Relative Valuation of U.S. Insurance Companies[+]

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Abstract

This study examines the accuracy of relative valuation methods in the U.S. insurance industry, using price as a proxy for intrinsic value. The approaches differ in terms of the fundamentals used, the adjustments made to the fundamentals, the use of conditioning variables, and the selection of comparables. The primary findings are as follows:

- Unlike for non-financial firms, book value multiples perform relatively well in valuing insurance companies and are not dominated by earnings multiples. In fact, over the last decade book value multiples have performed significantly better than earnings multiples. That is, estimated values calculated as the product of book value and the average price-to-book ratio of comparable insurers are generally closer to price than are similarly-calculated earnings-based value estimates.
- Inconsistent with the practice of many insurance analysts, excluding Accumulated Other Comprehensive Income (AOCI) from book value worsens rather than improves valuation accuracy.
- As expected, using income before special items instead of reported income improves valuation accuracy, but, surprisingly, excluding realized investment gains and losses does not. An exception to this latter result occurred during the financial crisis, likely due to an increase in "gains trading" activities.
- Conditioning the price-to-book ratio on ROE significantly improves the valuation accuracy of book value multiples. In contrast, incorporating proxies for growth, earnings quality and risk does not consistently improve out-of-sample predictions, although these determinants of the price-to-book ratio generally have the expected effects and are significant.
- Limiting peers to the same sub-industry (as opposed to all insurance companies) improves valuation accuracy.
- Adjusting with respect to potentially dilutive shares improves earnings-based valuations but not book value-based valuations.
- As expected, valuations based on analysts' earnings forecasts outperform those based on reported earnings or book value. However, the gap between the valuation performance of forecasted EPS and the conditional price-to-book approach was relatively small during the last decade.

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1. Introduction

Two alternative approaches are generally used in estimating equity value: fundamental valuation and relative valuation. Fundamental valuation involves discounting expected values of fundamentals such as free cash flow, dividends or residual income, while relative valuation specifies the value of the firm as a function of selected fundamentals and their average pricing for peer companies. This study examines the accuracy of relative valuation methods in the U.S. insurance industry, using price as a proxy for intrinsic value. Stated differently, the study compares the ability of alternative valuation methods to explain observed prices, with the objective of gaining a better understanding of how investors value insurance companies.

Relative valuation is typically implemented with price multiples, that is, by multiplying a firm's fundamental by the average price-to-fundamental ratio for a group of similar companies (same industry, size, leverage, etc.). The average multiple is calculated using location measures such as the mean, median or harmonic mean, and often reflects discretionary adjustments made to account for differences in relevant value drivers (e.g., growth, risk, payout, earnings quality) across the companies. Another relative valuation approach, which is less common, is to use conditional price multiples (hereafter "**conditional valuation**"). This approach explicitly adjusts observed multiples (e.g., the price-to-book ratio) for differences in relevant value drivers (e.g., return on equity or ROE). In effect, conditional valuation is the multivariate counterpart of price multiple valuation – it is based on the same rationale as price multiples but uses several fundamentals simultaneously.

Academic research and teaching emphasize fundamental valuation models, although in practice they are much less common than price multiple valuations.[1] Recognizing this gap, recent research has examined the valuation performance of various price multiples.[2] These studies generally calculate multiples within industries but evaluate their performance across all companies in the cross section. Importantly, prior research typically does not adjust the fundamentals or valuation approach for industry-specific factors or considerations.[3] This is unfortunate because industry-specific adjustments often have significant effects and are accordingly emphasized by analysts. This study examines the impact of industry-specific adjustments on the estimated values of U.S. insurance companies.[4]

An examination of analysts' reports reveals three primary differences between the reports of analysts that follow insurance companies (hereafter "**insurance analysts' reports**") and those of other analysts. First, price multiples based on the book value of equity are almost always included in the valuation section of insurance analysts' reports but are uncommon in other reports. Second, conditional price multiples—primarily price-to-book ratio conditioned on ROE—are often used in the insurance and banking industries but are rarely used outside the

[1] Asquith et al. (2005) analyze a sample of 1,126 analyst reports written during the years 1997-1999 (56 sell-side analysts, 11 investment banks, 46 industries). They find that in 99.1% of the reports the analysts mention that they use some sort of earnings multiple (e.g., a price-to-earnings ratio, EBITDA multiple, relative price-to-earnings ratio). In contrast, only in 12.8% (25.1%) of the reports the analysts cite using any variation of discounted cash flow valuation (asset multiple). Very few analysts use alternative valuation methodologies. All analysts who mention a valuation method use an earnings multiple; that is, the 0.9% that do not mention an earnings multiple do not mention any valuation method.

[2] For example, Alford (1992), Bhattacharya et al. (2003), Bhojraj and Lee (2002), Bhojraj et al. (2003), Gilson et al. (2000), Kim and Ritter (1999), Lie and Lie (2002), Liu et al. (2002, 2007), and Yee (2004).

[3] One exception is Calomiris and Nissim (2007), who develop and estimate a conditional relative valuation model for bank holding companies.

[4] In addition to (1) potential improvements from using industry-specific models and factors and (2) consistency with practice, industry-specific research offers the following advantages: (3) model stability (control for unmodeled factors that correlate with industry membership), (4) industry-specific research questions and insights, and (5) ability to conduct contextual analysis.

financial sector. Third, unique to the insurance industry, analysts often exclude Accumulated Other Comprehensive Income (**AOCI**) from book value when measuring ROE and the price-to-book ratio. The current study empirically evaluates the validity of the motivations underlying these choices.

In most industries, some form of an earnings construct is considered the primary value driver. In contrast, for insurance companies the book value of equity appears to play an equally important role to that of earnings. This is due to several reasons, including the financial nature of most assets and liabilities of insurance companies, the relatively small size of unrecognized intangibles, and the role of regulatory capital. Still, book value cannot fully capture intrinsic equity value. In particular, it does not reflect the value associated with unrecognized relationship assets and fee-generating activities, which for some insurers are significant. Fortunately, the value impact of these assets and activities is reflected in earnings. Thus, a valuation method that simultaneously extracts information from both book value and earnings should be preferable to univariate price multiples. Conditional valuation represents one such approach. By conditioning the price-to-book ratio on ROE and possibly other relevant characteristics, the resulting valuation reflects earnings in addition to book value. On the negative side, conditional valuation may be difficult to implement as it requires one to identify the relevant conditioning variables and to specify and estimate their effects. In particular, conditioning variables may be measured with error, their effects may be non-linear, and their inclusion in the model may reduce precision due to the increase in the number of estimated parameters. Therefore, whether conditional valuation performs better than price multiple valuation in valuing insurance companies is an open question, which this study addresses.

Insurance analysts exclude AOCI from book value to reduce the volatility of book value and mitigate accounting distortions. Because insurance companies report most investments at fair value, their book value is highly volatile at times of market dislocation such as the 2007-2009 financial crisis. In contrast, ex-AOCI book value is less sensitive to such fluctuations because it excludes unrealized investment gains and losses. Therefore, focusing on ex-AOCI book value allows analysts to use an arguably more representative measure of equity investment, similar to the use of "core" or "recurring" earnings instead of net income. Relatedly, excluding AOCI from book value mitigates distortions caused by the mixed attributes model—historical cost and fair value—used under current GAAP. This follows because the reserve liabilities that the investments are expected to fund and whose value is correlated with that of the investments (both are interest rate sensitive) are generally not marked to market. Thus, unrealized investment gains and losses cause an artificial volatility in AOCI and book value.

Yet, excluding AOCI from book value may be problematic. The parallel made between book value and earnings is misleading. In earnings-based valuation, transitory gains and losses are removed from the earnings construct because it serves as a proxy for future earnings. In contrast, book value serves as a proxy for net invested assets, which are expected to generate future earnings. All economic profits contribute to net assets and should therefore be reflected in book value. AOCI measures unrecognized economic gains and losses that increase net invested assets and should therefore be included in book value as are realized gains and losses.[5]

[5] While unrealized investment gains and losses contribute to economic equity, so do changes in the fair values of reserve liabilities, which are generally omitted from the balance sheet. Thus, removing AOCI may still be justified – not because unrealized investment gains and losses are transitory, but rather because they are approximately equal to the omitted unrealized gains and losses on reserve liabilities.

