at historical costs. The model presented in the next section tries to capture these issues and takes unrealized gains and losses from prior years into account.

## 7.4 Model development and explanations

The model presented in this section captures the unrealized gains and losses of assets and liabilities valued at fair value, in order to determine the impact of these unrealized gains and losses on net-income and equity. The model will simulate companies' net-income and equity, as if historical cost accounting was applied instead of fair value accounting. The term 'historical costs accounting' should not be taken literally in this sentence, since valuing financial assets and liabilities such as derivatives at historical costs, is impossible since these instruments often have no value upon acquisition. The simulation of net-income, should be seen as a benchmark, which enables to isolate the impact on net-income and equity of the unrealized gains and losses of assets (and liabilities) at fair value. There are two models, one investigating pro-cyclicality of net-income and one investigating pro-cyclicality of equity. Further more, each model consist of two parts:

1) The actual net-income (ACT**NI**) and actual equity (ACT**EQ**) from financial institutions, where a certain part of assets and liabilities is valued at fair value (different for every company). ACT**NI** and ACT**EQ** are determined from annual reports.

2) A simulation of net-income under full historical costs (S**NI**HC) and a simulation of equity under full historical costs (S**EQ**HC), from financial institutions derived from empirical data. The net-income and total equity are determined as if the assets and liabilities valued at fair value would have been valued at historical costs. Net-income and equity are only affected by impairments on assets (and amortized costs[2]) and losses on liabilities in the model and not by unrealized gains. S**NI**HC and S**EQ**HC will be determined with the model and will be based on data from annual reports and on certain assumptions which will be discussed later.

ACT**NI** and S**NI**HC will be determined over the years 2005-2009 and the results will be visualized in a graph. If in times of economic growth ACT**NI** > S**NI**HC, and when in times of economic downturn ACT**NI** < S**NI**HC, the results provide evidence for pro-cyclicality. The third and fourth sub-hypotheses of this research will therefore be:

**Sub-hypothesis 3:** *In times of economic growth, ACTNI > SNIHC*

**Sub-hypothesis 4:** *In times of economic downturn, ACTNI < SNIHC*

Economical growth and economical downturn is determined using MSCI Barra global value and growth indices. Figure 1 below, shows the overall economical growth for large

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[2] In this model is assumed that assets are not being amortized over time (see assumption (3) on page 36).

European companies between end-2002 and end-2009:
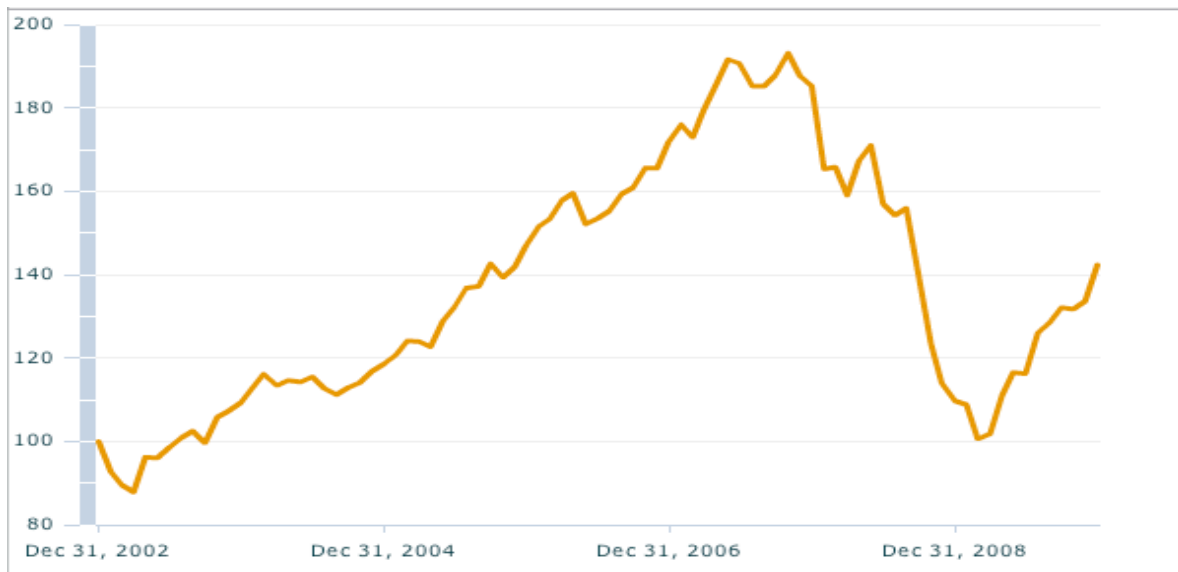


**Figure 1:** Economical growth (value growth equity) for largest European companies between end-2002 and end-2009. Y-axis: index of company growth (equity) of largest companies in Europe (financial sector) (base year end-2002: index 100)

Figure 1 shows that from end-2004 until end-2007 European companies experienced economical growth, compared to economical downturn from end-2007 until end-2008. In order to confirm sub-hypothesis three, the model result would need to show that ACT**NI** > S**NI**HC from end-2004 until end-2007 and from end-2008 until end-2009. In order to confirm sub-hypothesis four, the model result would need to show that ACT**NI** < S**NI**HC from end-2007 until end-2008. The period end-2002 until end-2004 will not be tested in this research.

Similar hypotheses can be formulated to test whether fair value accounting introduced pro-cyclicality in firms' equity. To test this, ACT**EQ** en S**EQ**HC need to be determined over the years 2005-2009. If in times of economic growth ACT**EQ** > S**EQ**HC, and when in times of economic downturn ACT**EQ** < S**EQ**HC, the results provide evidence for pro-cyclicality. The fifth and sixth sub-hypotheses of this research will therefore be:

**Sub-hypothesis 5:** *In times of economic growth, ACTEQ > SEQHC*

**Sub-hypothesis 6:** *In times of economic downturn, ACTEQ < SEQHC*

Because data about historical costs of assets and liabilities and (potential) impairments/amortizations of assets currently at fair value are not disclosed in annual reports of financial institutions, the model is subject to four important assumptions. Although this creates a bias, the assumptions are 'in favor' of the alternative hypothesis, that fair value

accounting did not incorporate pro-cyclical effects on financial institutions' financial statements. The assumptions are subject to the simulation of net income and equity under full historical costs. The assumptions itself and the reasons for the assumptions will be substantiated below.

**Assumption (1):** *The year end-2004 financial assets and liabilities valued at fair value are assumed to equal historical costs.*

Since financial institutions did not disclose the historical costs of assets and liabilities valued at fair value in annual reports, an estimation of historical costs must be made for the first measurement date (31-12-2004), in order to simulate the net-income under full historical cost accounting for the following years. It has to be stressed that this assumption creates a bias in the research however, it is probable the assumption will result in detecting either the actual level, or a lower level of pro-cyclicality than actually present (if present). This can be explained by observing figure 1. Figure 1 shows an economical growth starting from 2002, and keeps growing until the first measurement date (end-2004) and beyond. The assumption is made, that the net valuation result on all assets and liabilities at fair value is positive in 2004. The reason that the net valuation result would likely have been positive is because balance sheet values overall increase in times of economic growth. Therefore, the balance sheet values of assets and liabilities increased in 2004 and would have resulted in unrealized gains on assets and unrealized losses on liabilities. This statement only holds when a larger percentage of assets are valued at fair value than liabilities (a positive net-effect) (Bout et al. 2010). In the researches from Bout et al. (2010) and the SEC (2008), it was already determined that both in the U.S. as in Europe, all tested firms value a larger percentage of assets at fair value than liabilities. Therefore, the value changes in 2004 would have led to a positive net-valuations result in the base year (2004). So the ACTNI would be higher than the SNIHC in the base year. However, it is assumed that they are equal at end-2004. The problem with this assumption is that the level of pro-cyclicality that would be measured is lower than actually present (if present). On the one hand, this assumption is a safe assumption, since the assumption under this scenario, is in favor of the alternative hypothesis. On the other hand, the limitation remains that the model would detect a lower than actual level of pro-cyclicality if this scenario would represent reality. However, if pro-cyclical effect would actually be present in financial institutions financial statements, and the model would detect pro-cyclicality, this would actually add power to the findings of the model as a result of this assumption.

**Assumption (2):** *If the fair value of assets falls below their historical value, the assets are impaired by the full difference between historical costs and fair value.*

The validity of this assumption will be explained by a hypothetical example: as noted earlier, the first measurement date of the model is 31-12-2004. Assume that at the first measurement date, assets from a particular company are valued at € 400 million both at historical costs and at fair value (assumption (1) is applicable). In 2005 the assets are subject to € 100 million unrealized gains and EUR 200 million unrealized losses in 2006, as a result of revaluations. Under fair value accounting, the assets would be valued at € 300 million (400 + 100 -200) end-2006 and would represent the actual situation. If the assets had been valued at historical costs, the assets would be impaired for the full difference between the historical costs (400) and the fair value (300). The impairment therefore would be € -100 million. Note that assets are not amortized in this example. Normally, assets would have been amortized over the years 2005 and 2006, however, this research is about financial assets which are not amortized over time (assumption (4) discussed later).

As noted earlier, critics of fair value accounting argue that under historical cost accounting, the assets would not (always) be impaired for the full difference between historical costs and fair value if the fair value of assets would fall below historical costs. As also noted in the annual statements from ING Bank, assets will be impaired only for the full difference between historical costs and fair value, if the fair value of assets falls at least 25% (for some assets even 75%) below the historical value. However, it is impossible to determine what the amount of impairment would have been, if assets that are currently valued at fair value had been valued at historical costs. Therefore, this assumption is unavoidable, though similar to assumption (1), this assumption is a 'safe' assumption, since impairing for the full difference, reduces the level of pro-cyclicality detected by the model.

**Assumption (3):** *If the fair value of liabilities is higher than their historical value, this results in a loss, which will be recognized fully in net-income. .*

This assumption is similar to assumption (2), though a difference is that with liabilities, an increase in the fair value results in an unrealized loss, instead of an unrealized gain compared to assets. If for instance a liability is worth 500 at historical costs but the fair value increases the next year to 700, the difference between fair value and historical costs will be recognized in the balance sheet value. So under

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historical costs in the second year, the liability will be valued at 700, since losses are recognized immediately. The unrealized loss of 200 is recognized in net-income.

**Assumption (4):** *Assets are not being amortized over time but remain at their historical costs, unless the fair value falls below their historical costs. If the value of assets falls below their historical costs, assumption (2) is applicable.*

Since financial institutions do not disclose the historical costs of financial assets currently valued at fair value, neither the potential amortization (if at all) if assets had been valued at historical costs can be determined from annual reports. Therefore this assumption is necessary. However, similar to the previous assumptions, this assumption is a 'safe' assumption as well. Amortization costs of assets are distributed over a certain amount of years that represent the lifetime of the assets. Amortization costs are recognized in the profit and loss account and dampen the business cycle of net-income. A potential dampening of net income at historical costs (S**NI**HC part of the model) will therefore not occur since this assumption doesn't allow amortization. If in the model, SNIHC would be subject to amortization, this would create a pro-cyclical effect of fair value accounting. Example scenario 1 in table 6 (page 30) illustrates this effect. Without amortization, the historical costs would remain equal over time (400) and would result in an effect on income of -200 in 2008 (compared to -100 when amortized). As under fair value accounting, the effect on income was -300, the effect on income without amortization lies closer to the effect on net–income under fair value accounting. Therefore, fair value accounting behaves less pro-cyclical compared to historical cost accounting, under the condition of assumption (4). Similar to the previous assumptions, this assumption would add power to the findings of the model if the model detects pro-cyclicality.

### *Model explanations*

Unrealized gains and losses on assets and liabilities at fair value will serve as proxies for the simulation of net income and equity as if historical cost accounting was used. To illustrate how the model is constructed and how it works, I've presented several scenarios, examples and visualizations that aid in explaining the model.

Recall the first assumption that stated that end-2004, the fair value of all assets and liabilities is set to equal historical costs. This implies that both net-income and equity are equal under both fair value accounting as under historical cost accounting. This assumption is necessary for the following two reasons:

1) A certain base year is needed from which to start-off measuring unrealized gains and losses on assets and liabilities. As discussed earlier, this assumption is made since it is impossible to determine what the historical costs of all assets and liabilities at fair value were in 2004.

2) Data about unrealized gains and losses before 2005 is not always available for every financial institution. This is mainly because before the introduction of IFRS in 2005, companies were not obliged to disclose unrealized fair value gains and losses.

As mentioned above, there is only data available about unrealized gains and losses for the tested companies for 2005-2009. Therefore end-2004 will be used as the base year.

Converting the first assumption discussed earlier, into symbols gives:

**Assumption (1):**

$S\textbf{NI}HC_{t=0} = ACT\textbf{NI}_{t=0}$

And

$SE\textbf{Q}HC_{t=0} = ACT\textbf{EQ}_{t=0}$        **where,**

$S\textbf{NI}HC_{t=0}$ = Simulation of net-income under full historical cost accounting in year t = 0 = 2004

$ACT\textbf{NI}_{t=0}$ = Actual net-income in year t = 0 = 2004

$SE\textbf{Q}HC_{t=0}$ = Simulation of equity under full historical cost accounting in year t = 0 = 2004

$ACT\textbf{EQ}_{t=0}$ = Actual equity in year t = 0 = 2004

This assumption will determine the starting point of the graph that will visualize the $S\textbf{NI}HC$ and the $ACT\textbf{NI}$ and the $SE\textbf{Q}HC$ and the $ACT\textbf{EQ}$ respectively, over time. For a more clear understanding, the following examples will only incorporate those unrealized gains and losses that affect net-income and thus the $S\textbf{NI}HC$. The model for calculating the $SE\textbf{Q}HC$ will be discussed later.

To continue the explanation of the model, assume that at end-2004 the $ACT\textbf{NI}$ of a fictitious financial institution called BANK Y is € 4000 million and € 4500 million end-2005. Assume further that the following unrealized gains and losses were recognized in the $ACT\textbf{NI}$ end-2005 (next page):

| Table 9: Unrealized fair value gains and losses on assets and liabilities recognized in ACTNI end-2005 for BANK Y | |
|---|---|
| Unrealized gains on assets affecting income (UGAI) | 1000 |
| Unrealized losses on assets affecting income (ULAI) | 400 |
| Valuation result on assets (UGAI – ULAI) | **+600** |
| Unrealized gains on liabilities affecting income (UGLI) | 800 |
| Unrealized losses on liabilities affecting income (ULLI) | 1000 |
| Valuation result on liabilities (UGLI – ULLI) | **-200** |
| Total valuation result on assets and liabilities affecting income = ((UGAI – ULAI) + (UGLI – ULLI)) | **+400** |

Under fair value accounting the total valuation result of € +400 million is an unrealized gain that is recognized in the profit and loss account. The ACT**NI** is determined from the annual report and already includes the unrealized gain. However, under historical costs, unrealized gains would not have been recognized, therefore in 2005 the S**NI**HC would have been lower than the ACT**NI**. In order to calculate the S**NI**HC, first the net-income is needed as if not a single unrealized gain or loss is recognized. This can be modeled by deducting the net-valuation result in 2005 from the ACT**NI**, thus:

$$\text{S}\textbf{NI}\text{WGL}_{t=1} = \text{ACT}\textbf{NI}_{t=1} - ((\text{UGAI}_{t=1} - \text{ULAI}_{t=1}) + (\text{UGLI}_{t=1} - \text{ULLI}_{t=1}))$$
$$= 4500 - 400 = 4100$$

Where,

$\text{S}\textbf{NI}\text{WGL}_{t=1}$ = Simulation of net-income without any unrealized gains and losses recognized yet, in year t = 1 = 2005.

Thus, the amount of 4100 represents the income in which no valuation result is recognized yet. Under fair value accounting, both unrealized gains and losses are recognized. Since the valuation result is positive (400), the actual net-income would be 4500, which is correct (4100 + 400). However, under historical costs, the unrealized losses would be recognized, but unrealized gains would not be recognized in income. The S**NI**HC $_{t=1}$ can be calculated by deducting only the unrealized losses (on liabilities) from S**NI**WGL $_{t=1}$. Thus:

$$\text{S}\textbf{NI}\text{HC}_{t=1} = \text{ACT}\textbf{NI}_{t=1} - ((\text{UGAI}_{t=1} - \text{ULAI}_{t=1}) + (\text{UGLI}_{t=1} - \text{ULLI}_{t=1})) + (\text{UGLI}_{t=1} - \text{ULLI}_{t=1})$$

$$= \text{S}\textbf{NI}\text{WGL}_{t=1} + (\text{UGLI}_{t=1} - \text{ULLI}_{t=1})$$

$$= 4100 - 200 = 3900$$

The starting point in 2004 and the difference between the S**NI**HC and ACT**NI** in 2005 are shown in the figure below:
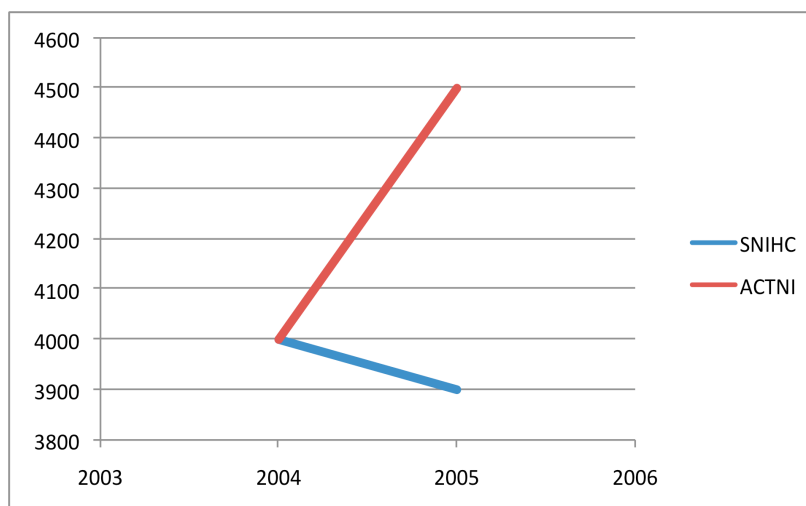


**Figure 2:** ACT**NI** and S**NI**HC (2004-2005)

In the graph it is observable, that under historical cost accounting, the unrealized gain of € +600 million would not have been recognized and therefore shows a lower net-income under historical cost accounting compared to fair value accounting.

Now will be explained how S**NI**HC can be calculated when incorporating more than one year. In order to do so, it is needed to explain how impairments and losses are affecting the model. Under historical cost accounting, the size of impairments and losses depend on the value changes of the assets and liabilities in the tested year but also on fair value changes in prior years. The following example will aid in demonstrating how to calculate the impairment on assets and losses on liabilities when more than one year taken is into account. Assume that the values of some assets and liabilities experienced the following value mutations over the years 2004-2007:

|  | End-2004 | End-2005 | End-2006 | End-2007 |
|---|---|---|---|---|
| HC of assets | 400 | 400 | 400 | 400 |
| HC of liabilities | 200 | 200 | 200 | 200 |
| **Scenario 1** |  |  |  |  |
| BS value of assets at FV | 400 | 450 | 500 | 300 |
| BS value of liabilities at FV | 200 | 250 | 300 | 150 |
| BS value of assets at HC | 400 | 400 | **400** | **300** |
| BS value of liabilities at HC | **200** | **250** | **300** | 300 |
| Unrealized gains/losses on assets at FV | - | +50 | +50 | **-200** |
| Unrealized gains/losses on liabilities at FV | - | -50 | -50 | +150 |
| Net-valuation result | - | - | - | -50 |
| **Impairment/loss under HC affecting net-income** | - | **-50** | **-50** | **-100** |
|  |  |  |  |  |
| **Scenario 2** |  |  |  |  |
| BS value of assets at FV | 400 | 500 | 350 | 300 |
| BS value of liabilities at FV | 200 | 300 | 300 | 100 |
| BS value of assets at HC | 400 | 400 | 350 | 300 |
| BS value of liabilities at HC | **200** | **300** | 300 | **300** |
| Unrealized gains/losses on assets at FV | - | +100 | -150 | **-50** |
| Unrealized gains/losses on liabilities at FV | - | -100 | 0 | +200 |
| Net-valuation result | - | +50 | -150 | +150 |
| **Impairment/loss under HC affecting net-income** | - | **-100** | **-50** | **-50** |

**Table 10:** two different scenarios resulting in different impairments on assets/losses on liabilities. BS = Balance sheet, FV = Fair value, HC = Historical costs.