Another difference between book value and earnings is related to earnings management. Some transitory earnings items are discretionary, so removing them from reported income makes earnings more informative. For instance, if management deliberately sells securities with unrealized gains to increase reported income, removing the gains makes earnings more representative. In contrast, removing AOCI makes book value more, not less, discretionary. For example, selling a security with unrealized gains reduces AOCI and increases ex-AOCI book value, but does not change total book value.

A third concern regarding ex-AOCI book value is that it does not reflect gains and losses from imperfect asset-liability management. While insurers generally attempt to match the duration and other interest rate attributes of their assets and liabilities, there is often a significant residual risk. This is due to several reasons, including the cost and limits of hedging, deliberate exposure for speculative or spread reasons, and implementation errors. In particular, to increase their spread income, life insurers often invest in assets that involve significant credit or prepayment risks. Changes in the pricing of these risks reduce the correlation between the values of the investments and reserve liabilities, as was evident during the financial crisis of 2007-2009. Thus, *a priori* it is not clear whether excluding AOCI improves the accuracy of book value-based valuations. The current study addresses this question.

The primary findings are as follows. Unlike for non-financial companies (e.g., Liu et al. 2002), valuations of insurance companies based on book value multiples are relatively precise and are not dominated by estimates calculated using earnings multiples. In fact, over the last decade book value multiples performed significantly better than earnings multiples. Inconsistent with the practice of many insurance analysts, excluding AOCI from book value worsens rather than improves valuation accuracy. As expected, using income before special items instead of

reported income improves the accuracy of valuations but, surprisingly, excluding realized investments gains and losses does not. An exception to this latter result occurred during the financial crisis. Consistent with Ellul et al. (2011), who document substantial "gains trading" activities by life insurance companies during the financial crisis, I find that excluding realized investments gains and losses from earnings increased the valuation accuracy of earnings during that period.

Conditioning the price-to-book ratio on recurring ROE significantly improves the valuation accuracy of book value multiples. However, incorporating proxies for growth, earnings quality, size, leverage, and other determinants of the price-to-book ratio does not consistently improve out-of-sample predictions, although these determinants of the price-to-book ratio generally have the expected effects and are significant.

As expected, valuations based on analysts' earnings forecasts dominate those based on reported earnings or book value, but in recent years the advantage of forecasted EPS multiples over the conditional price-to-book approach has been relatively small. This result is remarkable given that (1) analysts have access to significantly more information than earnings and book value, and (2) analysts likely consider price when making their forecasts. Of course, analysts also issue stock recommendations and provide additional information, which may be more important than the earnings forecasts. These outputs are not considered here.

The study also examines two methodological issues: the selection of comparables and the number of shares used in per share calculations. In contrast to prior studies, which either find or assume that using all industry members is better than restricting comparables to be from the same sub-industry (e.g., Alford 1992, Liu et al. 2002, Bhojraj et al. 2003), limiting the selection

of peers to the same sub-industry when valuing insurance companies improves valuation accuracy. The results with respect to the shares measure, specifically whether to use outstanding or diluted shares, are mixed. Using diluted instead of outstanding shares improves earnings-based valuations but not book value-based valuations.

The above inferences are based on the assumption that market prices are efficient, at least with respect to the pricing of the fundamentals examined here. The inferences also hold if the *average* pricing of the fundamentals is correct, or if deviations from intrinsic values are unrelated to the estimated values. If none of these conditions holds, the results may be biased. For example, if investors over-weight earnings and under-weight book value, the valuation performance of earnings (book value) would be overstated (understated). In any case, the findings are relevant in that they indicate which relative valuation methods are most commonly used by investors in setting the stock prices of insurance companies.

The paper proceeds as follows. Section 2 discusses the theory and implementation of relative valuation models, emphasizing considerations specific to the insurance industry. The discussion raises several research questions related to the performance of alternative relative valuation models. These questions are addressed empirically in Section 4, after describing the sample and data in Section 3. Section 5 concludes the paper.

2. Relative Valuation Models

This section starts with a description of price multiple valuation (subsection 2.1), and then elaborates on specific price multiples and their attributes – earnings versus cash flow (2.2), recurring versus net income (2.3), actuals versus forecasts (2.4), quality of matching (2.5), book value of equity (2.6), outstanding versus diluted shares (2.7), relevant characteristics (2.8), and

comparables (2.9). The final subsection (2.10) discusses conditional valuation models that simultaneously incorporate information from several fundamentals.

2.1 The Basics of Price Multiple Valuation

Two important assumptions underlying price multiple valuation are: (1) value is proportional to the fundamental used (e.g., earnings, revenue, cash flow, book value), and (2) a similar proportionality holds for "comparable" companies, that is, firms from the same industry and/or with similar characteristics (e.g., size, leverage, expected growth). In most cases, these assumptions are at best a reasonable approximation, with the precision of valuation depending on the extent to which (1) the fundamental chosen captures value-relevant information, (2) the "comparables" are indeed comparable, and (3) the comparables' stock prices are close to their intrinsic ("true") values. Given the choice of fundamental and a set of comparable companies, intrinsic value is estimated as the product of the company's fundamental and some measure of the average ratio of stock price to the fundamental for the comparables.

Price multiple valuation offers several advantages: it is simple and easy to implement, it uses market information directly, and it values a company relative to its peers. However, in contrast to the premise of price multiple valuation, the typical value/fundamental relationship is nonlinear, and value is determined by more than one fundamental. There are also important implementation issues. Value can only be estimated for firms with positive value for the fundamental, which rules out many company/fundamental combinations, especially when using cash flow multiples. Moreover, real comparables are rarely available, and compromise choices result in biased valuations. Error in the multiples also results from inefficient market pricing of comparables or from temporary shocks to the fundamental. For example, a company with

abnormally strong performance in the valuation period is likely to have a low price-to-fundamental ratio due to expected mean-reversion in the fundamental.

2.2 Earnings versus Cash Flow

Firm value is equal to the present value of future cash flows, so good candidates for price multiple valuation are fundamentals that are strongly related to future cash flows. Research in accounting and finance demonstrates that earnings perform better than cash flow in predicting future cash flows and, accordingly, earnings multiples generate more precise valuations than cash flow multiples.[6] Consistent with this evidence, analysts use earnings multiples more often than cash flow multiples. This is especially true for insurers and other financial service companies, because the financial nature of most assets and liabilities of these companies makes cash flows somewhat arbitrary. For example, insurers can easily increase cash flow by selling investment securities.

2.3 Recurring versus Net Income

The strength of the relationship between earnings and future cash flows, and hence the precision of earnings-based price multiple valuation, should increase when one removes from earnings items which are transitory in nature such as realized gains and losses, restructuring charges, impairment charges, and other "special items." Accordingly, earnings-based price multiple valuations are typically calculated using measures of "core" or "recurring" income. For insurance companies, the primary non-recurring item is realized investment gains and losses. For example, Genworth Financial, Inc., stated in a Press Release (July 27, 2006):

[6] See, for example, Dechow (1994), and Liu et al. (2002, 2007).

> "The company defines net operating earnings as net earnings excluding after-tax net investment gains (losses), which can fluctuate significantly from period to period, changes in accounting principles, and infrequent or unusual non-operating items. Management believes that analysis of net operating earnings enhances understanding and comparability of performance by highlighting underlying business activity and profitability drivers. … the company's definition of net operating earnings may differ from the definitions used by other companies."

Still, using recurring income instead of net income in price multiple valuation does not guarantee better performance. First, non-recurring items are difficult to measure, and companies and analysts often use different definitions (e.g., the Genworth cite above). Second, to the extent that firms use non-recurring items to smooth shocks to recurring earnings, net income may perform better than recurring income in predicting future earnings and value. Third, if investors overreact to non-recurring items, removing those items from earnings may not improve the price-earnings association. In Section 4, I empirically evaluate the impact of "undoing" special items and investment gains and losses on the accuracy of earnings-based price multiple valuations.

2.4 Actuals versus Forecasts

A more direct approach for improving the accuracy of price multiple valuation is to use analysts' earnings forecasts instead of attempting to remove transitory items from reported income. The rationale for this approach is that price reflects expectations regarding future, not past, earnings. Indeed, when used in price multiple valuation, reported earnings serve as a proxy for future earnings. Compared to reported earnings, analysts' earnings forecasts provide a more direct estimate of future earnings and, since they reflect a larger information set, are likely to be more accurate. Another advantage of forecasts is that they exclude the impact of unexpected transitory shocks to recurring items (e.g., unexpected revenue from an unusually large transaction) in

addition to "one-time" items (e.g., realized gains and losses).[7] On the other hand, using analysts' forecasts exposes the analysis to potential biases (e.g., long-term upward bias, short-term downward bias), and the forecasts may not fully reflect the implications of reported earnings for future earnings.[8]

There is another important bias when comparing the ability of analysts' earnings forecasts to explain price with that of reported earnings or book value. Price reflects the earnings forecasts of many market participants, including some sophisticated ones. Bayesian analysts understand this and thus adjust their forecasts to incorporate price-implied earnings forecasts. In most cases, this adjustment is implicit or intuitive rather than an explicit calculation. Still, to the extent that this effect is significant, the relationship between price and analysts' earnings forecasts may reflect reverse causation, that is, price affecting the forecast rather than the forecast affecting (or being reflected in) price. Therefore, the ability of valuations derived using multiples of earnings forecasts to explain price may not necessarily inform on the desirability of this valuation approach. For this reason, in most tests I focus on reported rather than forecasted earnings.

2.5 Quality of Matching

The informativeness of earnings regarding firm value also depends on the quality of matching in the income statement – that is, the extent to which reported expenses reflect the costs incurred in generating reported revenue. When expenses are poorly matched against revenue—for example,

[7] Analysts typically forecast earnings before special items and so exclude from their forecasts the expected portion of one-time items in addition to the unexpected portion. See, for example, Bhattacharya et al. (2003).

[8] For evidence regarding long-term upward bias (i.e., optimism bias), see, for example, O'Brien (1988) and Brown (1993). Evidence regarding short-term downward bias is provided by Degeorge et al. (1999) and Matsumoto (2002), among others. Studies showing that analysts' forecasts do not fully incorporate historical financial information include, among others, Mendenhall (1991) and Abarbanell and Bernard (1992).

due to the immediate expensing of advertising outlays—earnings measure current performance with error and so provide poor indication of future cash flows and value. This problem is quite pervasive and results primarily from conservative accounting principles. It mostly arises in the context of internally developed intangibles, including brands, information technology, human capital, intellectual property, start up costs, and similar resources. Under U.S. GAAP, expenditures made to develop these economic assets are expensed as incurred rather than being capitalized and amortized in subsequent years when the benefits are realized.[9]

The distortion caused by expensing internally developed intangibles generally affects insurers less than it affects firms operating in high growth or intangible-intensive industries. Still, for small or high growth insurance companies, or in periods of significant change, the effect can be material. Also, for Property and Casualty (PC) insurers, another important source of poor matching in the income statement is the overstatement of the loss and loss adjustment expense.[10] This expense is generally reported undiscounted and thus includes future interest costs. While this distortion is partially offset by the omission of current interest cost related to previously

[9] GAAP requires that "costs of internally developing, maintaining, or restoring intangible assets (including goodwill) that are not specifically identifiable, that have indeterminate lives, or that are inherent in a continuing business and related to an entity as a whole, shall be recognized as an expense when incurred." This standard was originally prescribed by APB Opinion No. 17, and was restated in subsequent pronouncements.

[10] The **loss and loss adjustment expense** is equal to the periodic change in the loss reserve, plus payments made during the year for claims and claim settlement expenses, minus the change in reinsurance recoverable (an asset), and minus the amount recovered from reinsurers during the period. Equivalently, the loss and loss adjustment expense is equal to the estimated cost to settle claims related to the current year coverage, plus the change in the estimated cost to settle claims relating to prior years insurance coverage, minus the corresponding reinsurance recoveries. The **loss reserve** measures estimated future payments to settle claims related to insured events that have occurred by the balance sheet date. It includes accruals for expected claim payments and claim expenses (e.g., adjustment and litigation costs) related to both claims that have been reported but not settled and claims incurred but not yet reported. Loss estimates are based upon the insurer's historical experience and actuarial assumptions that consider the effects of current developments, anticipated trends, and risk management programs. Reserves are reported net of anticipated salvage and subrogation. Most loss reserves are reported undiscounted. See Nissim (2010) for a comprehensive discussion of insurance companies reporting.

recognized loss and loss adjustment expense, the net effect is often quite significant, especially for insurers that specialize in long-tail lines and in periods of significant change.

Matching distortions can be mitigated in price multiple valuation by attempting to correct the accounting – for example, by calculating pro-forma earnings using discounted loss and loss adjustment expense, or by adjusting operating expenses with respect to expenditures made to develop the brand. However, the information required to make explicit adjustments is often unavailable. Instead, analysts mitigate the effects of such distortions by considering growth and other characteristics that are correlated with the matching distortion. For example, the magnitude of earnings understatement due to the reporting of undiscounted loss and loss adjustment expense is likely to be similar for insurers with comparable loss ratios, tails, and premium growth rates, and so PC insurers with similar values for these characteristics should have similar price-earnings ratios.

2.6 Book Value of Equity

Unlike non-financial firms, for insurers the book value of equity is a reasonable predictor of future earnings (Nissim 2010, 2011). This is due to at least four reasons. First, the book values of major assets and liabilities of insurance companies are relatively close to fair values (e.g., available-for-sale securities, some insurance reserves). Second, for insurance companies, unrecognized intangibles are on average relatively small. Third, due to regulation, insurers' ability to write premiums and generate income is directly related to their policyholders' surplus, which is a regulatory proxy for equity capital. Fourth, related to the previous point, insurers are required by regulators to maintain minimum equity capital at levels commensurate with the

scope and riskiness of their activities, assets and liabilities, making book equity a useful measure of the scale of insurers' operations.

The above attributes of insurers' book value motivate analysts to use book value multiples in addition to earnings multiples when valuing insurance companies. To further improve the informativeness of book value, many analysts adjust it by excluding Accumulated Other Comprehensive Income (AOCI). For example,

> "Our price target is derived using blended multiples of 1.1x our 12/31/10 BV ex. AOCI forecast (50% weight), 1.0x our 12/31/10 total BV projection (25% weight), and 8.5x our 2010 EPS estimate (25% weight). … The company currently trades at 0.9x BV ex. AOCI, roughly in line with the group level. On a P/E basis, MET trades at 7.8x our 2010 EPS estimate, close to the group median of 7.2x." Research report by JP Morgan on MetLife, February 3, 2010.

In Section 4, I compare the valuation accuracy of earnings and book value multiples, and I evaluate the impact of excluding AOCI from book value.

The same arguments that motivate most analysts to exclude transitory items from earnings—namely, the volatility and discretionary nature of these items—lead some analysts to exclude AOCI from book value when measuring ROE and the price-to-book ratio. However, this parallel is misleading. In earnings-based valuation, transitory items are removed from the earnings construct because it serves as a proxy for future earnings, and these items are less likely to persist into the future. In contrast, in book value-based valuation, book value serves as a proxy for net invested assets, which are expected to generate future earnings. All economic profits contribute to net assets and should therefore be reflected in book value. AOCI measures unrecognized economic gains and losses that increase net invested assets and should therefore be included in book value as are realized gains and losses (see footnote 5).

In addition, the removal of AOCI makes book value more, not less, discretionary. To see why, consider a situation where management deliberately sells securities with unrealized gains to increase reported income.[11] The removal of the gains from reported income indeed makes earnings less discretionary and potentially more representative. In contrast, the recognition of these gains reduces AOCI and increases ex-AOCI book value (the unrealized gain is recycled from AOCI to income and therefore retained earnings). That is, ex-AOCI book value is affected by this discretionary transaction while total book value remains unchanged.