In the table it is observable that the historical costs of assets are 400 and are 200 for liabilities, aquired at 31-12-2004, and are therefore valued at fair value on that date for the same amounts.

*Scenario 1:*

In 2005, the balance sheet value of assets rose to 450, resulting in an unrealized gain of +50. Liabilities became 'more expensive' in 2005 since the balance sheet value rose from 200 to 250, resulting in an unrealized loss of -50. In 2006, the balance sheet value rose to 500 for assets and to 300 for liabilities, resulting in similar gains and losses as in 2005. However in 2007, the balance sheet value dropped to 300 for assets and to 150 for liabilities. This resulted in an unrealized loss of **-200** (impairment) on assets and an unrealized gain of 150 on liabilities for that year under fair value accounting. However, under historical costs, the impairment depends on value mutations in prior years. Because of the unrealized gains on assets in 2005 and 2006 (2005: +50, 2006: +50), the impairment under historical costs is only **-100,** whereas under fair value accounting this was **-200**.

*Scenario 2:*

In 2005, the fair value of assets rose to 500, resulting in an unrealized gain of +100. Liabilities became 'more expensive' in 2005 since the fair value rose from 200 to 300, resulting in an unrealized loss of -100. In 2006, the fair value fell to 350 for assets and remained 300 for liabilities, resulting in unrealized losses on assets (-150). In 2007, the fair value dropped to 300 for assets and to 100 for liabilities. This resulted in an unrealized loss of **-50** (impairment) on assets and an unrealized gain of 200 on liabilities for that year under fair value accounting. However, under historical costs, the impairment depends on value mutations in prior years. Because of the unrealized gains on assets in 2005 and 2006 (2005: +100, 2006: -150), the fair value of the assets are already below their historical costs in 2006. Therefore, end 2006, the balance sheet value of assets is the same under both historical cost accounting and fair value accounting. The impairment under historical costs is therefore, equal as under fair value accounting, which is **-50**.

### *Conclusion drawn from the two scenarios*

From the two scenarios it can be concluded that the impairment/loss in a particular year that is recognized in income, depends on the value mutations in prior years. In table 2 it is observable that in 2007 the balance sheet value of both assets and liabilities are exactly the same under both scenarios. However, the unrealized loss (impairment) that is recognized in income under historical costs is different in both scenarios, since the amount of this loss depends on the value mutations in 2005 and 2006 (in this example). Therefore, in order to construct a proper equation to calculate the simulation of net-income under historical costs, not only unrealized gains and losses from the tested year but, also all unrealized gains and losses from prior years (until the base year) need to be taken into account. The valuation result from the tested year and prior years can be modeled by the following equations:

Cumulative valuation result on assets = $\displaystyle\sum_{t=0}^{n}$ (UGAI $_t$ – ULAI $_t$)

Cumulative valuation result on liabilities = $\displaystyle\sum_{t=0}^{n}$ (UGLI $_t$ – ULLI $_t$)

Applying scenario 2 to this equation gives:

    Cumulative valuation result on assets=
        0 **(2004)** + (+100) **(2005)** + (-150) **(2006)** + (-50) **(2007)** = -100


    Cumulative valuation result on liabilities =
        0 **(2004)** + (-100) **(2005)** + (0) **(2006)** + (+200) **(2007)** = +100

The cumulative valuation result on assets is -100. This means that the fair value of assets dropped 100 below their historical costs since base year 2004. This is also observable in table 2. Under historical costs, the assets are impaired from 400 (balance sheet value 2006), to 300 (balance sheet value 2007). While under fair value accounting, the impairment was 200, because the balance sheet value was 500 in 2006.

The cumulative valuation result denotes the amount of change in fair value compared to the historical balance sheet value. If this amount is negative, this would have led to impairment (loss) if historical cost accounting was used. If this amount is positive, this would result in an unrealized gain and is not recognized under historical cost accounting. The equations that calculate the cumulative valuation results are therefore only part of the equation to calculate SN**I**HC when they are **negative**. Mostly, if a valuation result on assets is positive, then the valuation result on liabilities will be negative. This is because for instance a change in interest has an opposite impact on liabilities compared to assets. However, it is also possible that the valuation results on assets and liabilities are both either positive or negative. Therefore, the following constrains apply to the model to calculate the SN**I**HC:

1) The cumulative valuation result on assets is only part of the equation to calculate the SN**I**HC if negative, thus if:

$$\sum_{t=0}^{n} (UGAI_t - ULAI_t) < 0,$$

2) The cumulative valuation result on liabilities is only part of the equation to calculate the SN**I**HC if negative, thus if

$$\sum_{t=0}^{n} (UGLI_t - ULLI_t)) < 0$$

The cumulative valuation result on both assets and liabilities will be ignored in the model to calculate the SN**I**HC when positive, since gains are not recognized under historical cost accounting.

Now combining the mentioned equations, the SNIHC can be calculated using the following equation:

$$SNIHC_t = ACTNI_t - ((UGAI_t - ULAI_t) + (UGLI_t - ULLI_t)) +$$

$$\sum_{t=0}^{n} ((UGAI_t - ULAI_t) + \sum_{t=0}^{n} (UGLI_t - ULLI_t))$$

$$SNIHC_t = SNIWGL_t + \sum_{t=0}^{n} ((UGAI_t - ULAI_t) + \sum_{t=0}^{n} (UGLI_t - ULLI_t))$$

Where,

$SNIHC_t =$     Simulation of net-income under full historical cost accounting in year t = n

$ACTNI_t =$     Actual net-income in year t = n,

$SNIWGL_t =$   Simulation of net-income without unrealized gains and losses recognized in year t=n

$UGAI_t =$     Unrealized gains on assets affecting income in year t = n

$ULAI_t =$     Unrealized losses on assets affecting income in year t = n

$UGLI_t =$     Unrealized gains on liabilities affecting income in year t =n

$ULLI_t =$     Unrealized losses on liabilities affecting income in year t =n

t = n = 0 =     31-12-2004………t = n = 5 = 31-12-2009

The following term in the equation from the model denotes the net-valuation result that is caused by changing fair values in year t=n:

$$((UGAI_t - ULAI_t) + (UGLI_t - ULLI_t))$$

This part is then deducted from the $ACTNI_t$ and calculates the simulation of net-income without any unrealized gains and losses recognized (SNIWGL). The second part of the equation takes prior years into account and determines the impairments on assets and losses on liabilities. The impairment ($IMPA_t$) is part of the second assumption of the model and is presented in symbols below. Also the losses on liabilities ($LOSSL_t$) which are part of the third assumption, are shown in symbols:

**Assumption (2):**

$$\text{IMPA}_t = \sum_{t=0}^{n} (\text{UGAI}_t - \text{ULAI}_t), \text{ only if negative}$$

**Assumption (3):**

$$\text{LOSSL}_t = \sum_{t=0}^{n} (\text{UGLI}_t - \text{ULLI}_t)), \text{ only if negative}$$

A positive $\text{IMPA}_t$ is the result of a positive net valuation result over n years and will not result in impairment. A negative $\text{IMPA}_t$ is a result of a negative valuation result over n years. This amount will be impaired fully. If the cumulative valuation result is positive, this term is **not** part of the equation. This is because the balance sheet value of assets at fair value would be higher then the historical value and there would be no impairment. These gains would not be recognized under historical costs, thus should not be included in the equation to calculate the S**N**IHC. To demonstrate this, several examples will help explaining the validity of the model further.

The next section will continue with the example of BANK Y that started on page 37. Recall, that in 2005, the ACT**NI** was US$ 4500 million and that the US$ 600 million **gain** would not be recognized under historical costs (observable in figure 2). Using the model equation to calculate the S**N**IHC $_{t=1}$ (in 2005) this gives:

$$\text{SNIHC}_{t=1} = \text{ACTNI}_{t=1} - ((\text{UGAI}_{t=1} - \text{ULAI}_{t=1}) + (\text{UGLI}_{t=1} - \text{ULLI}_{t=1})) +$$

$$\sum_{t=0}^{n} ((\text{UGAI}_t - \text{ULAI}_t) + \sum_{t=0}^{n} (\text{UGLI}_t - \text{ULLI}_t))$$

$$= 4500 - ((1000-400) + (800-1000)) +$$
$$(0 + (1000-400) + (800-1000))$$
$$= 4100 + \mathbf{(600)} + (-200)$$

Since the cumulative valuation result on assets is positive **(+600)** this term is not part of the equation **(assumption (2))**. Therefore,

$$\text{SNIHC}_{t=1} = 4100 - 200 = 3900$$

The loss of 200 on liabilities is recognized in net-income under historical costs, and is therefore deducted from S**N**IWGL (4100).

The example from BANK Y will be expanded for all years until 2008, to demonstrate the validity of the equation when more than one year needs to be taken into account. Assume further that in the years 2006-2008, the following mutations occurred:

| | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| ACTNI$_t$ | 4000 | 4500 | 5000 | 3500 | 4000 |
| Valuation result on assets in year t=n (UGAI$_t$– ULAI$_t$) | - | +600 | +300 | -1400 * | +300 |
| Valuation result on liabilities in year t=n (UGLI$_t$ – ULLI$_t$) | - | -200 * | -200 * | +500 | -200 * |
| Total valuation result in year t=n ((UGAI$_t$– ULAI$_t$) + (UGLI$_t$ – ULLI$_t$)) | 0 | +400 | +100 | -900 | +100 |

**Table 11:** Example Bank Y, continued
* Indicates that the cumulative valuation result is set zero. (Explained in the next section)

The year 2005 is already discussed. The next section continues with the years 2006-2008.


***BANK Y example calculation of SNIHC in 2006***

From table 11 can be observed that in 2006 the ACTNI$_{t=2}$ = 5000 and that the net-valuation result on assets is +300 and -200 for liabilities. The S**NI**HC$_{t=2}$ will be calculated as follows:

$$
\begin{aligned}
\text{SNIHC}_{t=2} \quad = \quad & \text{ACTNI}_{t=2} - ((\text{UGAI}_{t=2}- \text{ULAI}_{t=2}) + (\text{UGLI}_{t=2} - \text{ULLI}_{t=2})) + \\[6pt]
& \sum_{t=0}^{n} ((\text{UGAI}_t - \text{ULAI}_t) + \sum_{t=0}^{n} (\text{UGLI}_t - \text{ULLI}_t)) \\[6pt]
= \quad & 5000 - (300) + (-200) + \\
& (0 + (600) + (300) + (-200)) \\
= \quad & 5000 - (100) + (500) + (-200) \\
= \quad & 4900 + \mathbf{(900)} + (-200)
\end{aligned}
$$

Since the cumulative valuation result on assets is positive **(900)**, the term will be left out. Therefore,

$$\text{SNIHC}_{t=2} \quad = \quad 4900 - (200) = 4700$$

The unrealized gain of 300 in 2006 is not recognized under historical costs and thus the S**NI**HC is lower than the ACT**NI**. The unrealized gain of 600 is already recognized in 2005 and has no effect on the actual net-income in 2006.

Note that the actual cumulative valuation result on liabilities would have been -400, since the valuation result in 2005 was -200, and is again -200 in 2006. However, the losses on liabilities from 2005, are already recognized in income and on the balance sheet in 2005.

Therefore, the cumulative valuation result is set to zero for the next year, since the losses from 2005, have no impact on income in 2006. The same applies for assets. The following example in table 12 will aid in explaining why the cumulative valuation result is set to zero.

| | 2004 | 2005 | 2006 | 2007 | 2008 |
|---|---|---|---|---|---|
| HC of assets | 400 | 400 | 400 | 400 | 400 |
| HC of Liabilities | 200 | 200 | 200 | 200 | 200 |
| | | | | | |
| Change in value of assets | - | +100 | +100 | **-300** | +100 |
| Change in value of liabilities* | - | +50 | +50 | -150 | +50 |
| Unrealized gains/losses on assets | - | +100 | +100 | -300 | +100 |
| Unrealized gains/losses on liabilities | - | -50 | -50 | +150 | -50 |
| **Fair value accounting** | | | | | |
| BS value of assets at FV | 400 | 500 | 600 | **300** | 400 |
| BS value of liabilities at FV | 200 | 250 | 300 | **150** | 200 |
| Effect on income using FVA | - | +50 | +50 | -150 | +50 |
| **Historical cost accounting** | | | | | |
| BS value of assets at HC | 400 | 400 | 400 | **300** | 300 |
| BS value of liabilities at HC | 200 | 250 | 300 | **300** | 350 |
| Effect on income using HCA | - | -50 | -50 | -100 | -50 |

**Table 12:** Example calculation of impairments for different years.
*Note that a decrease in value of liabilities leads to a positive effect on income (an unrealized gain). The impairment (-200) under fair value accounting leads to a book value below

In table 12 it is observable that in 2007 the book values of assets are equal under fair value accounting and historical costs accounting (both 300). This is because the change in fair value in 2007, drops the book value of assets below the historical value (a loss of 100). Because the book value of assets are the same under both accounting methods, and the impairment is recognized in the S**NI**HC of 2007, the impairment and any value change of this year and previous years has no impact on income in the next year. For instance, if in the next year the valuation result on assets is -200, then under both historical cost accounting and fair value accounting, this loss will be recognized. In this case, valuation results from previous years have no influence on income in the next year. Therefore, the impairment is set to zero for the next year, and will function **as a new base year** for following years. Therefore if the following is true:

$$\sum_{t=0}^{n} ((UGAI_t - ULAI_t) < 0,$$ then the cumulative valuation result on assets is set to zero for the next year.

$$\sum_{t=0}^{n} (UGLI_t - ULLI_t)) < 0,$$ then the cumulative valuation result on liabilities is set to zero for the next year.

In the last example it also becomes clear how the fourth assumption is incorporated in the model. Recall, that was assumed that assets are not being amortized over time. The assumption converted into symbols gives:

**Assumption (4):**

$HCA_{t=0} = HCA_{t=n}$ if, $FVA_t > HCA_t$       where,

$HCA_t$ = Historical costs of assets

$FVA_t$ = Fair value of assets.

If $FVA_t < HCA_t$ → assets are subject to assumption (2).

Assumption (4) is not directly included in the model equation, since when historical costs remain constant over time, this doesn't affect income.

Notice in table 12 that assets are not amortized over time in the example. In fact, if the assets would be amortized over time, the amplification of net-income under historical costs would even be lower and show a larger difference between S**NI**HC and ACT**NI**. However, in reality financial assets are almost never amortized over time. Further more, because the assumption is in favor of the alternative hypotheses, the assumption adds power to the findings if pro-cyclicality is detected.

Back to BANK Y, the difference between S**NI**HC $_{t=2}$ and ACT**NI** $_{t=2}$ is only due to the unrealized gains of 300, that is not recognized under historical cost accounting. The results from 2006 are visualized below:



**Figure 3:** ACT**NI** and S**NI**HC (2004-2006)

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*BANK Y example calculation of SNIHC in 2007*

From table 11 can be observed that in 2007 the $\text{ACTNI}_{t=3} = 3500$, that the valuation result on assets is -1400 and +500 for liabilities. The $\text{SNIHC}_{t=3}$ will be calculated as follows:

$$\text{SNIHC}_{t=3} = \text{ACTNI}_{t=3} - ((\text{UGAI}_{t=3} - \text{ULAI}_{t=3}) + (\text{UGLI}_{t=3} - \text{ULLI}_{t=3})) +$$

$$\sum_{t=0}^{n}((\text{UGAI}_t - \text{ULAI}_t) + \sum_{t=0}^{n}(\text{UGLI}_t - \text{ULLI}_t))$$

$$= 3500 - (-1400) + (500) +$$
$$(0) + (600) + (300) + (-1400) + (500)$$
$$= 3500 - (-900) +$$
$$(-500) + (500)$$
$$= 4400 + (-500) + \mathbf{(500)}$$
$$\text{SNIHC}_{t=3} = 4400 - 500 = 3900$$

The cumulative result on liabilities is positive, and will be ignored **(500)**. The amount 4400 represents the ACT**NI** without any unrealized gains or losses recognized in 2007. Under fair value accounting, the impairment in that year was 1400. In the ACT**NI** determined from annual reports, the impairment is already included. Under historical cost accounting, the impairment would be lower. This is because under fair value accounting the unrealized gains from prior years have been recognized but would not have been recognized under historical cost accounting. The impairment under historical costs would only be 500, resulting in a higher S**NI**HC (3900) in 2007 than the ACT**NI** (3500). The results from 2004-2007 are visualized in a graph:
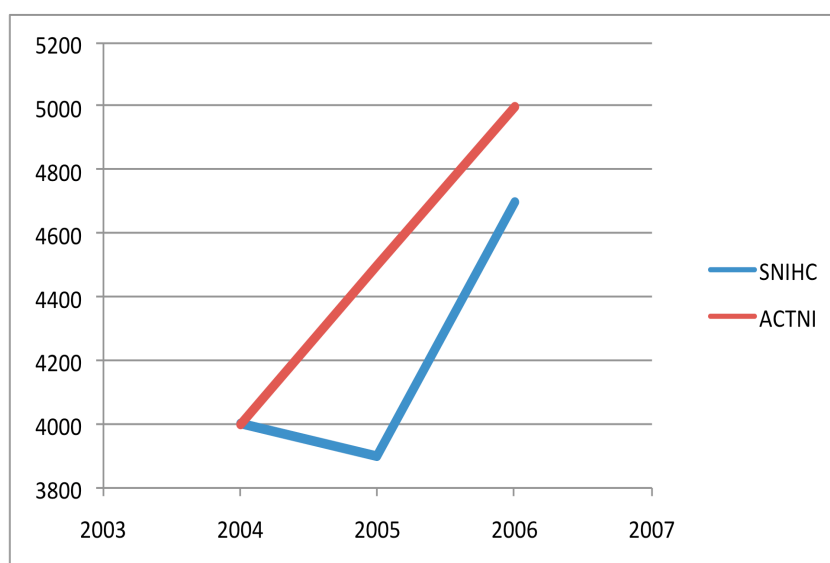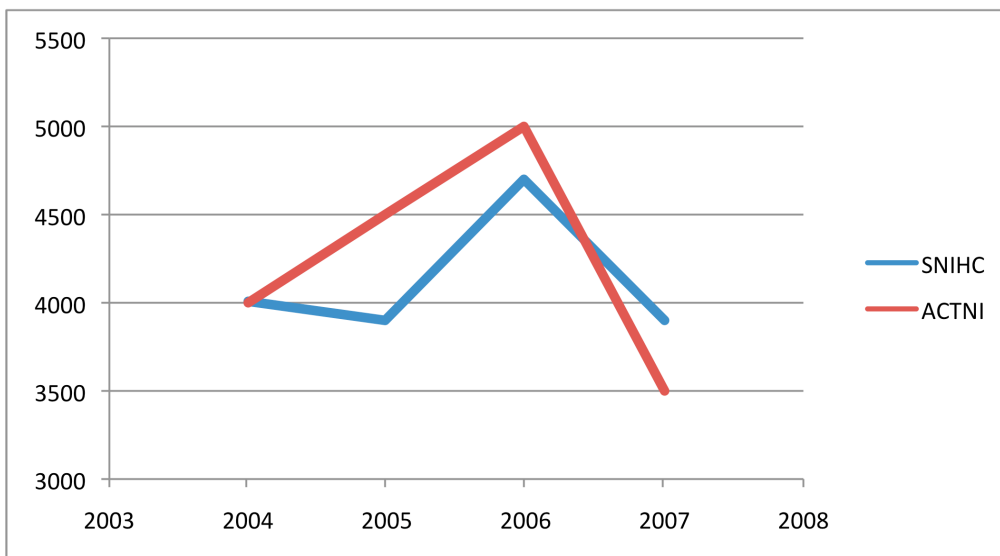


**Figure 4:** ACT**NI** and S**NI**HC (2004-2007)

*BANK Y example calculation of SNIHC in 2008*

From table 11 can be observed that in 2006 the ACTNI $_{t=4}$ = 4000, that the total net-valuation result on assets is +300 and -200 for liabilities is +400. The SNIHC $_{t=4}$ will be calculated as follows:

$$\text{SNIHC}_{t=4} = \text{ACTNI}_{t=4} - ((\text{UGAI}_{t=4} - \text{ULAI}_{t=4}) + (\text{UGLI}_{t=4} - \text{ULLI}_{t=4})) +$$

$$\sum_{t=0}^{n} ((\text{UGAI}_t - \text{ULAI}_t) + \sum_{t=0}^{n} (\text{UGLI}_t - \text{ULLI}_t))$$

$$= 4000 - ((300) + (-200)) +$$

$$(300) + (500) + (-200)$$

$$= 3900 + \textbf{(300)} + \textbf{(300)}$$

$$= 3900$$

Both the cumulative valuation result on assets as on liabilities is positive, therefore both terms are left out of the equation.

Note that the cumulative valuation result on assets is set to zero at the end of the previous year (2007). The results from 2004-2008 from the example of BANK Y are visualized below:
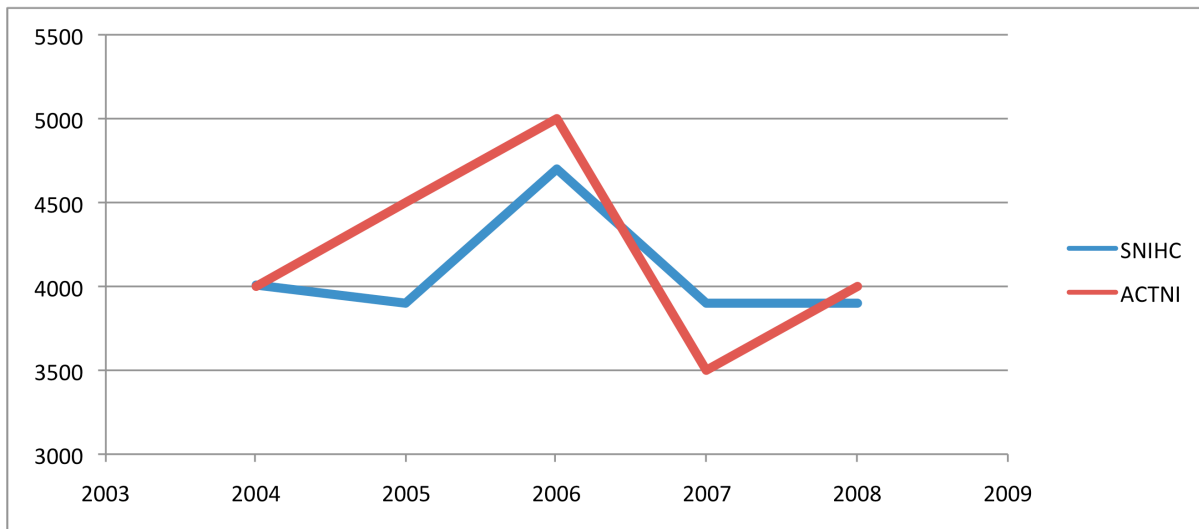


**Figure 5:** ACTNI and SNIHC (2004-2008)

*SEQHC-model*

The S**NI**HC-model has been discussed thoroughly in the previous section. A similar model will be used to test pro-cyclicality of equity, though there is one major difference. The major difference between the two models is that the two models use different 'categories' of unrealized gains and losses as proxies. Recall the different valuation categories discussed in chapter 2, where it is observable in table 2, that changes in fair value of 'available for sale' assets only affect equity and that the changes in fair value of 'assets and liabilities at fair value through P&L' only affect income. Further more, as discussed earlier, IFRS 7 doesn't allow changes in fair value of liabilities to affect equity. Since equity is not affected by changes in fair value of liabilities, this model ignores every change in fair value of liabilities. Apart from the mentioned differences, the calculations and assumptions apply to both models equally.

The simulation of equity under full historical cost accounting in year n is determined by the following equation:

$$\textsf{S}\textbf{EQ}\textsf{HC}_t = \textsf{ACT}\textbf{EQ}_t - ((\textsf{UGA}\textbf{E}_t - \textsf{ULA}\textbf{E}_t) + \sum_{t=0}^{n} ((\textsf{UGA}\textbf{E}_t - \textsf{ULA}\textbf{E}_t)$$

Where,

S**EQ**HC $_t$ =     Simulation of equity under full historical cost accounting in year t = n
ACT**EQ** $_t$ =     Actual equity in year t = n,
UGA**E** $_t$ =     Unrealized gains on assets affecting equity in year t = n
ULA**E** $_t$ =     Unrealized losses on assets affecting equity in year t = n
t = n = 0 =     31-12-2004………t = n = 5 = 31-12-2009

And with the constraint that if

$\sum_{t=0}^{n} ((\textsf{UGA}\textbf{E}_t - \textsf{ULA}\textbf{E}_t) < 0$, the cumulative result on assets is set to zero for the next year.

Further more, the term is only part of the equation that models S**EQ**HC $_t$, if negative.

*Model limitations*

The examples in this section provided a thorough explanation of the models that will be used to test pro-cyclicality of net-income and equity. The models' major limitation is that a certain base year, in this case 2004, is selected. The problem that arises is that the potential impairments calculated in the years after 2004 could also depend on the amount of unrealized gains and losses before 2004. However, the assumption is made that in 2004,

the fair value of assets and liabilities equals historical costs. This assumption could create a bias in the research however it is unavoidable to select a certain base year. In order to determine the difference in income and equity, between historical cost accounting and fair value accounting, a base year is needed.

## 7.5 Data collection

For the model to simulate the net income and total equity under historical cost accounting, data about unrealized gains and losses needs to be collected. Since the major international databases do not provide data about unrealized fair value gains and losses, the proxies for the model will need to be hand-collected from annual reports. Companies do provide quantitative disclosures in the financial statements or in the notes about this information since this is required by IFRS (see table 13 next page) (since 2005). Financial institutions' balance totals, total equity and total liabilities are collected from the Thomson One Banker database.

The availability of data in the annual reports can be proved with the disclosure requirements prescribed by IFRS. Companies need their financial reporting to comply with these rules and principles. IFRS prescribes that changes in fair value require disclosure, it is expected that companies disclose this information. IFRS legislation that requires companies to disclose changes in fair value and that specifies whether the fair value change affects income or equity, is presented in the following table:

| | Model variable(s): | Description | Valuation Category | Disclosure requirement IFRS/IAS (Since 2005) (Y/N) | Data available? (Y/N) |
|---|---|---|---|---|---|
| 1. | $ACT\mathbf{NI}_t$ | Actual net-income in year t=n | - | Y (net income from P&L) IAS 1.8 | Y |
| 2. | $(UGAI_t - ULAI_t)$ | Valuation result on assets affecting income in year t=n | 'Assets at fair value through profit and loss' | Y IAS 39 GI,G1 | Y |
| 3. | $(UGLI_t - ULLI_t)$ | Valuation result on liabilities affecting income in year t=n | 'Liabilities at fair value through profit and loss' | Y IAS 32.94 (f) | Y |
| 4. | $ACT\mathbf{EQ}_t$ | Actual equity in year t=n | - | Y (total equity from 'changes in equity statement') IAS 1.8 | Y |
| 5. | $(UGA\mathbf{E}_t - ULA\mathbf{E}_t)$ | Valuation result on assets affecting equity in year t=n | 'Available for sale assets' | Y IAS 32.94(h)(ii) | Y |
| 6. | $(UGL\mathbf{E}_t - ULL\mathbf{E}_t)$ = 0 (not allowed) | Valuation result on liabilities affecting equity in year t=n | Not applicable/ not allowed | - | - |
| 7. | $(UGAI_t - ULAI_t)$ - $(UGLI_t - ULLI_t)$ | Total valuation result on assets and liabilities affecting income in year t=n | 'Assets and liabilities at fair value trough profit and loss' | Y IAS 32.92 (d) | Y |
| 8. | $(UGA\mathbf{E}_t - ULA\mathbf{E}_t)$ | Total valuation result on assets (and liabilities) affecting equity in year t=n | 'Available for sale assets' | Y IAS 32.94(h)(ii) | Y |

**Table 13:** IFRS disclosure requirements. **Source:** International Financial Reporting Standards (2005), Disclosure checklist, *Meeting all IFRS requirements*, PricewaterhouseCoopers 2005

Table 13 summarized the IFRS standards, which require financial institutions to disclose all changes in fair value of assets and liabilities and whether these gains or losses resulting from the change in fair value, are recognized in income or in equity. These fair value changes will be used as input for the two models.

## 8. Results & analysis

This chapter presents the results and analysis of all tested hypotheses. The results and analysis of each hypothesis will be presented and explained separately. The analysis of the results, follows directly after the presentation of the results of each hypothesis. Statistical results are mentioned and analyzed in this chapter, but due to the extent of this information I refer to appendix 1 for disclosure about these results.

### 8.1 Results: net-effect of fair value accounting

The first sub-hypothesis stated that: *financial institutions' financial statements show a significant positive net-effect of fair value accounting, resulting in pro-cyclicality before and during the (current) financial crisis.*

From the sample (55 in total), 3 banks and 6 insurance companies have been removed from the sample due to data unavailability or missing disclosures about the amount of assets and/or liabilities that are valued at fair value over one or more years (2005-2009).

The 46 financial institutions that have been tested consist of 13 insurance companies and 33 banks. The percentage of assets and liabilities at fair value of the balance total, and the net-effect of fair value accounting, over the years 2005-2009, are presented in the table below:

| | 2005 | 2006 | 2007 | 2008 | 2009 | Average |
|---|---|---|---|---|---|---|
| **13 Insurance companies** | | | | | | |
| Financial assets at FV (% of balance total) | 67,24% | 68,10% | 64,05% | 58,68%* | 60,23% | 64% |
| Financial liabilities at FV (% of balance total) | 10,14% | 12,13% | 13,12% | 10,93%** | 11,66% | 12% |
| *Net-effect:* | **57,10%** | **55,98%** | **50,93%** | **47,75%**** | **48,58%** | **52%** |
| | | | | | | |
| **33 Banks** | | | | | | |
| Financial assets at FV (% of balance total) | 37,46% | 39,65% | 43,88% | 49,46%** | 41,30%** | 42% |
| Financial liabilities at FV (% of balance total) | 20,18% | 21,83% | 26,24%* | 37,36%* | 26,95%* | 26% |
| *Net-effect:* | **17,28%** | **17,82%** | **17,64%** | **12,10%*** | **14,35%*** | **16%** |
| | | | | | | |
| **Total sample (46)** | | | | | | |
| Financial assets at FV (% of balance total) | 43,33% | 45,02% | 47,24% | 50,81% | 44,33% | 46% |
| Financial liabilities at FV (% of balance total) | 18,20% | 20,00% | 24,05%** | 33,51%** | 24,51%** | 24% |
| *Net-effect:* | **25,12%** | **25,02%** | **23,18%** | **17,30%*** | **19,82%*** | **22%** |

**Table 14:** Results: The percentage of assets and liabilities at fair value of the balance total, and net-effect of fair value accounting, over the years 2005-2009.
*Significant increase/decrease compared to previous year on a 1% level.
**Significant increase/decrease compared to previous year on a 5% level.

The 33 banks and 13 insurance companies have been further divided into three sub-categories in order to determine whether company size might be related to the level of assets and liabilities at fair value and the net-effect. The results from the sub-populations are provided in the tables below:

| | 2005 | 2006 | 2007 | 2008 | 2009 | Average |
|---|---|---|---|---|---|---|
| **12 largest banks** | | | | | | |
| Financial assets at FV (% of balance total) | 39,43% | 42,42% | 48,09% | 55,48% | 45,61% | 46% |
| Financial liabilities at FV (% of balance total) | 23,03% | 25,11% | 30,34% | 43,16% | 30,64% | 30% |
| *Net-effect:* | **16,41%** | **17,31%** | **17,75%** | **12,32%** | **14,97%** | **16%** |
| | | | | | | |
| **12 mid-size banks** | | | | | | |
| Financial assets at FV (% of balance total) | 35,12% | 35,78% | 35,01% | 35,26% | 32,94% | 35% |
| Financial liabilities at FV (% of balance total) | 13,62% | 14,90% | 16,06% | 23,04% | 19,49% | 17% |
| *Net-effect:* | **21,49%** | **20,87%** | **18,95%** | **12,22%** | **13,45%** | **18%** |
| | | | | | | |
| **9 smallest banks** | | | | | | |
| Financial assets at FV (% of balance total) | 17,03% | 14,71% | 13,80% | 13,08% | 14,15% | 15% |
| Financial liabilities at FV (% of balance total) | 9,07% | 9,98% | 10,68% | 9,95% | 8,43% | 5% |
| *Net-effect:* | **11,55%** | **11,85%** | **9,77%** | **7,62%** | **9,07%** | **10%** |

**Table 15a:** Results separated by subpopulation and size (banks): The percentage of assets and liabilities at fair value of the balance total, and net-effect of fair value accounting, over the years 2005-2009.

| | 2005 | 2006 | 2007 | 2008 | 2009 | Average |
|---|---|---|---|---|---|---|
| **5 largest insurance firms** | | | | | | |
| Financial assets at FV (% of balance total) | 65,59% | 65,63% | 58,16% | 52,78% | 53,61% | 59% |
| Financial liabilities at FV (% of balance total) | 9,07% | 9,98% | 10,68% | 9,95% | 8,43% | 10% |
| *Net-effect:* | **56,53%** | **55,65%** | **47,49%** | **42,83%** | **45,18%** | **49%** |
| | | | | | | |
| **5 mid-size insurance firms** | | | | | | |
| Financial assets at FV (% of balance total) | 69,23% | 72,12% | 75,88% | 69,94% | 71,58% | 72% |
| Financial liabilities at FV (% of balance total) | 10,14% | 15,22% | 17,63% | 12,50% | 18,57% | 15% |
| *Net-effect:* | **59,09%** | **56,90%** | **58,25%** | **57,45%** | **53,01%** | **57%** |
| | | | | | | |
| **4 smallest insurance firms** | | | | | | |
| Financial assets at FV (% of balance total) | 66,69% | 65,61% | 74,25% | 71,22% | 77,04% | 71% |
| Financial liabilities at FV (% of balance total) | 28,43% | 30,28% | 31,46% | 23,56% | 32,54% | 30% |
| *Net-effect:* | **38,26%** | **35,33%** | **42,78%** | **47,67%** | **44,50%** | **41%** |

**Table 15b:** Results separated by subpopulation and size (insurance companies): The percentage of assets and liabilities at fair value of the balance total, and net-effect of fair value accounting, over the years 2005-2009.

## 8.2 Analysis of the results: net-effect of fair value accounting

From table 14, it becomes clear that insurance companies value a larger percentage of assets and a lower percentage of liabilities at fair value (on average: assets 64%, liabilities 12%), compared to banks (on average: assets 42%, liabilities 26%), resulting in a larger net-effect of fair value accounting for insurance companies (on average 52 % compared to 16% for banks). The total aggregated results indicate that the tested financial institutions value 46% of financial assets and 24% of financial liabilities at fair value, resulting in a net-effect of fair value accounting of 22% (on average over 2005-2009).

Table 14 indicates that the portion of assets and liabilities at fair value, and with this also the net-effect, remained fairly consistent over the years 2005 and 2006. There were no significant changes in the level of assets or liabilities at fair value over these years. In 2007, banks show a significant increase of liabilities at fair value, however this had little impact on the total net-effect in 2007, due to a simultaneous increase of banks' assets at fair value. Banks continued to increase the level of liabilities at fair value significantly in 2008. Combined with a significant decrease of assets at fair value for insurance companies, this resulted in a significant lower net-effect during the crisis in 2008 (net-effect dropped from 23,18% in 2007 to 17,3% in 2008). The significant decrease of assets at insurance companies was expected, because of the earlier mentioned introduction of the amendment of IFRS 7, allowing financial institutions to reclassify assets to historical costs. However, this effect is not demonstrated in the population of banks, were a significant increase (significant on a 5% level) of assets at fair value is demonstrated. The expectation can therefore not be confirmed.

After increasing the level of liabilities at fair value in 2007 and 2008, banks significantly decreased the level of liabilities at fair value in 2009. The impact however, on the total net-effect of fair value accounting, was largely offset by a decrease of assets at fair value by banks, though increased the total net-effect slightly in 2009, to almost 20%.

In table 15a and table 15b, the usage of fair value accounting and the net-effect from banks and insurance companies are differentiated by company size (based on total assets ultimo 2009). These subpopulations have not been tested for significant changes between years, since the populations are considered to be too small for statistical testing. However, the results can be used to assess whether company size is related to the usage of fair value accounting. To assess whether the usage of fair value accounting could cause pro-cyclical effects, it is important to determine whether fair value accounting may be adopted to a greater extent by larger banks and insurance companies, as in times of a crisis, these larger

companies can potentially influence the entire economy of a country, Europe or even the world.

Table 15a clearly demonstrates that larger banks value a larger percentage of assets at fair value compared to the mid-size and smaller banks. Larger banks also show a higher percentage of liabilities at fair value. Mid-size banks value a lower percentage of assets and liabilities at fair value, though because both assets and liabilities at fair value are less represented, the net-effect of fair value accounting doesn't differ a lot between large and mid-size banks. At the smaller banks in turn, the difference is clearly visible. Smaller banks tend to adopt fair value accounting scarcely and show a lower net-effect of fair value accounting. As also noted in the research from Bout et al. (2010), larger banks tend to have more derivative positions in financial markets, which are valued at fair value. This explains why larger banks are holding more assets and liabilities at fair value.

For insurance companies, the relationship between company size and the level of assets and liabilities at fair value is not as clearly notable as for banks. Table 15b shows that company size doesn't necessarily imply a larger share of assets at fair value in fact, smaller insurance companies tend to value a larger percentage of assets at fair value. Although insurance companies represent only a small part of the total sample, because the net-effect of fair value accounting is considered significant in all years and at all insurance companies, this indicates that insurance companies contribute a considerable (positive) part to the total net-effect of the entire population.

The total net-effect found in this study is considerably larger compared to the net-effect found in the research from Bout et al. (2010), where the net-effect was 11% in 2008. This can be explained, because in the study from Bout et al. (2010), the net-effect was only calculated for banks. Bout et al. (2010) did not investigate to what extent insurance companies valued liabilities at fair value and could therefore not calculate the net-effect for those companies. In table 14 it is observable that the net-effect for banks found in this research (12,1%) approximates the net-effect found by Bout et al. (2010). The small difference can be explained because some companies were eliminated from the sample because of data unavailability from years before 2008. The net-effect however from banks only, does not provide a representative value for the entire population, as table 14 shows that the net-effect of insurance companies is considerably larger in 2008 (47,75%). Insurance companies comprise a smaller percentage of the population compared to banks, therefore receiving a smaller weight in calculating the net-effect. Still the higher net-effect of insurance companies totals the net-effect to 17,3% in 2008, which is considerably larger compared to the 12,1 % percent found for banks only.

Furthermore, the net-effect of 2008 seems not representative for the entire tested period, as the average net effect is 22%. Especially the years before 2008 show a significant larger total net-effect compared to 2008 (significant on a 1% significance level). The decrease of the net-effect is mainly caused by banks, which show a significant increase of liabilities at fair value in 2008 (significant on a 1% level). According to the SEC, a net-effect of 30% is considered to cause pro-cyclicality into the financial statements. A net-effect of 11% is considered to cause no significant pro-cyclical effects according to Bout et al. (2010). An average level of 22% inclines that some level of pro-cyclicality has been present, at least in the years before 2008 (net-effect of 25% in 2005 and 2006), though it is too early to conclude whether the net-effect in 2008, during the crisis, would have caused pro-cyclicality. However, because the net-effect was significantly present in the years before the crisis, this could have led to a large amount of unrealized gains in those years. As noted earlier, this could have aggravated losses, when markets became illiquid, late 2007 and 2008. The results from the model that captures the unrealized gains and losses followed later, needs to be analyzed first to assess whether the net-effect before and during the crisis could have caused pro-cyclical effects, before any conclusions can be made.