Yet, there is an additional, more justifiable argument for the exclusion of AOCI from book value: removing AOCI mitigates distortions caused by the mixed attributes model—historical cost and fair value—currently used under GAAP. Specifically, most insurers' investments are classified as available for sale and reported at fair value, with unrealized gains and losses included in AOCI. In contrast, the reserve liabilities that these investments are expected to settle are generally not marked to market.[12] Because the values of the investments and reserve liabilities are positively correlated (both are inversely related to interest rates), the inclusion of unrealized investment gains and losses in AOCI causes an artificial volatility in book value. However, the correlation between the values of the investments and reserve liabilities is not perfect, and in some cases may be quite low or even negative. This is due to

[11] For example, Jordan et al. (1997), Lee et al. (2006), and Ellul et al. (2011) provide evidence that some insurers manage earnings through realized securities' gains and losses ("cherry picking" or "gains trading").

[12] Insurance reserves consist primarily of benefit reserves, claim reserves, and policyholders' account balances. **Benefit reserves** represent the present value of estimated future benefits to be paid to or on behalf of policyholders, including related expenses, less the present value of future net premiums (essentially gross premiums minus profit). Benefit reserves are due primarily to traditional life insurance products such as term and whole life. The assumptions and estimates used in measuring benefit reserves are generally "locked-in," and so the book value of the liability may deviate significantly from its fair value. **Claim reserves** represent estimated future payments to settle claims related to insured events that have occurred by the balance sheet date. Claim reserves are generally reported undiscounted. For property and casualty insurers, claim reserves are referred to as loss reserves (see footnote 10). **Policyholders' account balances** represent an accumulation of account deposits plus credited interest less withdrawals, expenses and mortality charges (e.g., universal life, investment contracts).

several reasons, including the cost and limits of hedging, deliberate exposure for speculative or spread reasons, and implementation errors. In particular, to increase their spread income life insurers often invest in assets that involve significant credit, prepayment or other risks. Changes in the pricing of these risks reduce the correlation between the values of the investments and reserve liabilities, as clearly happened during the financial crisis of 2007-2009. Thus, *a priori* it is not clear whether excluding AOCI improves the accuracy of book value-based valuations. In Section 4 below, I provide empirical evidence on this issue.

2.7 Outstanding versus Diluted Shares

Price multiple valuation is typically conducted at the per share level. In measuring earnings or book value per share, one can either use outstanding common shares or also consider potentially dilutive securities. Employee stock options, convertible bonds, convertible preferred stock, and other securities that may be exercised or converted into common shares may dilute the claims of existing common shares on earnings and book value and should therefore be incorporated in the valuation. However, as discussed below, estimating potential dilution from such securities is anything but straightforward. Therefore, whether the "signal-to-noise" ratio of adjustments for potentially dilutive securities is high enough to improve the accuracy of valuation is an empirical question, which this study addresses.

For earnings per share, companies are required to disclose an estimate of potential dilution due to some options and convertibles. However, this calculation only considers the extent to which outstanding options are in the money (i.e., no recognition of the time value of

options).[13] Similarly, convertibles are included in the calculation if the ratio of their reported cost to the incremental common shares that would have resulted from a hypothetical conversion is smaller than EPS assuming no conversion.[14] That is, convertibles are included in the calculation only if their conversion would have resulted in lower reported EPS. This adjustment is at best weakly related to economic dilution as it ignores the current stock price, which is an important determinant of economic dilution.

Unlike earnings per share, companies are not required to report diluted book value per share. Still, they are required to disclose some information about potentially dilutive securities, which can be used to estimate the likelihood and extent of book value dilution. Section 4 describes and tests a simple approach for estimating diluted book value.

2.8 Relevant Characteristics

The discussion above identifies earnings and book value as the primary fundamentals used in the relative valuation of insurance companies. In this section I derive the characteristics that are effectively "held constant" when using earnings and book value multiples. I first describe the theoretical relationship between intrinsic equity value (**EV**) and earnings and book value, and then manipulate it to obtain expressions that relate the EV/earnings ratio and the EV/book value ratio to their respective determinants. If price reflects intrinsic value, the same characteristics should also determine the price-earnings and price-to-book ratios, respectively.

[13] Specifically, the EPS denominator is (1) increased by the number of shares that would have resulted from exercise of dilutive options, and (2) reduced by the (smaller) number of shares that could have been repurchased using the proceeds from the hypothetical exercise of the options.

[14] The reported cost of convertible bonds is equal to the product of the related interest expense and one minus the tax rate. The reported cost of convertible preferred stock is the related preferred dividend.

I start with a generalization of the dividend discount model, which expresses the intrinsic value of common equity (EV) as the present value of expected net flows to common equity holders (Net Equity Flow or **NEF**):

$$EV_0 = \frac{E[NEF_1]}{(1+r_e)^{.5}} + \frac{E[NEF_2]}{(1+r_e)^{1.5}} + ... = \sum_{t=1}^{\infty} E[NEF_t] \times (1+r_e)^{-t+.5} \quad (1)$$

where $\mathbf{r_e}$ is the cost of common equity capital and NEF is assumed to be paid at the middle of each year. As shown in Appendix A, equation (1) can be restated in terms of comprehensive income attributable to common equity (**CI**) and the book value of common equity (**CE**):

$$EV_0 = CE_0 + \sum_{t=1}^{\infty} E[CI_t - r_e CE_{t-1}] \times (1+r_e)^{-t+.5} \quad (2)$$

That is, intrinsic equity value is equal to the sum of book value (CE) and the present value of expected residual income in all future years, where residual income is earnings (CI) in excess of the return required by investors given the amount (CE) and cost (r_e) of equity capital, that is, $CI_t - r_e CE_{t-1}$.

I next define Return On Equity (**ROE**) as the ratio of comprehensive income attributable to common equity to beginning-of-period common equity (i.e., $ROE_t = CI_t / CE_{t-1}$), and $\mathbf{CUM\_CE\_G_{t-1}}$ as one plus the cumulative growth rate in common equity from time zero through the beginning of future year t (i.e., $CUM\_CE\_G_{t-1} = CE_{t-1} / CE_0$). Substituting into equation (2), we get

$$EV_0 = CE_0 \times \left(1 + \sum_{t=1}^{\infty} E[(ROE_t - r_e) \times CUM\_CE\_G_{t-1}] \times (1+r_e)^{-t+.5}\right) \quad (3)$$

That is, intrinsic equity value depends on current book value (CE_0), the cost of equity capital (r_e), and expectations regarding ROE and common equity growth in all future years. Expected future ROE, in turn, depends on current profitability and expectations regarding future changes in profitability. Current ROE is observable, but future changes in profitability can only be estimated. An important predictor of future changes in ROE is earnings quality.[15]

Dividing both sides of equation (3) by the book value of equity (CE_0) yields an equation that identifies the determinants of the intrinsic-to-book value ratio: future profitability (and hence current profitability and earnings quality), growth, and the cost of equity capital.

$$\frac{EV_0}{CE_0} = 1 + \sum_{t=1}^{\infty} \frac{E\left[\left(ROE_t - r_e\right) \times CUM\_CE\_G_{t-1}\right]}{\left(1 + r_e\right)^{t-.5}} \quad (4)$$

Note that equation (4) establishes a benchmark for ROE, which in turn determines the relationship between the intrinsic and book value of equity: for the intrinsic-to-book value ratio to be greater than one, expected ROE must be greater than the cost of equity capital (r_e).

Valuation equations (3) and (4) emphasize the roles of book value and profitability in determining equity value. Given the properties of insurers' book value (see discussion in Section 2.6), this framework should be especially useful in the insurance industry. Indeed, Nissim (2011) finds that estimates of the implied cost of equity capital of U.S. insurance companies derived by inverting the residual income model perform relatively well. As discussed below, the current study uses equation (4) as the basis for deriving conditional price-to-book valuations.

[15] See Nissim and Penman (2001) for evidence on the persistence of ROE across all firms, and Nissim (2010) for analysis of the profitability and earnings quality of insurance companies.

Another valuation framework, which is used for essentially all companies, is to focus on earnings, earnings growth, and payout. The link between these drivers and intrinsic equity value can be established by expressing Net Equity Flow (NEF) as follows:

$$NEF_t = CI_0 \times \frac{CI_t}{CI_0} \times \frac{NEF_t}{CI_t} = CI_0 \times CUM\_EAR\_G_t \times PAYOUT_t \quad (5)$$

That is, **$CUM\_EAR\_G_t$** (= CI_t / CI_0) is defined as one plus the cumulative growth rate in earnings from year zero through future year t, and **$PAYOUT_t$** (= NEF_t / CI_t) is defined as the proportion of earnings paid out in year t. Substituting equation (5) into equation (1) and dividing by current comprehensive income (CI_0), we get

$$\frac{EV_0}{CI_0} = \sum_{t=1}^{\infty} \frac{E[CUM\_EAR\_G_t \times PAYOUT_t]}{(1+r_e)^{t-.5}} \quad (6)$$

That is, the ratio of intrinsic value to earnings depends on the cost of equity capital (r_e) and expectations regarding earnings growth and payout in all future years. Long-term earnings growth depends primarily on economic prospects, but short-term growth is largely driven by earnings quality.

2.9 Selection of Comparables

The previous section demonstrates that the price-earnings ratio depends on earnings growth, earnings quality, payout and the cost of equity capital, and that the price-to-book ratio is a function of profitability, earnings quality, book value growth and the cost of equity capital. Thus, the comparables used in calculating earnings or book value multiples should be similar to the firm being valued along these respective dimensions. One approach to achieve this is to explicitly consider relevant characteristics when selecting comparables. This approach is used,

for example, in Alford (1992) and Bhojraj and Lee (2002). Another approach is to focus on industry membership, since firms operating in the same industry often have similar characteristics and similar sensitivities to macro factors. Indeed, this is the more commonly used approach in academic research (e.g., Alford 1992; Bhojraj et al. 2003; Liu et al. 2002, 2007). Practitioners often combine the two approaches – they limit the comparables to the same industry, and they consider relevant characteristics when selecting the comparables. Moreover, analysts often adjust the price multiple for differences in characteristics between the target company and the comparables.[16]

An important trade-off when selecting comparables is bias versus variability. Using only the most similar comparables (e.g., same sub-industry, size, leverage, etc.) minimizes the likelihood of a systematic bias but, due to the small number of comparables, increases the variability of the estimated value. In contrast, when multiples are calculated using a large set of comparables, the effects of transitory shocks to the fundamentals and firm-specific deviations from intrinsic value are averaged out. However, the price-fundamental relationship may be systematically different for the target company, resulting in a biased valuation. In Section 4, I provide evidence on this trade-off as it pertains to insurers. Specifically, I compare the precision of valuations obtained when using all firms from the insurance industry as comparables versus when focusing on firms from the same sub-industry. I use the GIC classification which defines five insurance sub-industries: Life and Health (LH), Property and Casualty (PC), multi-line (companies with diversified interests in LH and PC insurance), reinsurers, and insurance brokers (companies engaged in sourcing insurance contracts on behalf of their customers).

[16] For example, an analyst may calculate an average price-earnings multiple of 15x but use a multiple of 17x to value the target company if it has better growth prospects than its competitors.

2.10 Conditional Valuation

The primary disadvantage of price multiples is that they do not allow for simultaneous consideration of several fundamentals. This shortcoming is particularly relevant when valuing insurers and other financial service companies whose book value contains significant value-relevant information incremental to earnings. One approach that facilitates simultaneous consideration of both earnings and book value is to use conditional price multiples, that is, price multiples that are conditioned on other fundamentals. For example, analysts often value financial services companies using book value multiples that are conditioned on ROE. This is achieved by regressing the price-to-book ratio on ROE and using the fitted value from the regression, evaluated at the target company's ROE, as the price multiple. The fitted value, and accordingly the value estimate, depends on both earnings and book value.[17] The following is an example of conditional valuation:

> "When establishing valuations for life insurers we primarily utilize a peer comparison of P/B regressed against ROE. … We derived our target using a valuation of 0.72x YE10 BV excluding AOCI of $43.08 using a projected 2010E ROE of 9.2%. This compares to the peer group average of 0.98x with a range of 0.6x-2.0x." Research report by Citi on Lincoln National Corp, January 11, 2010.

Another advantage of conditional valuation is that it enables analysts to use a large set of comparables. In price multiple valuation, companies with dissimilar characteristics are typically ignored. In contrast, conditional valuation extracts information from the pricing of companies with dissimilar characteristics by explicitly controlling for differences in characteristics. However, conditional valuation has its own shortcomings. Errors in identifying and measuring the conditioning variables or in specifying the functional relationship may reduce precision. In

[17] An alternative approach for extracting information from several fundamentals is to calculate a weighted average of the value estimates derived from the different price multiples. Yee (2004) suggests rules of thumb for combining two or more value estimates into a superior estimate.

addition, the inclusion of conditioning variables increases the number of estimated parameters, which in turn reduces the precision of the estimates. Therefore, whether conditional valuation performs better than price multiple valuation in valuing insurance companies is an open question. In section 4, I evaluate two alternative conditional valuation models. The first model specifies ROE as the only conditioning variable for the price-to-book ratio, similar to the approach taken by most analysts that implement conditional valuation. The second model incorporates additional conditioning variables to more fully control for differences in characteristics across the insurance companies.

3. Sample and Data

The sample used in this study includes all insurance companies with data available in the intersection of three databases: IBES, CRSP, and COMPUSTAT. Insurance companies are identified using the Global Industry Classification (GIC) system (industry GIC 403010), which is obtained from COMPUSTAT.[18] Market-related data (price, stock returns, shares, adjustment factors) are extracted from CRSP and yahoo finance (recent data).

There are three alternative approaches for measuring fundamental data: fiscal year, Trailing Four Quarters (**TFQ**), and quarterly. Fiscal year data are detailed and audited, but they are less timely than TFQ or quarterly data. Unlike quarterly data, TFQ data are not affected by seasonality, but they might mask recent trends. I focus here on TFQ data because analysts typically use annual data when conducting valuation analysis. Quarterly and fiscal year data are

[18] I merge the current and historical GIC classification files and fill up missing GICs by extrapolating from the closest available classification. For some companies that delisted prior to 1999, GIC classifications are not available. Because the sample period starts prior to 1999, omitting these firms would introduce survivorship bias. Therefore, I assign GIC to these companies based on an empirical mapping of SIC to GIC for firms with available classifications. This mapping is re-estimated each month (prior to 1999) to account for changes over time in SIC and GIC classifications. None of inferences of this study are affected by the inclusion of these companies.

available in COMPUSTAT, but TFQ data have to be constructed. Appendix B describes the approach taken in this study to calculate TFQ data.

As discussed in Section 2, the two primary fundamentals used in relative valuations of financial firms are earnings and book value. These fundamentals are used either as reported, excluding non-recurring items, or based on forecasts. Because book value forecasts are available only for a small subset of firms, I examine the valuation performance of the following five fundamentals: EPS before extraordinary items, recurring EPS, forecasted EPS, book value per share, and ex-AOCI book value per share.

I use two alternative measures of recurring EPS: EPS before extraordinary items (**EI**) and special items (**SI**), and EPS before EI, SI and realized investment gains and losses (**G/L**).[19] Because special items and realized investment gains and losses are reported before income taxes, I also "undo" the related income taxes, estimated using the top corporate federal tax rate for that year (insurance companies generally do not pay state income taxes). For reasons explained below, in most tests I use diluted EPS measures.[20] In contrast, when using book value per share, I focus on outstanding shares. However, in both cases I also evaluate the alternative calculation (basic EPS and diluted book value per share, respectively).[21]

[19] COMPUSTAT describes **special items** as "unusual or nonrecurring items presented above taxes by the company." An examination of a sample of insurer/quarter observations indicates that COMPUSTAT does not include investment gains and losses in "special items."

[20] To measure the recurring EPS metrics, I divide special items and investment gains and losses by weighted average diluted shares and "undo" their effect from EPS before EI. Because EPS before EI is measured after subtracting preferred dividends and noncontrolling interests from net income, so are the recurring EPS measures. Weighted average diluted shares are available from COMPUSTAT starting in 1998. For prior periods I estimate this quantity as the product of weighted average outstanding shares and the median ratio of basic to diluted EPS over the last eight quarters.