## 8.3 Results: level 3 assets and liabilities

The second sub-hypothesis stated that: *financial institutions' financial statements show a significant increase of level three valuations as a result of markets becoming illiquid.*

Financial institutions that value assets and liabilities at fair value are required to disclose a 3 level fair value hierarchy since 2009 (IFRS 7). Several financial institutions adopted the fair value hierarchy voluntarily before 2009. From the 55 financial institutions, 3 have been removed from the sample due to data unavailability from one or more years. From the remaining 52 institutions, 11 financial institutions failed to properly disclose the 3 level fair value hierarchy. The table below provides a summary of companies' best practices concerning the (voluntary) adoption of the fair value hierarchy:

|  | Count: | % of total (52) |
|---|---|---|
| Proper **voluntary/mandatory** disclosure 2007, 2008, 2009 | 13 | 25% |
| Proper **voluntary/mandatory** disclosure 2008, 2009 | 26 | 50% |
| Proper **mandatory** disclosure 2009 | 41 | 79% |
| **Improper** disclosure 2009 | 11 | 21% |
| Of which |  |  |
| **Large banks:** | 1 |  |
| **Mid-size banks** | 1 |  |
| **Small banks** | 4 |  |
| **Large insurance firms** | 1 |  |
| **Mid-size insurance firms** | 2 |  |
| **Small insurance firms** | 2 |  |

**Table 16:** Financial institutions' proper (voluntary) adoption rates of the 3 level fair value hierarchy

13 companies voluntarily adopted the fair value hierarchy, in 2007. To asses whether the crisis in 2008 led to an increase of level 3 valuations is therefore difficult to determine, since not many companies adopted the fair value hierarchy before 2008. Table 17 below, shows the level 3 valuations of the 13 companies that disclosed the fair value hierarchy in 3 consecutive years. Table 18 on the next page, shows the aggregated level 3 assets and liabilities of 13 companies in 2007, 26 companies in 2008 and 41 companies in 2009.

|  | 2007 | 2008 | 2009 |
|---|---|---|---|
| **13 financial institutions** |  |  |  |
| Level 3 assets (% of financial assets at FV) | 3,43% | 3,82% | 4,02% |
| Level 3 liabilities (% of financial liabilities at FV) | 3,44% | 2,30% | 2,79% |
| *Net-effect:* | **-0,01%** | **1,51%** | **1,24%** |

**Table 17:** Level 3 assets (% of total assets at FV), level 3 liabilities (% of total liabilities at FV) and the net-effect of level 3 instruments for 13 companies that disclosed fair value hierarchy for 3 consecutive years

| | 2007 | 2008 | 2009 |
|---|---|---|---|
| **13 financial institutions** | | | |
| Level 3 assets (% of financial assets at FV) | 3,43% | | |
| Level 3 liabilities (% of financial liabilities at FV) | 3,44% | | |
| *Net-effect:* | **-0,01%** | | |
| | | | |
| **26 financial institutions** | | | |
| Level 3 assets (% of financial assets at FV) | | 3,84% | |
| Level 3 liabilities (% of financial liabilities at FV) | | 2,38% | |
| *Net-effect:* | | **1,47%** | |
| | | | |
| **41 financial institutions** | | | |
| Level 3 assets (% of financial assets at FV) | | | 3,82% |
| Level 3 liabilities (% of financial liabilities at FV) | | | 2,93% |
| *Net-effect:* | | | **0,89%** |

**Table 18:** Level 3 assets (% of total assets at FV), level 3 liabilities (% of total liabilities at FV) and the net-effect of level 3 instruments.

## 8.4 Analysis of the results: level 3 assets and liabilities

A goal of this part of the research was not only to investigate whether financial institutions show a possible increase of level 3 valuations in 2008, but also to show if this increase has its roots in earlier years before the crisis (2005, 2006). Although there were some companies that voluntarily disclosed the fair value hierarchy before 2007, unfortunately there were not enough to make a thorough investigation. Though the analysis of the results from 2007, 2008 and 2009 did provide some important findings.

A first remarkable finding is that, although required by IFRS 7 since 2009, a significant part (21%) of the tested population failed to disclose the fair value hierarchy properly in 2009. Most of these companies disclosed an improper variant of the fair value hierarchy. The most common errors made were invalid aggregations of assets and liabilities within the fair value hierarchy, or the disclosure of financial assets in the fair value hierarchy only. IFRS 7 requires both assets and liabilities to be disclosed separately within the fair value hierarchy, though many companies aggregated all assets and liabilities in the fair value hierarchy. This withholds financial statements' users to determine the proportion of assets and liabilities that are represented in each of the different fair value levels. A second common seen error was the disclosure of level 3 assets only. This as well, withholds financial statement users to determine the ratio between assets and liabilities at fair value in each of the 3 levels. Most important for this study, the disclosure errors made it impossible to assess the level 3 valuations of those companies. A third error that was made by some companies was the application of a two level hierarchy. The first level represented those assets and liabilities that are valued based on quoted market prices, similar to level 1 from the proper fair value hierarchy required by IFRS 7. However, level 2 and level 3 were aggregated in a single second level, making it impossible to distinguish between level 2 and level 3 valuations.

Examples of the most common made errors are disclosed in appendix 3. Especially the smaller banks and insurance companies failed to properly disclose the fair value hierarchy. 2 companies failed to disclose any form of fair value hierarchy.

Not many companies disclosed the fair value hierarchy voluntarily before 2008, making it difficult to analyze whether the financial crisis accompanied an increase of level 3 valuations of assets and liabilities at fair value. However, the results from 2008 and 2009 from the 13 companies that disclosed the fair value hierarchy in 2007, 2008 and 2009 do not deviate significantly from the results from the larger tested populations in 2008 and 2009. Table 17 and 18 show that the proportion of level 3 assets and liabilities in 2009 does not deviate a lot between the population of 13 firms (table 17: assets 3,82%, liabilities 2,30%) and the population of 26 firms (table 18: assets 3,84% liabilities 2,38%). Similar, the results in 2009 from the population of 13 firms (table 17: assets 4,02%, liabilities 2,79%) do not deviate a lot from the results from the population of 41 firms (table 18: assets 3,82%, liabilities 2,93%). This can be explained because the majority of the larger and mid-size banks and are represented in the population that voluntarily disclosed the fair value hierarchy in 2007. The larger institutions receive a larger weight in the calculation of the total level 3 assets and liabilities and therefore comprise a large share in the calculation of the total level 3 assets and liabilities in 2008 and 2009. Although the sample is small in 2007, these results are therefore considered representative for the entire population.

An increase in level three classifications as a result of markets becoming illiquid indicates increased volatility, and thus increased pro-cyclicality (Bout et al. 2010, SEC 2008). From the results can be concluded that financial institutions valued only a small part of assets and liabilities based on unobservable inputs. As well, the portion of level 3 assets and liabilities remained fairly consistent over the three tested years. This invalidates the expectation that the results from 2008 would show a significant increase of level 3 valuations. Table 17 demonstrates that this effect is limited. This could be explained, because financial institutions tend to limit the classification of level 3 instruments, since these represent the most risk-full positions, especially in times of economic downturn. Many of these positions have been abolished, when signs of the economic crisis begun to take shape. Bout et al. (2010) also mentioned a possible explanation, which involves the reclassification of these risk-full positions to historical cost accounting. The difference between level 3 valuations from 2008 and 2009 neither show significant changes. As markets are recovering in 2010, perhaps an analysis of level 3 valuations in 2010 could indicate whether a 3 to 4% level of level 3 assets is significantly large. For now, the amount of level 3 valuations are considered low, and do not indicate that this involves significant increased volatility of earnings.

However, even a small portion of level 3 assets can have a considerable impact on net-income, as noted earlier was the case at ING group. Although ING Group's percentage of level 3 assets was low, the unrealized losses on these positions in 2008 had the potential to cause considerable impact on income, if not offset by a large portion of unrealized gains on liabilities which, were valued to great extent at fair value. Future research could investigate what the impact of level 3 valuations has had on net-income. Combined with the fair value hierarchy, IFRS 7 requires financial institutions to disclose all unrealized gains and losses that are a result of level 3 valuations. The model in the next section incorporates all unrealized gains and losses, including those involved with level 3 valuations. However, an investigation of the unrealized gains and losses of level 3 positions only, could isolate the impact of level 3 valuations on net-income. This would aid in determining whether the now considered 'low' percentage of level 3 assets and liabilities is in fact low, or may involved increased volatility of earnings and a considerable impact on net-income during the financial crisis.

## 8.5 Results: unrealized gains and losses affecting net-income

The unrealized gains and losses that affect net-income are investigated using the model that captures the unrealized gains and losses on assets and liabilities at 'fair value trough profit and loss', in order to determine net-income as if historical cost accounting was used. As noted earlier, the term 'historical costs accounting' should not be taken literally in this sentence, since valuing financial assets and liabilities such as derivatives at historical costs, is impossible since these instruments often have no value upon acquisition. The simulation of net-income, should be seen as a benchmark, which enables to isolate the impact on net-income of the unrealized gains and losses of assets and liabilities at 'fair value trough profit and loss', in each tested year. The sub-hypotheses that have been tested with the model were the following:

Sub-hypothesis 3: *In times of economic growth, ACT**NI** > S**NI**HC*

Sub-hypothesis 4: *In times of economic downturn, ACT**NI** < S**NI**HC*

IFRS requires separate disclosure of the net-valuation result (sum of unrealized gains and losses) of assets (IAS39) and liabilities (IAS32) at fair value through profit and loss (see table 13, p.52). For the model to properly calculate the simulation of net-income as if historical costs accounting was used, the net-valuation results of assets and liabilities need to be inserted in the model separately. As discussed earlier, liabilities at fair value tend to react opposite to market conditions compared to assets, creating a dampening effect on companies' business cycles. A first remarkable finding of this part of the research is that the largest part of the population did not properly disclose the net-valuation result of assets and liabilities at fair value trough profit and loss. From the total sample of 55 financial institutions, 3 companies were excluded from the sample due to data unavailability. Only 6 from the remaining 52 financial institutions properly separated the net-valuation result on assets and liabilities. 17 companies did disclose the valuation results on assets and liabilities, but without separation, disclosing only the aggregated net-valuation results on all assets and liabilities at fair value through profit and loss. These companies however, have been tested using a slightly less accurate version of the model that uses the aggregated net-valuation result on assets and liabilities. Though less accurate, the model can still be used to indicate pro-cyclicality. The validity of the 'less accurate' model will be analyzed and explained in the next section. All other companies (29) included the unrealized gains and losses among realized gains and losses in an account often called, '**net** gains/losses on assets/liabilities at fair value through profit and loss' or for instance '**net-**trading results'. It was disclosed that these accounts included both realized and unrealized gains and losses on assets and

liabilities, therefore making it impossible to determine which share of the result is realized or unrealized. As the model needs the unrealized gains and losses to properly calculate SNIHC, these companies had to be eliminated from the sample.

The total sample that has been tested consist out of two main groups: the 'perfect disclosure group, including 3 banks and 3 insurance firms, and the 'imperfect disclosure group', including the 6 financial institutions from the 'perfect disclosure group' and 8 banks and 9 insurance companies that disclosed the aggregated valuation results on assets and liabilities (total companies in 'imperfect disclosure group': 23). The unrealized gains and losses from liabilities from the 'perfect disclosure group' have been included in the valuation results on assets from the 'imperfect disclosure group', so that the SNIHC from all companies is calculated using the same (though less accurate) method.

First, the results from the 'perfect disclosure group' using the proper version of the model, are presented in the table and figures below:

| In millions EUR | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|---|---|
| **ACTIN** | 19,776 | 25,848 | 33,518 | 37,128 | (22,108) | 4,,510 |
| **SNIHC** | 19,776 | 17,462 | 29,118 | 24,137 | (16,852) | 1,948 |
| **DIFFERENCE** | - | 8,386 | 4,310 | 12,991 | (5,256) | 2,562 |

**Table 19:** Results from the model that captures the unrealized gains and losses affecting net-income of the 'perfect disclosure group' (6 financial institutions in total). ACTNI= Actual net-income, SNIHC= simulation of net-income at historical costs.

Both graphs contain the same results, though the second graph is made using a smooth line scatter plot in order to visualize and highlight pro-cyclical effects, if present.



**Figure 6:** Simulation of net-income and actual income over the year 2004-2009 for the **'perfect disclosure group'** (6 financial institutions in total). Y-axis: amounts in millions of EUR

**Figure 7:** Smooth line scatter plot of the simulation of net-income and actual income over the year 2004-2009 for the **'perfect disclosure group'** (6 financial institutions in total). Y-axis: amounts in millions of EUR

The following tables and figures contain the results from the 'imperfect disclosure group' established by using the aggregated valuation results of assets and liabilities as inputs for the model. As noted earlier, the SNIHC from the 'perfect disclosure group' has been calculated using the same (less accurate) method as all companies in the 'imperfect disclosure group'.

| In millions EUR | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|---|---|
| **ACTIN** | 38,222 | 54,436 | 68,855 | 76,700 | (2,712) | 19,220 |
| **SNIHC** | 38,222 | 39,075 | 44,837 | 53,247 | 24,295 | 5,733 |
| **DIFFERENCE** | - | 15,361* | 24,017* | 23,453** | (27,008)** | 13,468 |

**Table 20:** Results from the model that captures the unrealized gains and losses affecting net-income of the **'imperfect disclosure group'** (23 financial institutions in total). ACTNI= Actual net-income, SNIHC= simulation of net-income at historical costs.
*Significant difference between ACTNI and SNIHC at a 1% significance level.
**Significant difference between ACTNI and SNIHC at a 5% significance level.



**Figure 8:** Simulation of net-income and actual income over the year 2004-2009 for the 'imperfect disclosure group' (23 financial institutions in total). Y-axis: amounts in millions of EUR
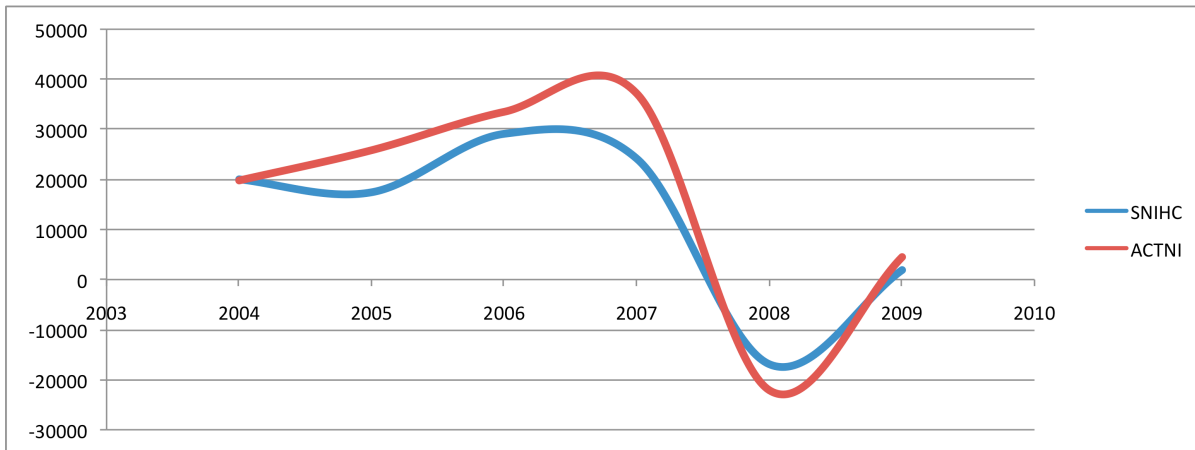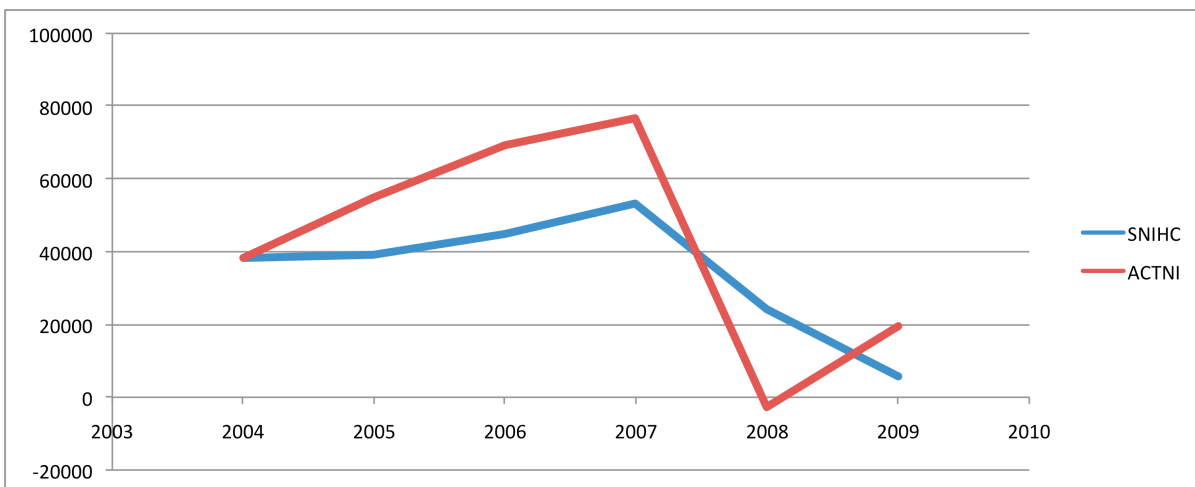
**Figure 9:** Smooth line scatter plot of the simulation of net-income and actual income over the year 2004-2009 for the imperfect disclosure group (23 financial institutions in total). Y-axis: amounts in millions of EUR
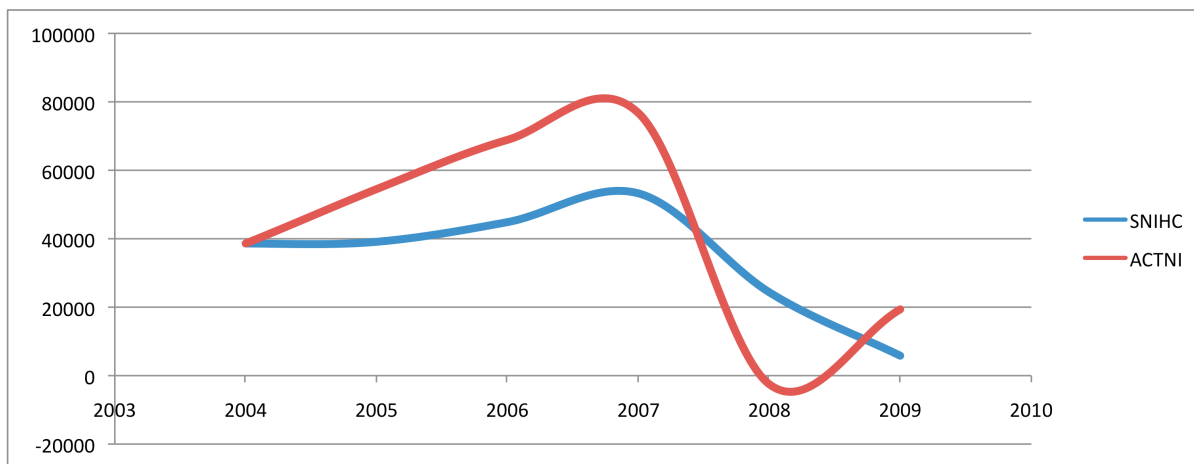
The final results from this part of the research show for how many companies in the perfect and imperfect disclosure group and in how many years, ACTNI was measured higher than SNIHC in times of economical growth, and was lower in times of economic downturn,

| Perfect disclosure group (6 in total) | ACTNI > SNIHC 2005 | ACTNI > SNIHC 2006 | ACTNI > SNIHC 2007 | ACTNI < SNIHC 2008 | ACTNI > SNIHC 2009 |
|---|---|---|---|---|---|
| Number of companies scoring 'yes' | 5 | 6 | 5 | 3 | 4 |
| % Of total | **83%** | **100%** | **83%** | **50%** | **67%** |
| **Average number of companies that show pro-cyclicality per year: 4,6 (77%)** | | | | | |
| | | | | **COUNT:** | **% OF TOTAL** |
| Number of companies that show pro-cyclicality all (5) years: | | | | 1 | **17%** |
| Number of companies that show pro-cyclicality in 4 years: | | | | 3 | **50%** |
| Number of companies that show pro-cyclicality in 3 years: | | | | 2 | **33%** |
| Number of companies that show pro-cyclicality in 2 years: | | | | 0 | **0** |
| Number of companies that show pro-cyclicality in 1 year: | | | | 0 | **0** |
| Number of companies that show pro-cyclicality in 0 years: | | | | 0 | **0** |
| **TOTAL:** | | | | **6** | **100%** |

**Table 21:** 'Pro-cyclicality indication scores' for 2005-2009 for the perfect disclosure group

| Imperfect disclosure group (23 in total) | ACTNI > SNIHC 2005 | ACTNI > SNIHC 2006 | ACTNI > SNIHC 2007 | ACTNI < SNIHC 2008 | ACTNI > SNIHC 2009 |
|---|---|---|---|---|---|
| Number of companies scoring 'yes' | 16 | 22 | 16 | 18 | 13 |
| % Of total | **83%** | **74%** | **54%** | **74%** | **57%** |
| **Average number of companies that show pro-cyclicality per year: 17 (74%)** | | | | | |
| | | | | **COUNT:** | **% OF TOTAL** |
| Number of companies that show pro-cyclicality all (5) years: | | | | 4 | **17%** |
| Number of companies that show pro-cyclicality in 4 years: | | | | 9 | **39%** |
| Number of companies that show pro-cyclicality in 3 years: | | | | 9 | **39%** |
| Number of companies that show pro-cyclicality in 2 years: | | | | 1 | **5%** |
| Number of companies that show pro-cyclicality in 1 year: | | | | 0 | **0%** |
| Number of companies that show pro-cyclicality in 0 years: | | | | 0 | **0** |
| **TOTAL:** | | | | **23** | **100%** |

**Table 22:** 'Pro-cyclicality indication scores' for the imperfect disclosure group from 2005-2009

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## 8.6 Analysis of the results: unrealized gains and losses affecting net-income

The first remarkable finding of this part of the research is that many companies did not properly disclose the unrealized gains and losses on assets and liabilities. A large part (17 in total) of the population only disclosed the aggregated valuation results on assets and liabilities. An even larger group included the unrealized gains and losses within an account were also realized gains and losses on assets and liabilities are recognized, but did not differentiate between unrealized and realized gains and losses. An example of from UBS (a Swiss bank) is included in appendix 2. UBS discloses that the unrealized gains and losses on trading assets, among **realized** gains and losses are recognized within the account '**net**-trading income'.