[21] I estimate diluted book value per share as the product of book value per share and the ratio of weighted average diluted shares to weighted average outstanding shares. That is, I assume that the relationship between diluted and outstanding shares at the end of the year is the same as the average ratio during the year.

Analysts' earnings forecasts are obtained from IBES and measured using the consensus (median) annual EPS forecast. This data item is provided at a monthly frequency, typically on Thursday before the third Friday of the month (hereafter referred to as the "**IBES date**"). I use the forecast for the current fiscal year if the IBES date is at least six month before the end of the fiscal year; otherwise I use the forecast for the following year. This choice guarantees that the forecast is indeed a forecast and not a reflection of reported earnings to date (see discussion in Liu et al. 2002).

The sample consists of monthly observations, measured on the IBES date. I merge the monthly forecasts with the fundamental data based on the relationship between the IBES date and the COMPUSTAT quarterly reporting date ("the date on which quarterly EPS are first publicly reported"). To assure that the fundamentals are available by the IBES date, I require that the reporting date be at least 17 days prior to the IBES date.[22] To avoid using stale information, I require that the fundamentals be available no later than 92 days after the end of the fiscal quarter, and the IBES date be no later than 184 days after the end of the most recently reported fiscal quarter (that is, a reporting delay of up to three months and up to three subsequent monthly observations).

To be included in the sample, EPS before EI, book value of equity, and consensus analysts' EPS forecasts must be available. To avoid losing observations, special items and realized investments gains/losses are set to zero when missing. Because investment gains and losses are often significant for insurance companies, and this information is consistently available at a quarterly frequency only since 1989, the sample period starts in March 1990 (the

[22] Following Collins and Hribar (2000), I assume that non-earnings information becomes available within 17 days after the earnings announcement.

TFQ calculations for the first, second, and third quarters use previous year data, and there is a delay in the reporting of financial information). The sample period ends in January 2011. Overall, 32,001 observations satisfy the above data requirements, relating to 372 different firms.

For tests concerning AOCI, the sample period is considerably shorter. AOCI is available from COMPUSTAT at a quarterly frequency starting the fourth quarter of 2001. Therefore, after considering the delay in the reporting of financial information, monthly observations with non-missing values for AOCI are consistently available for the period March 2002 through January 2011. The sample for this analysis consists of 12,103 observations (187 different firms).

Finally, to mitigate the effects of outliers, I trim extreme values of the fundamental-to-price ratios and of the variables used in the conditional valuation models (described in Section 4.5 below).[23] Table 1 presents summary statistics for the variables.

4. Empirical Tests

In this section, I compare the accuracy of the different valuation approaches discussed in Section 2 (price multiple valuation using alternative fundamentals, adjustments and comparables, and conditional valuation). When using multiples, I estimate the value of each company as the product of its fundamental and the related price multiple, calculated using the harmonic mean of

[23] Extreme values of the variables are identified using the following procedure. For each variable, I calculate the 10^{th} and 90^{th} percentiles of the empirical distribution (P10 and P90 respectively) and trim observations outside the following range: P10 – 2 × (P90 – P10) to P90 + 2 × (P90 – P10). For normally distributed variables, this range covers approximately 6.5 standard deviations from the mean in each direction (= 1.3 + 2 × (1.3 – (-1.3)), which is more than 99.9999% of the observations. For ratios with relatively few outliers (e.g., beta), the percentage of retained observations is also very high (often 100%). However, for poorly-behaved variables a relatively large proportion of the observations are deleted. Still, the overall loss of observations is much smaller than under the typical 1%-99% approach. Moreover, unlike the "traditional" 1%-99% range, which still retains some outliers, all extreme observations are removed.

the price-to-fundamental ratio for all remaining companies in the group.[24] I use the harmonic mean—that is, the inverse of the average value of the fundamental-to-price ratio—instead of the simple mean or median because prior research has demonstrated that using harmonic means results in more accurate valuations (e.g., Baker and Ruback 1999, Liu et al. 2002).[25] When using conditional valuation, I calculate the value of each company as the product of its book value and a conditional price-to-book ratio, which is estimated using relevant attributes of that company (e.g., ROE) and the empirical relationship across the comparables between the price-to-book ratio and those attributes.

If market prices are efficient, an estimated value that is close to the actual price suggests that the particular valuation approach performs well. Therefore, to evaluate the valuation performance of alternative methods, I compare the proximity of the different valuations to price. For each valuation approach, I examine the following statistics: the percentage of observations with estimated value within 10% of price, 25% of price, 50% of price, 75% of price, and 90% of price. I also test the significance of the differences in these statistics across the valuation approaches, and I plot the percentage of observations with estimated value within 25% of price each month. The plots allow me to identify changes over time in the absolute or relative performance of the valuation methods.

[24] Deleting the target company from the comparable group before calculating the price multiple is necessary to avoid the target's valuation being "contaminated" by its own price. This is especially important when comparing the performance of price multiples derived using alternative grouping of comparables (e.g., industry versus sub-industry).

[25] To understand the intuition of the harmonic mean, consider earnings-based price multiples. When using the mean (or median) P/E ratio to calculate the multiple, the firm is valued so that its value-to-earnings ratio is equal to the mean (or median) of the comparables' price-earnings ratio. In contrast, when using the harmonic mean, the firm is valued so that its earnings-to-value ratio is equal to the mean of the comparables' earnings yields. Earnings yields have much better statistical properties than price-earnings ratios (lower coefficient of variation, lower kurtosis, more symmetric distribution), which increases the precision of the estimates. Calculating multiples using the median instead of the mean also mitigates the effect of outliers. However, unlike the harmonic mean, the median ignores the magnitude of differences in the price/fundamental ratios across the comparables.

Because some of the fundamentals are often negative (e.g., earnings) or missing (e.g., ex-AOCI book value), I use pair-wise comparisons where all observations that satisfy the data requirements for the two valuation approaches (but not necessarily for others) are included. This choice increases the generalizability of the results, because companies with positive values for all fundamentals may be systematically different from other companies (e.g., they may be large and mature). To reduce error in measuring the multiples, I require that at least five comparables be available for calculating each multiple.

The empirical tests are described in five separate sub-sections: earnings multiples (4.1), book-value multiples (4.2), comparisons across fundamentals (4.3), selection of industry comparables (4.4), and conditional valuation (4.5).

4.1 Earnings Multiples

As discussed in Section 2, analysts typically exclude from earnings items that they deem transitory. For insurance companies, these include special items and investments' gains and losses. Table 2 presents empirical evidence on the validity of these adjustments. As shown in Panel A, excluding special items improves the valuation accuracy of earnings. For example, the percentage of valuations within 25% of price is 49.7% for income before extraordinary and special items (hereafter, income before EI and SI) compared to 49.0% for income before EI. The higher accuracy of income before EI and SI is also reflected in each of the other distribution statistics (percentage of valuations within 10%, 50%, 75%, and 90% of price), and all differences are statistically significant.

Panel A of Figure 1 demonstrates the consistency of the valuation advantage of income before EI and SI over income before EI. This graph plots the percentage of observations with

estimated value within 25% of price each month for the two alternative valuation approaches. Income before EI and SI outperformed income before EI in most of the months, although typically the performance difference was small.

While the removal of special items improves the valuation accuracy of earnings, the removal of investment gains and losses (G/L) does not. As shown in Panel B of Table 2, the valuation performance of income before EI, SI and G/L is not significantly better than that of income before EI and SI. Panel B of Figure 1 indicates that removing G/L worsens rather than improves the valuation performance of earnings for most of the sample period. However, at the height of the 2007-2009 financial crisis, realized investment gains/losses significantly reduced the valuation accuracy of earnings. This finding is consistent with Ellul et al. (2011), who document strong evidence of "gains trading" by life insurance companies during the financial crisis.[26]

The failure of the exclusion of investment gains and losses to consistently improve the valuation accuracy of earnings is surprising. It could be that some companies realize investment gains and losses to smooth earnings over time. Alternatively, it is possible that investors do not fully understand the discretionary and transitory nature of investment gains and losses.[27] This issue requires a dedicated investigation, which is beyond the scope of this paper. At any rate, given the above findings, for all remaining earnings-related tests in this study I use income

[26] Specifically, Ellul et al. (2011) show that life insurers that experienced severe downgrades among their holdings in asset-backed securities largely continued to hold the downgraded securities and instead selectively sold their corporate bond holdings with the highest unrealized gains.

[27] Consistent with this hypothesis, Lee et al. (2006) find that insurers with a tendency to manage earnings through realized securities' gains and losses are more likely to report comprehensive income in the statement of equity as opposed to the performance statement, to reduce the transparency of these items.

before EI and SI. Robustness checks indicate that all inferences are identical when using income before EI, SI and G/L instead.

I next turn to the issue of per share calculation: should one use basic or diluted earnings per share when conducting earnings-based price multiple valuation? Panel C of Table 2 indicates that using diluted instead of basic earnings per share improves valuation accuracy (see also Panel C of Figure 1), although the improvement is relatively small. Therefore, all earnings-related tests reported in this study use diluted shares.

4.2 Book Value Multiples

Table 3 presents summary statistics for the performance of price-to-book multiples. Panel A compares the valuation performance of book value per share with that of diluted book value per share. Unlike for earnings, using diluted instead of outstanding shares slightly weakens rather than improves the accuracy of book value-based valuations. However, similar to earnings, the differences between the results for diluted and outstanding shares are small, as is clear from the near identity of the plots in Panel A of Figure 2. Given these results, I use book value per outstanding share in all remaining book value-related tests.

Panel B of Table 3 compares the valuation accuracy of book value and ex-AOCI book value multiples. As discussed above, the sample for this test is relatively small because COMPUSTAT started to collect quarterly AOCI in the fourth quarter of 2001. Inconsistent with analysts' practice, excluding AOCI from book value significantly worsens rather than improves valuation accuracy, and this is true in almost all months (see Panel B of Figure 2). Therefore, except the current test, all measures and tests involving book value in this study use reported book value.

4.3 Comparisons across Fundamentals

Table 4 compares the valuation accuracy of multiples based on book value, income before EI and SI, and forecasted EPS, while Figure 3 presents the corresponding time-series plots. Unlike for non-financial companies (e.g., Liu et al. 2002), earnings multiples do not outperform book value multiples. In fact, the opposite is true. Book value clearly dominates earnings for large valuation errors. Moreover, Panel A of Figure 3 reveals that over the last decade book value multiples performed significantly better than earnings multiples even at the middle of the distribution. Book value has another important advantage over earnings, which is not reflected in the above results. Reported earnings are often negative (see Table 1), ruling out the ability to calculate earnings-based price multiple valuations. In contrast, the book value of insurance companies is rarely negative.

As expected, valuations based on analysts' earnings forecasts dominate those based on income before EI and SI (Panel B) or book value (Panel C). However, as discussed in Section 2, the accuracy of valuations based on analysts' earnings forecasts likely overstates the informativeness of the forecasts because analysts may consider price when predicting earnings.

4.4 Industry versus Sub-industry

I next compare the accuracy of price multiple valuations when the benchmark group includes all insurers versus when it includes only companies from the same sub-industry (life and health, property and casualty, multiline, reinsurers, and brokers). The results, reported in Table 5, indicate that limiting the selection of peers to the same sub-industry when valuing insurance companies improves valuation accuracy. This is true for income before EI and SI (Panel A), book value (Panel B), and forecasted EPS (Panel C). The time series plots in Figure 4 do not

indicate any clear pattern over time. Therefore, all tests reported in this study are based on sub-industry benchmarks. The dominance of sub-industry benchmarks in valuing insurance companies stands in contrast to prior price multiple studies, which either find or assume that using all industry members is better than restricting comparables to be from the same sub-industry (e.g., Alford 1992, Liu et al. 2002, Bhojraj et al. 2003). This result is likely due to the large differences in the financial profiles and activities of insurers operating in the different sub-industries.[28]

4.5 Conditional Valuation

In this section I provide empirical evidence on the valuation performance of conditional valuation. Consistent with analysts' practice, I focus on a relatively simple model that conditions the price-to-book ratio on ROE. To improve the performance of this model, I use **Recurring ROE** (i.e., the ratio of income before EI and SI to beginning-of-period equity), and I specify the book-to-price ratio instead of the price-to-book ratio as the dependent variable. I employ Recurring ROE because excluding transitory items strengthens the price-earnings relationship. I invert the price-to-book ratio for the same reason that I use the harmonic mean instead of the simple mean in calculating price multiples – the book-to-price ratio has better statistical properties than the price-to-book ratio (lower kurtosis, more symmetric distribution, fewer outliers), which facilitate more precise estimation.[29] To further improve efficiency, each regression is estimated with all insurance companies (other than the target) and includes fixed

[28] For example, life insurers are increasingly more similar to banks than to property and casualty insurers. They have significantly higher leverage and larger scale than property and casualty insurers, and they generate a substantial portion of their income from a spread business and from managing portfolios.

[29] Focusing on firms with positive book value (a required condition for book value-based price multiple valuation), the skewness of the book-to-price ratio is 1.5 compared to 2.1 for the price-to-book ratio. Similarly, the kurtosis of the book-to-price ratio is 4.0, while that of the price-to-book ratio is 5.5. Moreover, the price-to-book ratio has many more outliers (220 or 0.7%) than the book-to-price ratio.

effects for the sub-industries.[30] These choices imply that the conditional valuation model is a generalization of the book value multiples analyzed earlier. Indeed, when recurring ROE is omitted, the resulting valuations are identical to those obtained using book value multiples.

As discussed in Section 2.8, the price-to-book ratio depends on additional characteristics besides Recurring ROE. In particular, the price-to-book ratio is positively related to earning quality and growth prospects, and negatively related to risk. Therefore, I also evaluate an extended model that includes the following variables in addition to Recurring ROE: recurring revenue-to-equity ratio, recurring revenue growth, asset growth, equity-to-assets ratio, log of equity, market beta, and idiosyncratic volatility.[31] Summary statistics from the distributions of these variables are provided in Table 1. The motivations for their inclusion are as follows.

The recurring revenue-to-equity ratio, which measures net asset turnover, is a proxy for efficiency and earnings quality.[32] A low turnover ratio may suggest that equity is overstated either because the company understated its liabilities or contra-assets (e.g., loss reserve, liability for future policy benefits, tax valuation allowance), over-capitalized expenditures (e.g., including operating expenses in deferred policy acquisition costs), or understated amortization or write-downs (e.g., of deferred policy acquisition costs, value of business acquired, or investment

[30] As mentioned earlier, excluding the target company when estimating price multiples (in price multiple valuation) or regression coefficients (in conditional valuation) prevents the target's valuation from being affected by its own price.

[31] In selecting these variables, I use the following criteria: (1) information required to measure the variable is available in COMPUSTAT or CRSP; (2) the variable's effect is likely to be economically and statistically significant; (3) the variable is likely to contain incremental information given other included variables (to mitigate multicolinearity); (4) the variable is relevant for most insurers (for example, this criterion rules out the combined ratio, which is relevant only for property and casualty insurers, and assets under management, which is relevant primarily for life insurers); (5) to mitigate endogeneity issues, the variable is not directly affected by the market value of equity (for example, this criterion rules out measuring size using the market value of equity); and (6) the number of variables is not excessive (given the relatively small number of observations in each regression).

[32] Financial firms, especially insurers, need few operating assets to generate revenue, but they are required to hold equity capital at levels sufficient to support their operations. Thus, unlike non-financial firms for which turnover ratios are calculated relative to assets, insurers' turnover is more properly evaluated relative to equity.

assets). A low turnover ratio may also imply that the insurer does not use its equity efficiently. **Recurring revenue** is estimated by subtracting realized investment gains and losses from reported revenue.[33]

To the extent that growth is correlated over time and across financial statement line items, historical growth rates in recurring revenue and assets should predict future earnings and equity growth rates. I focus on revenue and asset growth rates because they are generally more persistent (and therefore better predictors of growth prospects) than growth rates in other financial statement numbers such as earnings or book value.