Overall seen, financial institutions tend limit the use of the word 'unrealized' in their financial statements. Including unrealized gains in an account that is called **net**-trading income, implies that those earnings have been realized. This could be misleading for financial statement users. The improper disclosures of unrealized gains and losses could aggravate pro-cyclical effects. Investors could react stronger to economic growth of companies when information about unrealized gains and losses are not disclosed properly, only reacting only on what is believed are, realized gains and losses. In times of economic downturn, unrealized losses are not realized yet, and investors would know that these losses could be temporarily and would disappear when markets appeal. But if not disclosed properly, it seems for investors that unrealized losses are realized, and could create pro-cyclical behavior in the form of fewer investments, contributing to the downward spiral. For financial institutions it is therefore important to disclose these unrealized gains and losses properly, since this could lead to a more stable progression of net-income and more stable behavior from investors. Also it would increase the value relevance and the usefulness of financial statements.

Table 19 presented the results from the simulation of total net-income as if historical cost accounting was used (SNIHC) and the difference between total SNIHC and total ACTNI (actual net-income) from the 'perfect disclosure group'. Sub-hypotheses 3 stated that in times of economic growth, ACTNI > SNIHC and sub-hypothesis 4 stated that ACTNI < SNIHC in times of economic downturn. 'Times of economic growth and downturn' were determined earlier in this research, using MSCI Barra global value and growth indices (page 33). The years 2005-2007 and 2009, were considered 'times of economic growth'. Table 19 indicates that from 2005-2007 and in 2009, ACTNI was higher compared to SNIHC. The year 2008 was the year of the financial crisis, and marked as 'times of economic downturn'. In 2008, ACTNI was tested lower compared to SNIHC. Though this indicates pro-cyclicality for those 6 tested companies, it is questionable whether the difference between SNIHC and

ACTNI is significant, and whether this small sample is representative for the entire population. A significance test has indicated that the difference between ACTNI and SNIHC was significant for the 6 tested companies in 2005 and 2006, though these outcomes have low value because of the small sample size.

To determine pro-cyclicality of net-income, it is not only important to investigate whether the difference between SNIHC and ACTNI is significant, but also whether this amount is material. Table 19 indicates that the difference in 2008 is around € 5 billion, indicating the (extra) loss that is attributable to the valuation results on assets and liabilities at fair value through profit and loss. This amount represents the loss that could have been 'saved' if for instance a larger percentage liabilities would have been valued at fair value through profit and loss. If the € 5 billion (extra) loss of the 6 tested companies is representative for the entire population, this could total to a considerable loss on the entire economy, which may could have been prevented. On the other hand, the 6 tested companies comprise the larger companies of the total population. It can be assumed that the effect is lower for the smaller companies. Analyzing the results from the 'imperfect disclosure group' might provide insight in whether the results from the 'perfect disclosure group' are representative. But in order to do so, it needs to be analyzed first whether the calculation of SNIHC from the 'imperfect disclosure group' provides accurate results. This can be done by aggregating the valuations results on liabilities to the valuation results of assets, so that the SNIHC from the 'perfect disclosure group' is calculated the same way as the SNIHC from the 'imperfect disclosure group'. Figure 10 on the next page, shows the SNIHC and ACTNI from the 'perfect disclosure group' calculated using the 'imperfect group method'.
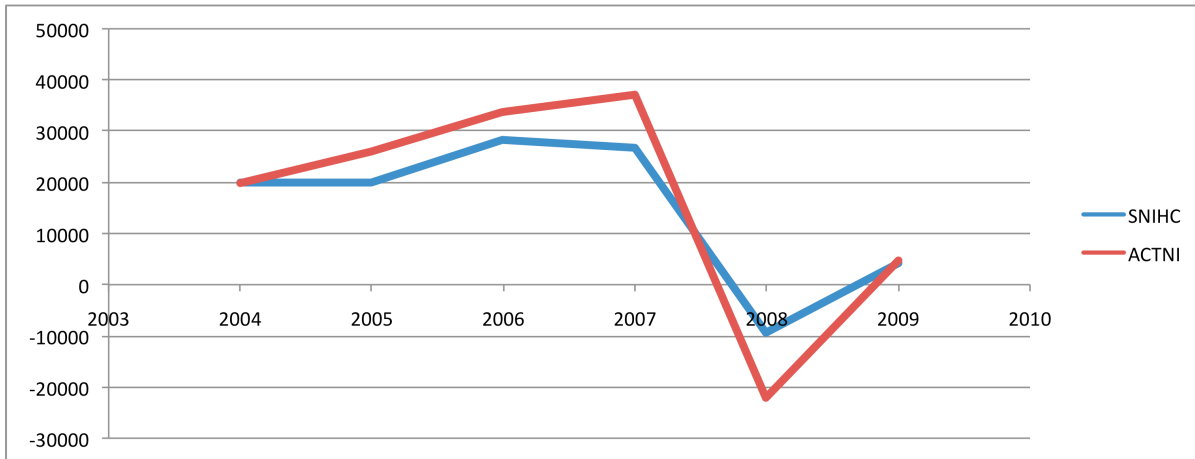
**Figure 10:** Simulation of net-income and actual income over the year 2004-2009 for the **'perfect disclosure group' using the 'imperfect group method'** (6 financial institutions in total). Y-axis: amounts in millions of EUR

This figure can be compared with the earlier showed simulation of net-income from the 'perfect disclosure group' that is calculated using the proper version of the model:



**Figure 11:** Simulation of net-income and actual income over the year 2004-2009 for the **'perfect disclosure group' using the proper version of the model** (6 financial institutions in total). Y-axis: amounts in millions of EUR

The differences between ACTNI and SNIHC for both groups are demonstrated in table 23:

| In millions EUR | 2005 | 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|---|
| **ACTNI – SNIHC 'imperfect group method'** | 5,911 | 5,223 | 10,571 | (12,723) | 436 |
| **ACTNI – SNIHC 'perfect group method'** | 8,386 | 4,310 | 12,991 | (5,256) | 2,562 |

**Table 23:** Differences between ACTNI and SNIHC using the two different methods, 2005-2009.

It is clearly demonstrated that both methods provide a similar progression of the SNIHC-line over time. However, the differences between ACTNI and SNIHC do not correspond, indicating that the 'imperfect group method' does not provide an accurate calculation of SNIHC, though it can be used as an indication of pro-cyclicality. Bear in mind that with the

proper version of the model, a lower level of pro-cyclicality is detected. This should be taken into consideration when analyzing the results from the 'imperfect disclosure group'.

An additional welcome finding of this analysis is that the two figures can be used to demonstrate the effect of liabilities at fair value on pro-cyclicality. This is in fact the reason for the different two calculated values of SNIHC in 2008. In 2008, the difference between ACTNI and SNIHC is larger in figure 10 compared to figure 11. This is because in figure 11, the unrealized gains and losses on assets and liabilities at fair value have been inserted in the model separately. In 2008, some of the 6 financial institutions from this sample showed large losses on assets, but were accompanied by simultaneous large gains on liabilities, dampening pro-cyclical effects. Here the net-effect of fair value accounting demonstrated: a larger percentage of liabilities at fair value reduces the net-effect of fair value accounting, thus reducing pro-cyclicality. For instance, Barclays suffered an unrealized loss of almost € 10 billion on assets but was largely offset by a € 7,5 billion unrealized gain on liabilities. These gains and losses (and gains and losses from prior years) resulted in a negative cumulative valuation result of € 9 billion on assets and a positive cumulative valuation result of € 8 billion on liabilities. The effect of liabilities at fair value on net-income, is demonstrated in the following simplified calculation[3] from Barclays. Recall the formula that calculates the SNIHC:

$$\text{SNIHC}_t = \text{ACTNI}_t - ((\text{UGAI}_t - \text{ULAI}_t) + (\text{UGLI}_t - \text{ULLI}_t)) +$$

$$\sum_{t=0}^{n} ((\text{UGAI}_t - \text{ULAI}_t) + \sum_{t=0}^{n} (\text{UGLI}_t - \text{ULLI}_t))$$

Applying the example from Barclays in 2008 gives (ACTNI of € 4,5 billion in 2008):

$$\text{SNIHC}_t = \text{€ 4,5 billion} - (- \text{€ 10 billion}) - (\text{€ 7,5 billion}) +$$

$$(- \text{€ 9 billion}) + (\text{€ 8 billion}) = -\text{€ 2 billion}$$

Recall that the cumulative valuation results are only part of the equation if negative, the positive valuation result on liabilities is therefore eliminated. SNIHC is calculated at € – 2 billion, this in fact indicates that the gains on liabilities did not only dampen pro-cyclicality, it even involved a countercyclical effect in this situation, since SNIHC > ACTNI in times of economic downturn.

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[3] The calculations on this page have been simplified because of the extent of the calculations. Some amounts cannot be calculated using the information on this page, for instance the cumulative valuation results.

The next section evaluates the results from the 'imperfect disclosure group'. The differences between ACTNI and SNIHC from table 20 have been tested significant on a 1% significance level in 2005 and 2006, and was tested significant on a 5% level in 2007 and 2008. The difference between ACTNI and SNIHC amounts to € 27 billion in 2008. As just demonstrated, these results provide an indication, but enhance the level of pro-cyclicality that is actually present, because the valuation results of liabilities are not inserted in the model separately. Therefore, the level of pro-cyclicality in 2008 will in fact be lower, than shown in figure 8 and 9. The difference between ACTNI and SNIHC tested significant in 2008 for the 'imperfect disclosure group'. It can be assumed that when using the proper version of the model, ACTNI and SNIHC would lie closer together and the difference may not be significant (though this is impossible to test due to improper disclosure). This indicates, that the € 27 billion found difference is in fact too large, and that the actual difference between ACTNI and SNIHC is considered to be lower in 2008. This will be taken into consideration when drawing conclusions.

Lastly, table 21 and table 22 indicate for how many companies the sub-hypotheses are confirmed for each year. These results are established by performing the calculation of SEQHC for each company individually. The results show that on average 4,6 (77%) of the 6 tested financial institutions from the 'perfect disclosure group' confirm the sub-hypothesis in each tested year, thus indicating that 77% of the companies show at least some level of pro-cyclicality of net-income in all tested years. Though most important, during the crisis in 2008, the number of firms that incorporated pro-cyclicality of net-income was considerably lower: 3 (50%).

The results from table 22 do indicate pro-cyclicality in 2008, since for 17 of the 23 (74%) companies tested the sub-hypothesis was confirmed, though it has to be noted that this number would be lower if it was possible to use the proper version of the model.

Combining all results, it can be concluded that the unrealized gains and losses on financial assets at fair value caused a pro-cyclical impact on net-income, especially during the years before the financial crisis. As demonstrated, the level of pro-cyclicality depends heavily on the net-effect of fair value accounting. The pro-cyclical effect was therefore largely mitigated due to an increase of liabilities at fair value in 2008. This is also corresponds with the progression of the net-effect over time found earlier. Recall that the net-effect found in 2008 was considerably lower compared to previous years, due to a significant increase of liabilities at fair value. This explains why the difference between ACTNI and SNIHC is smaller in 2008. On the other hand, the difference would be larger in reality. Remember that

the model was subject to certain assumptions that would in fact reduce the level of pro-cyclicality found by the model. Therefore any level of pro-cyclicality found by the model, is the level that is definitely present and would be larger in reality due to the assumptions made. For instance the second assumption stated that if the fair value of assets falls below their historical value, the assets are impaired by the full difference between historical costs and fair value. In reality this is not always true, since many companies impair assets only for the full difference between historical costs and fair value, if the fair value of assets falls at least 25% (for some assets even 75%) below the historical value. This would mean that the difference between SNIHC and ACTNI would be larger than found by the model. Moreover, the assumption was made that ACTNI would equal SNIHC in 2004 (the base year). It is probable that, ACTNI would actually be higher than SNIHC in 2004, since these were times of economic growth, and the net-effect of fair value accounting was positive for all companies (resulting in unrealized gains that would not be recognized under historical cost accounting). This means that the cumulative valuation results that were used as inputs for the model would in reality be higher. The larger the cumulative valuation result in the years before the crisis, the larger the losses during the crisis, when the fair value falls below historical costs. This would result in a larger difference between ACTNI and SNIHC. Although the level of pro-cyclicality is small in 2008, the effect is present and would in fact be larger in reality due to the underlying assumptions of the model.

## 8.7 Results: unrealized gains and losses affecting equity

The unrealized gains and losses that affect equity are investigated using the model that captures the unrealized gains and losses on 'available-for-sale' assets, in order to determine shareholders' equity as if historical cost accounting was used. The simulation of equity, as if historical cost accounting was used should be seen as a benchmark, which enables to isolate the impact on equity of the unrealized gains and losses of the available-for-sale assets, in each tested year. The sub-hypotheses that have been tested with the model were the following:

Sub-hypothesis 5: *In times of economic growth, ACTEQ > SEQHC*

Sub-hypothesis 6: *In times of economic downturn, ACTEQ < SEQHC*

IAS 32 requires financial institutions to disclose the unrealized gains and losses on available-for-sale assets in the 'statement of comprehensive income' or in the 'statement of changes in equity'. From the total sample of 55 financial institutions, 3 companies were excluded from the sample due to data unavailability and 7 of the remaining 52 were excluded because of improper disclosure of the unrealized gains and losses of available-for-sale assets. One bank (Swedbank) was removed from the sample because the bank disclosed it held no assets classified as available-for-sale. The total tested sample consisted out of 46 financial institutions, of which 32 banks and 14 insurance companies.

The unrealized gains and losses that affect equity are used as input for the model that simulates the equity as if historical cost accounting was used. For every company a separate calculation of the simulation of equity is made. The aggregated results from the total tested population (46 in total) are presented in the tables and figures below:

| In millions EUR | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|---|---|
| **ACTEQ** | 735,472 | 857,982 | 997,460 | 1,133,425 | 1,000,182 | 1,270,135 |
| **SEQHC** | 735,472 | 809,814 | 949,354 | 1,115,060 | 1,052,979 | 1,186,006 |
| **DIFFERENCE** | - | 48,168* | 48,106* | 18,365** | (52,797)* | 84,129* |
| **% OF ACTEQ** | - | 5,61% | 4,82% | 1,62% | 5,28% | 6,62% |

**Table 24:** Results from the model that captures the unrealized gains and losses affecting equity. ACTEQ= Actual equity, SEQHC= simulation of equity at historical costs.
*Significant difference between ACTEQ and SEQHC at a 1% significance level.
**Significant difference between ACTEQ and SEQHC at a 5% significance level.

The results from table 24 depend on the valuation results of available-for-sale assets of each year and on the cumulative valuation results from prior years. The aggregated unrealized gains and losses, and (cumulative) net-valuation results are presented in table 25:

| In millions EUR | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|---|---|
| **Unrealized gains** | - | 48,168 | 51,446 | 26,283 | 10 | 84,311 |
| **Unrealized losses** | - | (2,065) | (5,245) | (14,988) | (153,120) | (8,561) |
| **Net valuation result** | - | 46,103 | 46,201 | 11,296 | (153,110) | 75,750 |
| **Cumulative valuation result** | - | 46,103 | 92,304 | 103,600 | (49,510) | 75,750 |

**Table 25:** Aggregated unrealized gains and losses, and (cumulative) valuation results on available-for-sale assets, 2005-2009.

For a better interpretation of the results from table 24, they are presented in the graphs below. Both graphs contain the same results, though the second graph is made using a smooth line scatter plot in order to visualize and highlight pro-cyclical effects, if present.
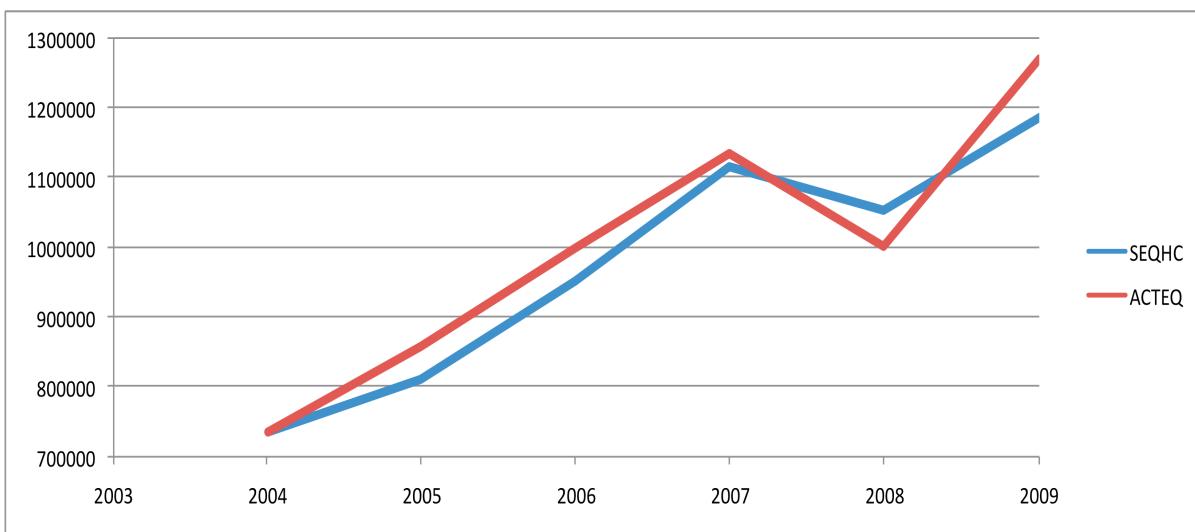


**Figure 11:** Simulation of equity and actual equity over the year 2004-2009. Y-axis: amounts in millions of EUR
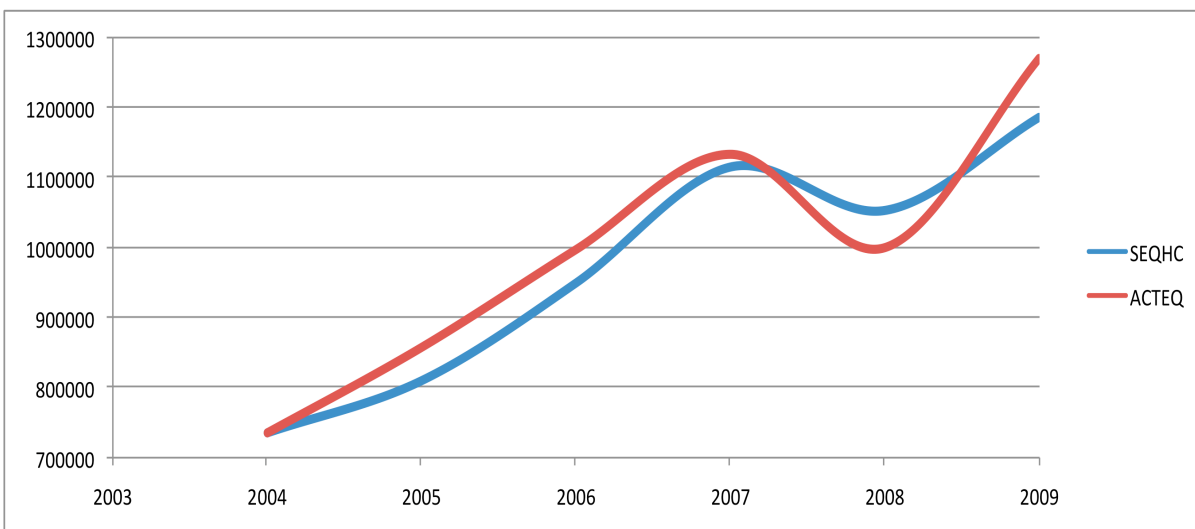


**Figure 12:** Smooth line scatter plot of the simulation of equity and actual equity over the year 2004-2009. Y-axis: amounts in millions of EUR.

To determine which companies comprise the largest portion of unrealized gains and losses the results have been divided into groups based on company type (banks/insurance companies). The results are presented in the table and graphs below:

| (Amounts in millions EUR) 32 BANKS | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|---|---|
| ACTEQ | 552,972 | 654,710 | 760,561 | 891,786 | 804,545 | 1,038,386 |
| SEQHC | 552,972 | 633,344 | 736,116 | 880,837 | 844,542 | 1,000,639 |
| DIFFERENCE | - | 21,366* | 24,445* | 10,949 | (39,997)* | 37,747* |
| % OF ACTEQ | - | 3,26% | 3,21% | 1,23% | 4,97% | 3,64% |
| **14 INSURANCE FIRMS** | | | | | | |
| ACTEQ | 182,499 | 203,271 | 236,898 | 241,638 | 195,636 | 231,748 |
| SEQHC | 182,499 | 176,469 | 213,237 | 234,223 | 208,437 | 185,366 |
| DIFFERENCE | - | 26,801 | 23,661 | 7,415 | (12,800)** | 46,382** |
| % OF ACTEQ | - | 13,19% | 9,99% | 3,07% | 6,54% | 20,01% |

**Table 26:** Results from the model that captures the unrealized gains and losses affecting equity separated by company size. ACTEQ= Actual equity, SEQHC= simulation of equity at historical costs.
*Significant difference between ACTEQ and SEQHC at a 1% significance level.
**Significant difference between ACTEQ and SEQHC at a 5% significance level.
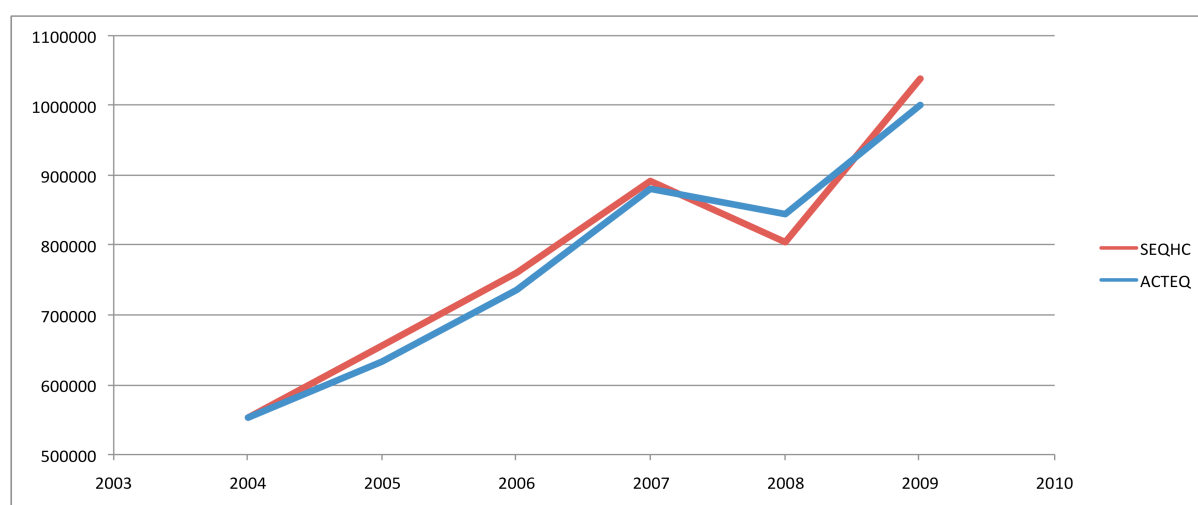


**Figure 13:** Simulation of equity and actual equity over the year 2004-2009 for **banks**. Y-axis: amounts in millions of EUR
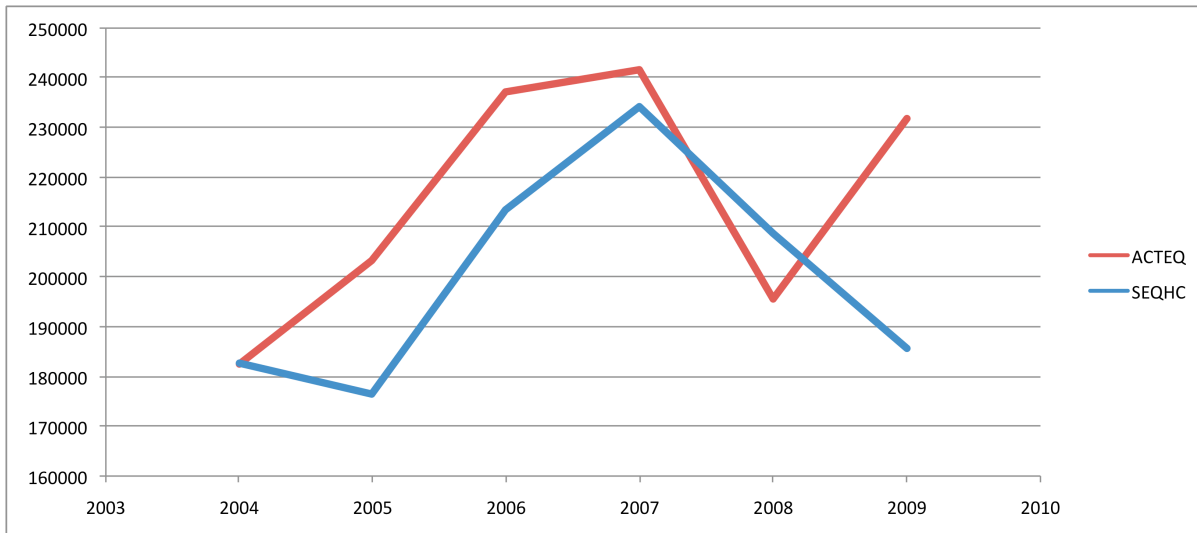
**Figure 14:** Simulation of equity and actual equity over the year 2004-2009 for **insurance companies**. Y-axis: amounts in millions of EUR

The final results from this part of the research show for how many companies and in how many years, ACTEQ was measured higher than SEQHC in times of economical growth, and was lower in times of economic downturn, thus indicating pro-cyclicality.

| | ACTEQ > SEQHC 2005 | ACTEQ > SEQHC 2006 | ACTEQ > SEQHC 2007 | ACTEQ < SEQHC 2008 | ACTEQ > SEQHC 2009 |
|---|---|---|---|---|---|
| Number of companies scoring 'yes' | 38 | 34 | 25 | 34 | 39 |
| % Of total | **83%** | **74%** | **54%** | **74%** | **85%** |
| **Average number of companies that show pro-cyclicality per year: 34 (74%)** | | | | | |
| | | | | **COUNT:** | **% OF TOTAL** |
| Number of companies that show pro-cyclicality all (5) years: | | | | 16 | **35%** |
| Number of companies that show pro-cyclicality in 4 years: | | | | 13 | **28%** |
| Number of companies that show pro-cyclicality in 3 years: | | | | 7 | **15%** |
| Number of companies that show pro-cyclicality in 2 years: | | | | 7 | **15%** |
| Number of companies that show pro-cyclicality in 1 year: | | | | 3 | **7%** |
| Number of companies that show pro-cyclicality in 0 years: | | | | 0 | **0** |
| **TOTAL:** | | | | **46** | **100%** |

**Table 27:** 'Pro-cyclicality indication scores' for 2005-2009.

**8.8 Analysis of the results: unrealized gains and losses affecting equity**

The main results of this part of the research are presented in table 24, showing the simulation of total equity as if historical cost accounting was used (SEQHC) and the difference between total SEQHC and total ACTEQ (actual equity). Sub-hypotheses 5 stated that in times of economic growth, ACTEQ > SEQHC and sub-hypothesis 6 stated that ACTEQ < SEQHC in times of economic downturn. Table 24 indicates that from 2005-2007 and in 2009, ACTEQ was significantly higher compared to SEQHC (2005, 2006 and 2009 on a 1% significance level and in 2007 on a 5% significance level). The year 2008 was the year of the financial crisis, and marked as 'times of economic downturn'. In 2008, ACTEQ was tested significantly lower compared to SEQHC (based on a 1% significance level). Sub-hypothesis 5 and 6, have therefore been confirmed thus indicating pro-cyclicality of equity in all tested years.

Table 25 provides more insight in the unrealized gains and losses, which are the underlying values that shaped the final results. In 2005, unrealized gains totaled € 48 billion and unrealized losses totaled € 2 billion, resulting in a net-valuation result of € 46 billion. The unrealized gains would not be recognized under historical cost accounting but the unrealized losses however, are recognized. Therefore, the difference between SEQHC and ACTEQ is equal to the total unrealized gains in 2005. Economical growth continued in 2006 and 2007, as the net valuation result in those years remained positive, totaling the cumulative valuation result in 2007 to around € 103 billion (€ 46 billion (2005) + € 46 billion (2006) + € 11 billion (2007)). In 2008, the impact of the financial crisis is clearly demonstrated as the net-valuation result totals to a loss of € 153 billion. This loss of € 153 billion is already completely recognized in the actual total equity of 2008. Under historical cost accounting this loss would be recognized as well and assets would be impaired, but only if the fair value of those assets would fall below historical costs. In the years before the crisis, the net-valuation result was positive in each year, which increased the value of those assets. Under historical costs, these unrealized gains would not be recognized, but the underlying value (equal to the fair value) of those assets would increase similarly as with fair value accounting. The reason for the difference between SEQHC and ACTEQ in 2008 therefore lies with the positive valuation results of previous years. Under historical costs the loss would be considerably lower, because the fair value falls below the historical costs, only for that part that the unrealized losses are larger than the positive cumulative valuation result from prior years. Under fair value accounting, the unrealized gains from prior years have already been recognized, therefore the unrealized loss in 2008 that is recognized in equity is equal to the net-valuation result in that year. It has to be noted that the actual calculation of SEQHC cannot be demonstrated using the data from table 24 and 25, due to the complexity and size

of the entire calculation. In 2009, the net-valuation result was positive again. Because the net-valuation result was negative in 2008, the cumulative valuation result is set to zero, because it is assumed that the fair value of assets equal historical value less impairments.

Hypotheses 5 and 6 have been confirmed and proved significant, though with such large companies and with such an influence on the economy, it is also a matter of materiality. In 2008, ACTEQ was almost € 53 billion lower compared to SEQHC (comprising 5,28 % of total ACTEQ). The question is not only whether this amount is significantly lower, but is this amount also material? Of course companies face losses in times of economic downturn, but the (extra) € 53 billion loss, can be considered as direct result of fair value accounting. Valuing a larger part of liabilities is not an option in this situation to mitigate pro-cyclical effects, since IFRS doesn't allow fair value gains and losses on liabilities to be recognized through equity. But what if not such a large part of assets would have been classified as available-for-sale or valued at fair value? The results (table 24, figure 11) demonstrate that losses could have been lower if fewer assets would have been valued at fair value. A € 53 million aggravation of the financial crisis due to fair value accounting would be considered material, because of the high influence and responsibility these financial institutions have to society. However, the model remains a simulation, and what actually would have happened if companies valued a smaller portion of assets at fair value, is impossible to determine.

Table 26 and figure 13 and 14 contain the results separated by company type. Here, the difference between significance and materiality is demonstrated. For banks, the difference between SEQHC and ACTEQ is tested significant (all based at a 1% significance level) for all tested years except 2007. For insurance companies, the difference is only tested significant in 2008 and 2009 (based on a 5% significance level). However, the differences at insurance companies comprise a much larger part of total ACTEQ compared to banks. For instance in 2005, the difference between ACTEQ and SEQHC for insurance companies is almost € 27 billion, which is almost 14% of total equity of all insurance firms. For banks, the difference comprised only 3,26% of total equity. The difference between ACTEQ and SEQHC was tested insignificant for insurance companies, but significant for banks, which at first hand seems odd. However, this can be explained because the difference for insurance firms was mainly established by a few outliers that caused the relatively large difference. These outliers could be removed from the sample but again; the difference found is not only a matter of significance. Although the few outliers disturb the relationship between the significance and the found difference, these outliers should not be removed from the sample because the difference found should be tested for materiality as well, in order to form a proper conclusion. For example, if one large bank would show an enormous loss caused by

fair value changes of available-for-sale assets, this could impose a large (material) effect on equity. In 2008, the equity of some banks dropped below the constraints of the Basel I accord (at least 4% equity in percentage of Tier I capital), threatening the continuity of some banks and could have harmed many clients, shareholders and even the economy of an entire country. In this situation it is therefore not applicable to eliminate those insurance companies from the sample that comprised the largest differences.

Though not significant in all years, the difference between SEQHC and ACTEQ from insurance companies, comprise a much larger share of total aggregated equity compared to banks. This is also demonstrated in figure 13 and 14, though the graphs can have a slightly misleading appearance. Keep in mind when analyzing the graphs that there are more banks represented in the total sample. For instance in 2008, the difference between SEQHC and ACTEQ is almost € 40 billion for banks and almost € 13 billion for insurance companies, though the difference and the impact on equity is most clearly demonstrated in percentage of total equity (at around 5% for banks and 6,5% for insurance companies). Also the next graph enables to better compare the difference between ACTEQ and SECHC of insurance companies and banks:
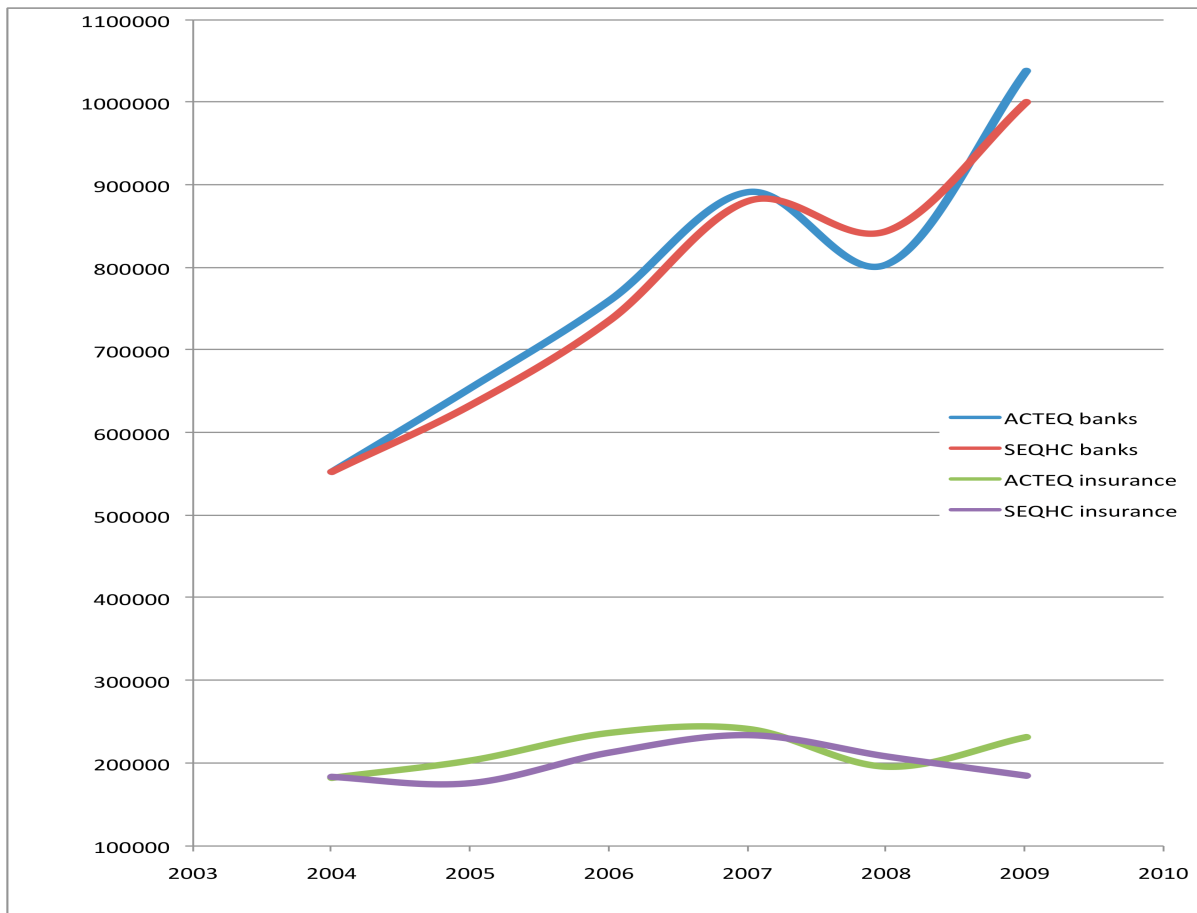
**Figure 15:** Smooth line scatter plot of ACTEQ and SEQHC for banks and insurance companies. Y-axis: amounts in millions of EUR.

Lastly, table 27 indicates for how many companies the sub-hypotheses are confirmed for each year. These results are established by performing the calculation of SEQHC for each company individually. The results show that on average 34 (74%) of the 46 tested financial institutions confirm the sub-hypothesis in each tested year, thus indicating that 74% of the companies show at least some level of pro-cyclicality of equity in all tested years. Most important, during the crisis in 2008, the number of firms that incorporated pro-cyclicality of equity was equal to the average: 34 (74%). Furthermore, the second part of table 27 indicates that 35% of the tested companies show pro-cyclicality of equity in all tested years.

The results have shown what impact unrealized gains and losses of available-for-sale assets can be have on financial institutions' equity. The impact on equity has proved to be larger for insurance companies compared to banks, since the difference between ACTEQ and SEQHC in percentage of ACTEQ was considerably larger for insurance companies. Insurance companies value a larger portion of financial assets at fair value, as demonstrated earlier in the results concerning the net-effect of fair value accounting. This could explain why the impact on equity is larger for insurance companies. Analyzing to what extent banks and insurance companies classify assets as available-for-sale could provide more insight in

the issue. Though not tested in this research, I expect insurance companies to classify a larger percentage of assets as available-for-sale assets, causing the larger impact on equity. Another way to test the impact of available-for-sale assets is to test the adequacy of the available-for-sale assets revaluation reserve (IAS 32p94). The unrealized gains and losses on the available-for-sale assets are recognized in this part of the companies' equity. Determining whether these reserves could cope with the large losses in 2008 could provide additional insight. It came to my attention, that a lot of these reserves had a negative value in 2008, implying that the reserves were not build up adequately to withstand a crisis.

The aggregated results have shown that the sub-hypotheses were tested significant in all years, thus indicating pro-cyclicality. As well, the total difference between SEQHC and ACTEQ in 2008, of € 53 billion, is considered material, because of the high responsibility these large companies have to society. The most probable explanation for the pro-cyclical effects of equity is that financial institutions are not allowed to value liabilities at fair value through equity. As demonstrated in the previous section, liabilities at fair value involve a countercyclical effect on companies' business cycles. Though, because only assets are valued at fair value through equity, this accompanies favorable effects on equity in times of economic growth, but increases the risk of larger losses through equity in times of economic downturn.

# 9. Conclusions, implications, limitations and future research

The last chapter of this research provides the conclusions of all tested hypotheses and what implications the findings have on financial institutions, investors, analysts, the accounting profession, and the economy and society as a whole. Also the limitations of the research method and the results will be highlighted. Finally, some recommendations for future research concerning fair value accounting and pro-cyclicality will be proposed.

## 9.1 Conclusions

The main hypothesis, tested in this research stated that:

***Fair value accounting incorporated a pro-cyclical effect on financial institutions' financial statements before and during the (current) financial crisis (2005-2009)***

The hypothesis was divided into two main directions throughout this research using different approaches. The first direction investigated pro-cyclicality of net-income, using the net-effect of fair value accounting, level 3 valuations and the model that isolated the impact of unrealized fair value gains and losses on net-income, as indicators of pro-cyclical effects. The second direction of this research investigated pro-cyclicality of equity, using the model that isolated the impact of unrealized fair value gains and losses on equity. The main hypothesis will be answered combining the results and analysis of all sub-hypotheses.

The first sub-hypothesis stated that: *financial institutions' financial statements show a significant positive net-effect of fair value accounting, resulting in pro-cyclicality before and during the (current) financial crisis*.

An analysis of the net-effect differentiated by company type indicated that especially the larger banks, and all insurance companies most intensively applied fair value accounting. The results and analysis have indicated that banks proved to be more conservative with the application of fair value accounting compared to insurance companies, valuing a smaller portion of the assets and a larger portion of liabilities at fair value, resulting in an average net-effect of 16% over 2005-2009. The average net-effect of insurance companies was considerably higher (52%). Because the net-effect of fair value accounting is considered significant in all years and at all insurance companies, this indicates that insurance companies contributed a considerable (positive) part to the total net-effect of the entire population.

The total net-effects found in 2005, 2006 (both 25%), 2007 (23%) and 2009 (20%) are

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considered to be significantly positive, based on comparable findings from the SEC and Bout et al. (2010). The net-effect in 2008 proved to be significantly lower (17%), due to a significant increase of liabilities at fair value. A remarkable finding was that the net-effect found in 2008 was considerably larger compared to the net-effect found in the research from Bout et al. (2010). This difference was completely attributable to the net-effect of insurance companies, which had not been investigated by Bout et al. (2010). Bout et al. (2010) determined that the net-effect of 11% found in their research was insignificantly positive. However, a 17% net-effect is considerably larger, and based on the net-effect from earlier years combined with the findings from the model that investigates pro-cyclicality of net-income I consider the net-effect of 17% to have a small, though present pro-cyclical effect on net-income. The model that investigates pro-cyclicality of net-income has demonstrated that significantly positive net-effects from prior years (before 2008), result in large unrealized gains in those year and larger losses when markets become illiquid. Therefore, the net-effect of 17% in 2008 is considered to have had an impact on net-income. Further more, pro-cyclicality should not be investigated over one year but over a period, since a single intensifying effect of fair value accounting in one year, does not imply pro-cyclicality. The results and the analysis showed that the average net-effect of fair value accounting over all tested years was 22%, which I consider to be significantly positive based on comparable findings from the SEC and Bout et al. (2010), and the findings of the model that investigates pro-cyclicality of net-income. The first hypothesis is therefore considered confirmed. This conclusion will be connected and elaborated later in the conclusion of the findings from the model as well.

The second sub-hypothesis stated that: f*inancial institutions' financial statements show a significant increase of level three valuations as a result of markets becoming illiquid.*

First of all can be concluded that a large part of the population (21%), did not disclose the fair value hierarchy properly in 2009, although required by IFRS. Most of these companies did disclose some form of a fair value hierarchy, but did not distinguish between assets and liabilities at fair value, adopted a two level fair value hierarchy or disclosed only the fair value hierarchy for assets. The lack of disclosure has an impact on the usefulness of the financial statements, making it difficult for investors and analysts to determine the risk-full level 3 positions of financial institutions.

From the results can be concluded that financial institutions classified only a small part of assets and liabilities as level 3 valuations over 2007, 2008 and 2009. As well, the portion of level 3 assets and liabilities remained fairly constant over the three tested years. This

invalidates the expectation that the results from 2008 would show a significant increase of level 3 valuations. This could be explained, because financial institutions tend to limit the classification of level 3 instruments, since these represent the most risk-full positions, especially in times of economic downturn. As also noted by Bout et al. (2010), it may be possible that financial institutions reclassified a large portion of level 3 valuations to historical costs. The effect of level 3 valuations on pro-cyclicality is therefore considered limited.

The second sub-hypothesis can thus not be confirmed: financial institutions did not show a significant increase of level three valuations as a result of markets becoming illiquid. As well, financial institutions did not show a decrease of level three valuations when markets appealed in 2009.

The third and fourth sub-hypotheses stated that: *in times of economic growth, ACTNI > SNIHC and in times of economic downturn, ACTNI < SNIHC.*

While investigating the third and fourth hypothesis many problems arose concerning the necessary data collecting, because of improper disclosure of unrealized gains and losses. The improper disclosure could mislead investors when analyzing the financial statements, and could base their investments on misleading information. This could in turn, contribute to pro-cyclical behavior from investors, investing more in times of economic growth, because of the unawareness that possible large unrealized gains are included in an account that implies that all gains are realized (i.e. **net**-trading income). Similarly, in times of economic downturn, better disclosure about unrealized losses could provide investors the knowledge that these losses could be temporarily and could withhold investors abolishing their investments. Not only investors and analysts would benefit from better disclosure, the financial institutions could benefit from it as well. If better disclosure would limit investors' pro-cyclical behavior, financial institutions would show a more stable growth, and lower losses in times of crisis, which is beneficial for both investors and the company.

An additional finding while investigating pro-cyclicality of net-income is that the model demonstrated the alleged dampening effect of liabilities at fair value on pro-cyclicality. These findings correspond with expectations from the SEC (2008), Bout et al. (2010), and the IMF (2009). Though it seems logical that liabilities at fair value have a dampening effect, the effect was not demonstrated before. The findings from the model indicated that in the years before the crisis, the pro-cyclical effect was larger compared to the year of the crisis (2008). This corresponds with the findings of the net-effect of fair value accounting, which showed an increase of liabilities at fair value, resulted in a lower net-effect during the financial crisis,

explaining the lower found pro-cyclicality in 2008. The lower net-effect in 2008 also corresponds with the findings from the research from Bout et al. (2010) though still the outcome differed. The different outcome can be explained because insurance companies were not included in the calculation of the net-effect of fair value accounting in the research from Bout et al. (2010). However, the net-effect from insurance companies proved to contribute a considerable (positive) part to the total net-effect from the entire population.

Combining all results, it can be concluded that the unrealized gains and losses on financial assets at fair value caused a pro-cyclical impact on net-income, especially during the years before the financial crisis. In 2008 the level of pro-cyclicality found was lower, due to the significant increase of liabilities at fair value. Though small, the effect in 2008 is considered to be significant due to the underlying assumptions of the model, which reduce the level of pro-cyclicality found by the model. The pro-cyclical effect would therefore be larger in reality. The model found a small level of pro-cyclicality in 2008, and is because of the underlying assumptions of the model, the level that is least present. Even a small pro-cyclical effect should not be ignored, because of the enormous amounts these financial institutions trade with, and the impact these companies have on society. Especially the years before the crisis show larger pro-cyclical effects. For the companies but also for investors and society, it is desired to have a stable progression of growth instead of intensified growth by unrealized gains and intensified downturn by unrealized losses.

As noted earlier, pro-cyclicality should not be determined over one single year, but over a longer period. The graphs displaying the results (page 64) demonstrate that fair value accounting did incorporate a level of pro-cyclicality. The third and fourth sub-hypotheses have therefore been confirmed for all tested years, though it has to be stated that the effect was smaller in 2008 and 2009. This also corresponds with the lower net-effect of fair value accounting found in those two years. The lower level of pro-cyclicality found in 2008 indicates that the effect of fair value accounting on the financial crisis was limited. Fair value accounting did not aggravate the financial crisis a lot, though some losses could have been prevented with better application of fair value accounting (creating a lower net-effect) and better disclosure of unrealized gains and losses.

The final two hypotheses investigated pro-cyclicality of equity and stated that: i*n times of economic growth, ACTEQ > SEQHC and in times of economic downturn, ACTEQ < SEQHC.*

The results and analysis have indicated that the two hypotheses are confirmed and proved significant in all tested years, indicating pro-cyclicality of equity over the entire tested period.

This is also clearly demonstrated in the graphs (page 73) displaying the results. The total difference between ACTEQ and SEQHC comprised € 53 billion in 2008, indicating the loss that is attributable to unrealized losses on available-for-sale assets. This amount is considered to have had a material impact on the financial crisis, the economy and society because the sample consisted out of the largest banks and insurance companies, which have a high responsibility, and a large influence on society.

The differences between ACTEQ and SEQHC at insurance companies comprised a much larger part of total ACTEQ compared to banks, indicating that insurance companies are more vulnerable to the exposure of unrealized gains and losses on available-for-sale assets. This can be explained because insurance companies value a considerable larger part of assets at fair value, as was determined earlier.

The analysis and calculation of SEQHC for each company individually has indicated pro-cyclical effects as well. The results show that on average 34 (74%) of the 46 tested financial institutions confirm the sub-hypothesis in each tested year, thus indicating that 74% of the companies show at least some level of pro-cyclicality of equity in all tested years. Further more, 35% of all tested companies show pro-cyclicality of equity in all tested years.

The most probable explanation for the pro-cyclical effects of equity is that financial institutions are not allowed to value liabilities at fair value through equity. Another explanation could be the inadequacy of the available-for-sale reserves, although this has not been tested.

Concluding, the aggregated results have shown that the sub-hypotheses were tested significant, thus confirming the sub-hypotheses in all tested years.

Combining all conclusions from all the sub-hypotheses now the main hypothesis of this research can be answered, which stated:

***Fair value accounting incorporated a pro-cyclical effect on financial institutions' financial statements before and during the (current) financial crisis (2005-2009)***

The main hypothesis is confirmed based on the findings from the sub-hypotheses. It has to be stated that the pro-cyclical effect on equity was larger compared to the pro-cyclical effect on net-income. The most probable explanation for the higher level of pro-cyclicality of equity, is that unrealized gains and losses on liabilities cannot be recognized through equity. The

pro-cyclical effect on equity was proved significant in all tested years. Most importantly, the pro-cyclical effect is considered to have aggravated losses during the crisis, worsening the equity positions of financial institutions. The pro-cyclical effect on net-income was especially present during the years before the financial crisis, however this effect was lower in 2008 and 2009. Losses could have been higher in 2008, if there had not been a significant increase of liabilities at fair value through profit and loss, dampening pro-cyclical effects.

## 9.2 Implications

This part evaluates some possible solutions that could mitigate pro-cyclicality and evaluates some implications that the findings of this research could have on financial institutions, standard setters, the accounting profession, investors, analysts and society. This research has not only demonstrated that fair value accounting incorporates pro-cyclical effects, but also that these effects could have been mitigated. Most importantly, part of the unrealized losses in 2008, could have been prevented. Below, first some implications are provided. Also some recommendations concerning the mitigation of pro-cyclical effects will be evaluated.

This research provided an investigation on pro-cyclicality of fair value accounting on equity and net-income. Pro-cyclicality of fair value accounting has not been researched extensively in the past. The results from this study can therefore contribute in understanding the impact that fair value accounting has on companies' financial statements, and on the economy and society as a whole. The findings from this study could be helpful for investors and analyst to assess the effect of unrealized gains and losses, and could influence investment decisions. Furthermore, the accounting profession and standard setters could use the findings to improve accounting standards concerning fair value accounting and also the disclosure quality of unrealized gains and losses and the fair value hierarchy. Lastly, the models from this research can be used in further research to investigate pro-cyclical effects in the future, though the quality of disclosures should be improved first.

It has been demonstrated that companies can increase the level of liabilities at fair value, in order to limit the net-effect, and limit pro-cyclical effects. However, financial institutions should not apply this solution as an earnings management tool. Decreasing the level of liabilities at fair value in times of growth, and increasing the level when a downturn is anticipated could be considered earnings management or income smoothing. Providing financial institutions the discretion to classify assets and liabilities at fair value depending on market conditions could increase pro-cyclical effects during times of economic growth. It is therefore important for standard setters to regulate the ratio between assets and liabilities at

fair value that is applied by financial institutions. The amendment that allows the reclassification of assets to historical costs is a good example of a standard that mitigates pro-cyclicality but also retains earnings management, since it is not allowed to reclassify assets back to fair value (in times of growth). On the other hand, in times of growth, reclassified assets could be disposed off, and replaced by other assets, indicating that there is still a possibility to manage earnings using fair value accounting.

Limiting pro-cyclical effects could also be accomplished by means of better disclosure of unrealized gains and losses, so that investors can base their investment decisions on more qualitative information. As discussed earlier, this reduces pro-cyclical behavior from investors, both in times of economic growth and downturn. Furthermore, this would increase the usefulness of the financial statements. Standard setters and the accounting profession could improve the disclosure quality of these disclosures by performing tighter control on financial institutions.

Disclosing all unrealized gains and losses separately and differentiated by type of asset and type of liability, could provide additional insight in the effect of these gains and losses on net-income. Also the ratio between assets and liabilities at fair value, or the net-effect of fair value accounting would be useful for financial statements users to asses the risk of their investments. These additional disclosures would increase the value of information to investors, providing more insight in the effect of unrealized gains and losses on net-income and equity. An example of such a useful disclosure is disclosed in appendix 2 (from Generali Assicuazioni, insurance company).

Companies could also look at the possibility to decrease the application of fair value accounting, valuing less assets and less liabilities at fair value. On the other hand, fair value accounting's (alleged) advantage is the increase in value relevance of financial statements for investors because assets or liabilities valued at market value are more strongly associated with stock prices than when valued at historical costs (Barth et al. 2001). 'Going back' to historical cost accounting is not an option, since most financial assets and liabilities are not suited for this accounting method, as they often have no value upon acquisition.

For financial institutions it is important to be aware of the possible effects of fair value accounting because of the high responsibility and influence these companies have on society. Exacerbating unrealized gains in times of economic growth should not be seen as an easy method to boost profits. Combined with improper disclosures, this can mislead investors and analysts and can cause severe losses when markets become illiquid. On the

long term, it is not only beneficial for investors and analysts to limit pro-cyclicality, but it is beneficial for the financial institutions as well. Lowering pro-cyclical effects diminishes volatility of earnings and enables financial institutions to show a more stable progression of growth to their investors. Stable growth often signals lower risks from an investor's perspective. Further more, stable growth provides better protection withstanding a crisis.

Lastly, I've selected some recommendations from previous studies, which I consider could mitigate some of issues surrounding fair value accounting.

Barth (2004) argued that additional disclosures about the mean and variance of assets and liabilities at fair value could provide useful information for financial statements' users to predict the fair value with more certainty in the next period.

Also the adoption of 'the expected loss model' instead of the 'incurred loss model' or the creation of 'capital buffers', would create protection to withstand a downturn (FSF 2009, discussed on page 17).

## 9.3 Limitations

There are several limitations to this research. First of all, it could not accurately be determined what level of the net-effect would in fact be considered significant. In this research it is assumed that a net-effect of 17% was considered significant in 2008, though that this effect was small. This was based on the findings from the model and on comparable studies, but could not be determined with absolute certainty.

Two models were used in this research to indicate pro-cyclicality, by conducting a simulation of net-income and equity. The findings of the models implied that if some losses could have been prevented, if for instance the net-effect would have been lower. However, the findings remain subject to a simulation, and it cannot be determined whether in reality, losses would have actually been lower if in case of a lower net-effect. Furthermore the models were subject to certain assumptions, though it was determined that these assumptions would add power to the findings, if pro-cyclicality would be detected. However, they remain assumptions, and in reality this could have been different.

During the research, the disclosure quality of unrealized gains and losses proved to be poor, making it difficult to find enough data and to perform a proper calculation of the simulation of net-income. This resulted in a small sample for which pro-cyclicality could be tested properly. The results from the population that only disclosed the aggregated valuation results provided only an indication of pro-cyclical effect. The models can be used properly in further research if the disclosure of unrealized gains and losses has improved.

Lastly, many samples in this research have been tested for significance, though some of those are considered too small for statistical testing. This reduces the value of those findings. This has been noted throughout the research when this was the case. On the other hand, the findings are not only a matter of significance, but also a matter of materiality, if not more important. The findings that that were presented in absolute amounts (such as the difference between ACTEQ and SEQHC and ACTNI and SNIHC) are of greater importance, since these differences indicate the impact of the unrealized gains and losses on equity and income. It is more important to indicate whether these outcomes are considered material than significant. Significance values only indicate whether pro-cyclical effects are present over the entire population. Though if only a number of companies show pro-cyclical effects, this could still impose an impact on the economy and society.

## 9.4 Future research

The final part of this research contains recommendations for future research concerning fair value accounting and pro-cyclicality.

In this research was found that insurance companies' unrealized gains and losses have had a larger impact on equity compared to banks. In this research was not tested to what extent banks and insurance companies classify assets as available-for-sale. I expect insurance companies to classify a larger percentage of assets as available-for-sale assets, causing the larger impact on equity. It could be tested in further research, whether a relation exists between the level of available-for-sale assets, and the equity positions of financial institutions. Many of the tested companies showed a very disturbing equity position, some violating the Basel I accord (less than 4% equity in percentage of Tier I capital). It could be tested whether those companies that violated those constraints, showed a higher level of available-for-sale assets, or larger losses on these assets.

Another way to test the impact of available-for-sale assets is to test the adequacy of the available-for-sale assets revaluation reserve (IAS 32.94). The unrealized gains and losses on the available-for-sale assets are recognized in this part of the companies' equity. Determining whether these reserves could cope with the large losses in 2008 could provide additional insight. It came to my attention, that a lot of these reserves had a negative value in 2008, implying that the reserves were not build up adequately to withstand a crisis.

The disclosure quality of fair value related items could be investigated in further research, as in this research, this proved to be done improperly by many companies. Research could be done on the adoption and quality of the fair value hierarchy and on the disclosure quality of unrealized gains and losses on assets and liabilities at fair value through profit and loss.

The usage of fair value accounting could also be investigated in relation to earnings management practices. As indicated, valuing less liabilities at fair value in times of economic growth and more in times of economic downturn could be seen as an earnings management tool. It could be tested whether this relation exists. If indeed the net-effect of fair value accounting is somehow used as an earnings management tool, this could be included as a proxy in earnings management measurement models.

In this research, was concluded that a 3 to 4% of level 3 valuations did not introduce pro-cyclicality, at least not largely. However, it is still unsure whether even a small percentage of level 3 valuations, could have a large impact on net-income and equity. This could be investigated, by isolating the impact of fair value changes of level 3 assets (and liabilities) on net-income and equity.

A still unknown part of this research is whether the disclosure quality of unrealized gains and losses of assets and liabilities at fair value through profit and loss have had an impact on financial statement users. It has been noted that improper disclosure (including unrealized gains and losses within accounts that seem to include realized gains and losses) could cause pro-cyclical behavior of investors. It could be investigated how financial statement users interpret those accounts, and how investors use the information of unrealized gains and losses. Not only the unrealized gains and losses themselves could create pro-cyclicality, also the behavior of the market and its investors could introduce pro-cyclicality into the financial statements. Investigating investors' response to fair value changes could provide more insight whether investors' behavior could cause pro-cyclicality.

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# Appendix

## Appendix 1: statistical tests

### 1.1 Net-effect of fair value accounting and percentage of assets and liabilities at fair value tested between years:

### Assets at Fair value:

**Paired Samples Test**

| | | Paired Differences | | | | | t | df | Sig. (2-tailed) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | 99% Confidence Interval of the Difference | | | | |
| | | Mean | Std. Deviation | Std. Error Mean | Lower | Upper | | | |
| Pair 1 | ASSETSATFVINSURANCE2005 - ASSETSATFVINSURANCE2006 | -.00067 | .00604 | .00168 | -.00578 | .00445 | -.397 | 12 | .698 |
| Pair 2 | ASSETSATFVINSURANCE2006 - ASSETSATFVINSURANCE2007 | .00311 | .01081 | .00300 | -.00604 | .01227 | 1.039 | 12 | .319 |
| Pair 3 | ASSETSATFVINSURANCE2007 - ASSETSATFVINSURANCE2008 | .00413 | .00502 | .00139 | -.00012 | .00839 | 2.967 | 12 | .012 |
| Pair 4 | ASSETSATFVINSURANCE2008 - ASSETSATFVINSURANCE2009 | -.00119 | .00838 | .00233 | -.00830 | .00591 | -.513 | 12 | .617 |
| Pair 5 | ASSETSATFVBANKS2005 - ASSETSATFVBANKS2006 | -.00066 | .00594 | .00103 | -.00350 | .00217 | -.642 | 32 | .525 |
| Pair 6 | ASSETSATFVBANKS2006 - ASSETSATFVBANKS2007 | -.00128 | .00692 | .00120 | -.00458 | .00202 | -1.063 | 32 | .296 |
| Pair 7 | ASSETSATFVBANKS2007 - ASSETSATFVBANKS2008 | -.00169 | .00566 | .00098 | -.00439 | .00100 | -1.718 | 32 | .095 |
| Pair 8 | ASSETSATFVBANKS2008 - ASSETSATFVBANKS2009 | .00247 | .00733 | .00128 | -.00102 | .00597 | 1.937 | 32 | .062 |
| Pair 9 | ASSETSATFVTOTAL2005 - ASSETSATFVTOTAL2006 | -.00066 | .00590 | .00087 | -.00301 | .00168 | -.764 | 45 | .449 |
| Pair 10 | ASSETSATFVTOTAL2006 - ASSETSATFVTOTAL2007 | -.00004 | .00832 | .00123 | -.00334 | .00326 | -.031 | 45 | .975 |
| Pair 11 | ASSETSATFVTOTAL2007 - ASSETSATFVTOTAL2008 | -.00005 | .00604 | .00089 | -.00244 | .00235 | -.052 | 45 | .959 |
| Pair 12 | ASSETSATFVTOTAL2008 - ASSETSATFVTOTAL2009 | .00144 | .00773 | .00114 | -.00163 | .00450 | 1.260 | 45 | .214 |

# Liabilities at fair value:

**Paired Samples Test**

| | | Paired Differences | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | 99% Confidence Interval of the Difference | | | | |
| | | Mean | Std. Deviation | Std. Error Mean | Lower | Upper | t | df | Sig. (2-tailed) |
| Pair 1 | LIABILITIESATFVIN SURANCE2005 - LIABILITIESATFVIN SURANCE2006 | -.00153 | .00336 | .00093 | -.00437 | .00132 | -1.641 | 12 | .127 |
| Pair 2 | LIABILITIESATFVIN SURANCE2006 - LIABILITIESATFVIN SURANCE2007 | -.00077 | .00186 | .00052 | -.00235 | .00081 | -1.485 | 12 | .163 |
| Pair 3 | LIABILITIESATFVIN SURANCE2007 - LIABILITIESATFVIN SURANCE2008 | .00169 | .00328 | .00091 | -.00109 | .00447 | 1.854 | 12 | .089 |
| Pair 4 | LIABILITIESATFVIN SURANCE2008 - LIABILITIESATFVIN SURANCE2009 | -.00056 | .00566 | .00157 | -.00536 | .00424 | -.356 | 12 | .728 |
| Pair 5 | LIABILITIESATFVBA NKS2005 - LIABILITIESATFVBA NKS2006 | -.00050 | .00475 | .00083 | -.00276 | .00176 | -.605 | 32 | .549 |
| Pair 6 | LIABILITIESATFVBA NKS2006 - LIABILITIESATFVBA NKS2007 | -.00133 | .00419 | .00073 | -.00333 | .00066 | -1.831 | 32 | .076 |
| Pair 7 | LIABILITIESATFVBA NKS2007 - LIABILITIESATFVBA NKS2008 | -.00337 | .00626 | .00109 | -.00635 | -.00039 | -3.097 | 32 | .004 |
| Pair 8 | LIABILITIESATFVBA NKS2008 - LIABILITIESATFVBA NKS2009 | .00315 | .00705 | .00123 | -.00020 | .00651 | 2.572 | 32 | .015 |
| Pair 9 | LIABILITIESATFVT OTAL2005 - LIABILITIESATFVT OTAL2006 | -.00079 | .00439 | .00065 | -.00253 | .00095 | -1.222 | 45 | .228 |
| Pair 10 | LIABILITIESATFVT OTAL2006 - LIABILITIESATFVT OTAL2007 | -.00117 | .00367 | .00054 | -.00263 | .00028 | -2.171 | 45 | .035 |
| Pair 11 | LIABILITIESATFVT OTAL2007 - LIABILITIESATFVT OTAL2008 | -.00194 | .00600 | .00088 | -.00432 | .00044 | -2.195 | 45 | .033 |
| Pair 12 | LIABILITIESATFVT OTAL2008 - LIABILITIESATFVT OTAL2009 | .00210 | .00683 | .00101 | -.00061 | .00482 | 2.089 | 45 | .042 |

# Net-effect of fair value accounting:

**Paired Samples Test**

| | | Paired Differences | | | 99% Confidence Interval of the Difference | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | Std. Deviation | Std. Error Mean | Lower | Upper | t | df | Sig. (2-tailed) |
| Pair 1 | NETEFFECTINSURANCE 2005 - NETEFFECTINSURANCE 2006 | .00086 | .00539 | .00149 | -.00370 | .00543 | .577 | 12 | .574 |
| Pair 2 | NETEFFECTINSURANCE 2006 - NETEFFECTINSURANCE 2007 | .00388 | .01089 | .00302 | -.00534 | .01310 | 1.286 | 12 | .223 |
| Pair 3 | NETEFFECTINSURANCE 2007 - NETEFFECTINSURANCE 2008 | .00244 | .00482 | .00134 | -.00164 | .00653 | 1.830 | 12 | .092 |
| Pair 4 | NETEFFECTINSURANCE 2008 - NETEFFECTINSURANCE 2009 | -.00063 | .00434 | .00120 | -.00431 | .00304 | -.527 | 12 | .608 |
| Pair 5 | NETEFFECTBANKS2005 - NETEFFECTBANKS2006 | -.00016 | .00178 | .00031 | -.00101 | .00068 | -.530 | 32 | .600 |
| Pair 6 | NETEFFECTBANKS2006 - NETEFFECTBANKS2007 | .00005 | .00302 | .00053 | -.00139 | .00149 | .103 | 32 | .919 |
| Pair 7 | NETEFFECTBANKS2007 - NETEFFECTBANKS2008 | .00168 | .00295 | .00051 | .00027 | .00309 | 3.272 | 32 | .003 |
| Pair 8 | NETEFFECTBANKS2008 - NETEFFECTBANKS2009 | -.00068 | .00140 | .00024 | -.00135 | -.00001 | -2.792 | 32 | .009 |
| Pair 9 | NETEFFECTTOTAL2005 - NETEFFECTTOTAL2006 | .00002 | .00138 | .00020 | -.00052 | .00057 | .111 | 45 | .912 |
| Pair 10 | NETEFFECTTOTAL2006 - NETEFFECTTOTAL2007 | .00040 | .00258 | .00038 | -.00063 | .00142 | 1.047 | 45 | .301 |
| Pair 11 | NETEFFECTTOTAL2007 - NETEFFECTTOTAL2008 | .00128 | .00214 | .00032 | .00043 | .00213 | 4.062 | 45 | .000 |
| Pair 12 | NETEFFECTTOTAL2008 - NETEFFECTTOTAL2009 | -.00055 | .00107 | .00016 | -.00097 | -.00012 | -3.478 | 45 | .001 |

## 1.2 Differences between ACTEQ and SEQHC

### Total sample:

**Paired Samples Test**

| | | Paired Differences | | | | | | | |
| | | Mean | Std. Deviation | Std. Error Mean | 99% Confidence Interval of the Difference | | t | df | Sig. (2-tailed) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Lower | Upper | | | |
| Pair 1 | ACTEQ2005 - SEQHC2005 | 1E+009 | 2686743983 | 4E+008 | -2E+007 | 2E+009 | 2.643 | 45 | .011 |
| Pair 2 | ACTEQ2006 - SEQHC2006 | 1E+009 | 2685594881 | 4E+008 | -2E+007 | 2E+009 | 2.641 | 45 | .011 |
| Pair 3 | ACTEQ2007 - SEQHC2007 | 4E+008 | 1563657394 | 2E+008 | -2E+008 | 1E+009 | 1.732 | 45 | .090 |
| Pair 4 | ACTEQ2008 - SEQHC2008 | -1E+009 | 1577439897 | 2E+008 | -2E+009 | -5E+008 | -4.935 | 45 | .000 |
| Pair 5 | ACTEQ2009 - SEQHC2009 | 2E+009 | 3488536441 | 5E+008 | 4E+008 | 3E+009 | 3.556 | 45 | .001 |

### Banks only:

**Paired Samples Test**

| | | Paired Differences | | | | | | | |
| | | Mean | Std. Deviation | Std. Error Mean | 99% Confidence Interval of the Difference | | t | df | Sig. (2-tailed) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Lower | Upper | | | |
| Pair 1 | ACTEQBANKS2005 - SEQHCBANKS2005 | 7E+008 | 1318988048 | 2E+008 | 3E+007 | 1E+009 | 2.864 | 31 | .007 |
| Pair 2 | ACTEQBANKS2006 - SEQHCBANKS2006 | 8E+008 | 1074405742 | 2E+008 | 2E+008 | 1E+009 | 4.022 | 31 | .000 |
| Pair 3 | ACTEQBANKS2007 - SEQHCBANKS2007 | 3E+008 | 1199075322 | 2E+008 | -2E+008 | 9E+008 | 1.614 | 31 | .117 |
| Pair 4 | ACTEQBANKS2008 - SEQHCBANKS2008 | -1E+009 | 1578267011 | 3E+008 | -2E+009 | -5E+008 | -4.480 | 31 | .000 |
| Pair 5 | ACTEQBANKS2009 - SEQHCBANKS2009 | 1E+009 | 1913440849 | 3E+008 | 3E+008 | 2E+009 | 3.487 | 31 | .001 |

### Insurance companies only:

**Paired Samples Test**

| | | Paired Differences | | | | | | | |
| | | Mean | Std. Deviation | Std. Error Mean | 99% Confidence Interval of the Difference | | t | df | Sig. (2-tailed) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Lower | Upper | | | |
| Pair 1 | ACTEQINSURRANCE2005 - SEQHCINSURRANCE2005 | 2E+009 | 4435593683 | 1E+009 | -2E+009 | 5E+009 | 1.615 | 13 | .130 |
| Pair 2 | ACTEQINSURRANCE2006 - SEQHCINSURRANCE2006 | 2E+009 | 4644436045 | 1E+009 | -2E+009 | 5E+009 | 1.362 | 13 | .196 |
| Pair 3 | ACTEQINSURRANCE2007 - SEQHCINSURRANCE2007 | 5E+008 | 2238002547 | 6E+008 | -1E+009 | 2E+009 | .886 | 13 | .392 |
| Pair 4 | ACTEQINSURRANCE2008 - SEQHCINSURRANCE2008 | -9E+008 | 1609081517 | 4E+008 | -2E+009 | 4E+008 | -2.126 | 13 | .053 |
| Pair 5 | ACTEQINSURRANCE2009 - SEQHCINSURRANCE2009 | 3E+009 | 5475939533 | 1E+009 | -1E+009 | 8E+009 | 2.264 | 13 | .041 |

## 1.3 Differences between ACTNI and SNIHC (imperfect disclosure group):

**Paired Samples Test**

| | | Paired Differences | | | | | t | df | Sig. (2-tailed) |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | Std. Deviation | Std. Error Mean | 99% Confidence Interval of the Difference | | | | |
| | | | | | Lower | Upper | | | |
| Pair 1 | ACTNI2005 - SNIHC2005 | 7E+008 | 992310801.9 | 2E+008 | 8E+007 | 1E+009 | 3.228 | 22 | .004 |
| Pair 2 | ACTNI2006 - SNIHC2006 | 1E+009 | 1742708669 | 4E+008 | 2E+007 | 2E+009 | 2.874 | 22 | .009 |
| Pair 3 | ACTNI2007 - SNIHC2007 | 1E+009 | 2324352960 | 5E+008 | -3E+008 | 2E+009 | 2.104 | 22 | .047 |
| Pair 4 | ACTNI2008 - SNIHC2008 | -1E+009 | 2790978270 | 6E+008 | -3E+009 | 5E+008 | -2.018 | 22 | .056 |
| Pair 5 | ACTNI2009 - SNIHC2009 | 6E+008 | 2075941197 | 4E+008 | -6E+008 | 2E+009 | 1.355 | 22 | .189 |

**Appendix 2: examples of proper and improper disclosures of unrealized gains and losses:**

**UBS (Bank) improper disclosure about the unrealized gains and losses on trading assets:**

*"The trading portfolio is carried at fair value. **Gains and losses realized** on disposal or redemption **and unrealized gains and losses** from changes in the fair value of trading portfolio assets and liabilities are reported as Net trading income".*

The disclosure of the account 'Net-trading income' does not differentiate between realized and unrealized gains and losses. Only the **net** gains and losses on assets and liabilities are disclosed within the account 'net-trading income'.

**Example proper disclosure Generali assicurazioni (insurance company):** unrealized and realized gains and losses are properly separated in this disclosure.

### 1.3 – Net income from financial assets at fair value through profit or loss

| (€ million) | Financial investments held for trading 31/12/2009 | 31/12/2008 | Financial investments back to policies where the investment risk is borne by the policyholders and related to pension funds 31/12/2009 | 31/12/2008 | Financial investments designated as at fair value through profit or loss 31/12/2009 | 31/12/2008 | Total financial investments at fair value through profit or loss 31/12/2009 | 31/12/2008 |
|---|---|---|---|---|---|---|---|---|
| Interest and other income | 120.4 | 208.8 | 484.8 | 725.2 | 873.2 | 856.9 | 1,478.4 | 1,790.9 |
| Realized gains | 968.1 | 887.8 | 349.5 | 206.4 | 1,077.5 | 1,016.5 | 2,395.1 | 2,110.7 |
| Realized losses | -1,214.2 | -644.0 | -336.1 | -1,157.3 | -1,016.2 | -1,638.1 | -2,566.5 | -3,439.5 |
| Unrealized gains | 289.8 | 428.1 | 8,762.5 | 2,761.3 | 4,527.6 | 845.2 | 13,579.9 | 4,034.6 |
| Unrealized losses | -479.0 | -560.5 | -4,109.9 | -12,400.7 | -2,800.8 | -3,531.0 | -7,389.8 | -16,492.1 |
| Total | -314.9 | 320.2 | 5,150.7 | -9,865.1 | 2,661.2 | -2,450.5 | 7,497.1 | -11,995.5 |

## Appendix 3. Examples of fair value three-level hierarchy disclosures:

Improper disclosure (Banco Popolare Italy): this overview shows only the fair value hierarchy for assets at fair value, the hierarchy is not disclosed for liabilities.

| Item / Levels (in thousands of euros) | Level 1 | Level 2 | Level 3 | Total |
|---|---|---|---|---|
| **20. Financial assets held for trading** | | | | |
| Debt securities | 4,390,649 | 1,753,774 | 58,101 | 6,202,524 |
| Equity securities | 298,711 | | 276 | 298,987 |
| UCITS units | 456,363 | | 3,641 | 460,004 |
| **Total item 20** | **5,145,723** | **1,753,774** | **62,018** | **6,961,515** |
| **30. Financial assets measured at fair value** | | | | |
| Debt securities | | 7,369 | 42,833 | 50,202 |
| Equity securities | | 2,929 | 3,146 | 6,075 |
| UCITS units | 255,061 | | 37 | 255,098 |
| **Total item 30** | **255,061** | **10,298** | **46,016** | **311,375** |
| **40. Financial assets available for sale** | | | | |
| Debt securities | 446,913 | 274,123 | 40,218 | 761,254 |
| Equity securities | 140,431 | 98,685 | 464,453 | 703,569 |
| UCITS units | 55,512 | | 104,819 | 160,331 |
| **Total item 40** | **642,856** | **372,808** | **609,490** | **1,625,154** |
| **Total cash items measured at fair value** | **6,043,640** | **2,136,880** | **717,524** | **8,898,044** |
| **% cash assets measured at fair value** | **67.9%** | **24.0%** | **8.1%** | **100.0%** |

An Example of proper disclosure from ING:

The fair values of the financial instruments carried at fair value were determined as follows:

**Methods applied in determining fair values of financial assets and liabilities**

| 2008 | Reference to published price quotations in active markets | Valuation technique supported by market inputs | Valuation technique not supported by market inputs | Total |
|---|---|---|---|---|
| **Assets** | | | | |
| Trading assets | 97,808 | 61,214 | 821 | 159,843 |
| Non-trading derivatives | 9,671 | 956 | 4 | 10,631 |
| Financial assets designated at fair value through profit and loss | 1,528 | 2,715 | 305 | 4,548 |
| Available-for-sale investments | 60,251 | 53,199 | 19,915 | 133,365 |
| | 169,258 | 118,084 | 21,045 | 308,387 |
| **Liabilities** | | | | |
| Trading liabilities | 91,308 | 60,947 | 356 | 152,611 |
| Financial liabilities designated at fair value through profit and loss | 5,591 | 8,354 | 64 | 14,009 |
| Non-trading derivatives | 15,265 | 1,784 | 1 | 17,050 |
| | 112,164 | 71,085 | 421 | 183,670 |

**Methods applied in determining fair values of financial assets and liabilities**

| 2007 | Reference to published price quotations in active markets | Valuation technique supported by market inputs | Valuation technique not supported by market inputs | Total |
|---|---|---|---|---|
| **Assets** | | | | |
| Trading assets | 121,865 | 70,271 | 79 | 192,215 |
| Non-trading derivatives | 6,079 | 690 | 16 | 6,785 |
| Financial assets designated at fair value through profit and loss | 4,905 | 4,146 | 95 | 9,146 |
| Available-for-sale investments | 89,707 | 52,760 | 1,165 | 143,632 |
| | 222,556 | 127,867 | 1,355 | 351,778 |
| **Liabilities** | | | | |
| Trading liabilities | 75,067 | 73,803 | 16 | 148,886 |
| Financial liabilities designated at fair value through profit and loss | 7,723 | 6,159 | | 13,882 |
| Non-trading derivatives | 5,010 | 465 | 94 | 5,569 |
| | 87,800 | 80,427 | 110 | 168,337 |

## Appendix 4: Companies that are included in the total sample:

| | |
|---|---|
| Aegon | Insurance |
| Allianz SE | Insurance |
| Alpha Bank | bank |
| Aviva | insurance |
| AXA | Insurance |
| Banca Monte Dei Paschi Di Siena | Bank |
| Banco Bilbao Vizcaya Argentaria | Bank |
| Banco Comercial Portugues | Bank |
| Banco de Sabadell | Bank |
| Banco Espirito Santo | Bank |
| Banco Popolare | Bank |
| Banco Popular Esp | Bank |
| Banco Santander S.A | Bank |
| Banesto | Bank |
| Barclays | Bank |
| BNP Paribas | Bank |
| Cnp Assurance | Insurance |
| Commerzbank | Bank |
| Credit Agricole | Bank |
| Danske Bank AS | Bank |
| Deutsche bank | Bank |
| Deutsche Postbank | Bank |
| Dexia | Bank |
| DnB NOR | Bank |
| EFG Eurobank | Bank |
| Erste Group Bank | Bank |
| Generali Assicurazioni | Insurance |
| HSBC Hldgs | Bank |
| ING Group CVA | Insurance |
| Intesa-Sanpaolo | Bank |
| KBC Group | Bank |
| legal & General Group | Insurance |
| Lloyds Banking Group | Bank |
| Muenchener Rueckversicherungs Reg | Insurance |
| Mapfre S.A | Insurance |
| Nataxis | Bank |
| National Bank of Greece | Bank |
| Nordea Bank AB | Bank |
| old Mutual | Insurance |
| Prudential | Insurance |
| RBS | Bank |
| Reifeissen Bank | Bank |
| RSA Insurance Group | Insurance |
| Sampo Oyi | Insurance |
| Skand Enskilda Bnk (SEB) | bank |
| Soc Generale De France | Bank |
| Standard Chartered | Bank |
| Standard Life | Insurance |
| Svenska Handelsbnk | Bank |
| Swedbank | Bank |
| UBS AG | Bank |
| Unicredito SpA | Bank |
| Unione Di Banche Italiane | Bank |
| Vienna Insurance | Insurance |
| Zurich Financial Services | Insurance |