The equity-to-assets ratio and the log of equity serve as proxies for both risk and growth prospects. High equity-to-assets ratio indicates low financial leverage and therefore low risk; it also implies that the insurer has "free" equity capital that can be invested to generate growth. All else equal, the log of equity book value, which measures size, should be negatively related to risk. Large insurers are on average better diversified, more likely to use financial hedging techniques, and more profitable. They also have greater financial flexibility, lower information risk, and lower variability in profitability and growth rates. Some insurers may be considered "too big to fail," as was made evident in 2008. On the negative side, size may be inversely related to growth due to diminishing returns to scale and learning, finite demand, and life cycle effects.

[33] Insurers' revenues consist of premiums, investment income, fees, realized investment gains and losses, and other income. Premiums represent the majority of reported revenues for most insurers. Investment income is typically the second largest category and is particularly significant for life insurers. Fees are generated in insurance operations (e.g., universal life, annuities) as well as asset management and other activities. Realized investment gains and losses are small *on average* (over time or across insurers) due to offsetting gains and losses, but their magnitude for a given insurer/quarter observation is often quite significant.

The final conditioning variables are **market beta** and **idiosyncratic volatility** (slope and RMSE of the market model regression, respectively). These variables, which serve as risk and growth proxies, are estimated using stock returns and S&P 500 total returns during the 252 trading days ending on the IBES date. Nissim (2011) finds that these variables—particularly idiosyncratic volatility—are strongly positively related to the implied cost of equity capital of insurance companies. In addition, Kogan and Papanikolaou (2009) hypothesize and provide evidence that firms with high growth opportunities have high stock return volatility and large market beta. They attribute these relationships to real options, arguing that growth opportunities behave as a levered claim on assets in place and so increase the volatility of returns and the sensitivity to aggregate shocks.

Table 6 reports summary statistics from 251 cross-sectional monthly regressions (March 1990 through January 2011) of the basic and extended models. As expected, the book-to-price ratio is strongly negatively related to Recurring ROE in both the basic and extended models. Similarly, the additional characteristics in the extended model generally have the expected signs and are significant, particularly idiosyncratic volatility. Moreover, the average R-squared of the extended model is substantially higher than that of the basic model.

While the additional fundamentals in the extended model are statistically significant, whether they improve the accuracy of out-of-sample valuations is an empirical question, because their inclusion reduces the ratio of observations to parameters.[34] Panel A of Table 7 and Panel A of Figure 5 compare the valuation performance of the basic and extended conditional models. As shown, incorporating proxies for earnings quality, growth and risk does not consistently improve

[34] All else equal, the precision of estimation increases with the ratio of observations to estimated parameters.

out-of-sample predictions. The extended model generates higher proportions of both small and large valuation errors and lower proportion of intermediate errors. In addition, Panel A of Figure 5 does not reveal any clear trend in the performance difference between the two models. I therefore focus on the basic model for the remaining tests.

Panels B, C and D of Table 7 and Figure 5 compare the valuation accuracy of the basic conditional model with that of price multiples based on book value (Panel B), income before EI and SI (Panel C), and forecasted EPS (Panel D). Conditioning the price-to-book ratio on Recurring ROE significantly improves the valuation accuracy of book value multiples (Panel B), and makes the advantage of book value over earnings even bigger (Panel C). While forecasted EPS remains the most accurate fundamental, its advantage over the conditional price-to-book is significantly smaller than in prior comparisons. In fact, during the last two and a half years the conditional price-to-book ratio outperformed forecasted EPS (Panel D of Figure 5). This result is remarkable given that (1) analysts have access to significantly more information than earnings and book value, and (2) analysts may consider price when making their forecasts.

5. Summary and Conclusion

This study evaluates the accuracy of relative valuation models in the U.S. insurance industry. The primary findings are as follows:

- Unlike for non-financial companies, book value multiples perform relatively well in valuing insurance companies and are not dominated by earnings multiples. In fact, over the last decade book value multiples performed significantly better than earnings multiples.

- Inconsistent with analysts' practice, excluding AOCI from book value worsens rather than improves valuation accuracy.

- As expected, using income before special items instead of reported income improves the accuracy of valuations, but, surprisingly, excluding realized investment gains and losses does not. An exception to this latter result occurred during the financial crisis, likely due to an increase in "gains trading" activities.

- Conditioning the price-to-book ratio on recurring ROE significantly improves the valuation accuracy of book value multiples. However, incorporating proxies for growth, earnings quality and risk does not consistently improve out-of-sample predictions, although these determinants of the price-to-book ratio generally have the expected effects and are significant.

- Limiting peers to the same sub-industry (as opposed to all insurance companies) improves valuation accuracy.

- Using diluted instead of outstanding shares improves earnings-based valuations but not book value-based valuations.

- As expected, valuations based on analysts' earnings forecasts outperform those based on reported earnings or book value. However, the gap between the valuation performance of forecasted EPS and the conditional price-to-book approach was relatively small over the last decade.

I conclude with three caveats. The first caveat concerns the implicit assumption of market efficiency. The benchmark used in evaluating valuation performance in this study is

contemporaneous price; that is, market prices are assumed to correctly reflect fundamentals. However, extant research demonstrates that market prices may not fully incorporate all available information. If pricing errors vary systematically across the valuation approaches, some of the above inferences may not hold. In particular, if relatively sophisticated valuation approaches (e.g., the extended conditional valuation model) are less likely to be used in inefficient markets, their estimated accuracy may be understated.

Second, the analysis in this study uses only information that is available in academic databases. Institutional investors and analysts often have access to more detailed data and can therefore calculate more precise fundamentals. For example, instead of attempting to estimate diluted book value per share using EPS data, analysts can incorporate information on options and convertible securities. With more precise estimates, some of the inferences of this study may change. Similarly, when selecting comparables, analysts incorporate information and considerations that are difficult to capture in large sample studies, such as product characteristics, strategies, and other attributes that may affect the persistence or pricing of fundamentals.

Third, earnings forecasts are only a subset of the information provided by analysts. Discussions with portfolio managers and other practitioners suggest that at least some users of analysts' research are interested not that much in the earnings forecasts but rather in other information that the analysts provide. Therefore, focusing only on the accuracy of valuations based on earnings forecasts understates the contribution of analysts' research.

Appendix A
Derivation of the Residual Income Model

The value of any financial claim is the present value of expected net flows to the owners of that claim. Accordingly, the value of common equity (Equity Value or EV) is the present value of expected net flows to common equity holders (Net Equity Flow or NEF):

$$EV_0 = \frac{E[NEF_1]}{(1+r_e)^{.5}} + \frac{E[NEF_2]}{(1+r_e)^{1.5}} + ... = \sum_{t=1}^{\infty} E[NEF_t] \times (1+r_e)^{-t+.5} \quad \text{(A1)}$$

where r_e is the cost of common equity capital. Equation (A1) assumes that NEF is paid at the middle of each year.

Theoretically, to value exiting common equity, NEF should only include flows associated with currently existing common shares. However, this definition of NEF is impractical because future dividends and share repurchases will be paid not only to existing shares but also to shares that will be issued in the future. An alternative approach is to assume that all future share issuance transactions will be at fair value; that is, the present value of the cash or other assets or services that will be received when new shares are issued is equal to the present value of the subsequent dividends and share repurchases associated with those shares. Under this assumption, NEF is redefined as the total of all common dividends, common share repurchases and noncash distributions, minus the fair value of assets or services to be received in exchange for issuance of common shares.

Valuation model (A1) can be restated in terms of comprehensive income attributable to common equity (Comprehensive Income or CI) and the book value of common equity (Common Equity or CE) by substituting the following relation for NEF_t:

$$NEF_t = CI_t - CE_t + CE_{t-1} \quad \text{(A2)}$$

This relation postulates that changes in common equity are due to either comprehensive income attributable to common equity or to net equity flows. Given the definitions of NEF (discussed above) and comprehensive income (net income plus other comprehensive income), equation (A2) accounts for essentially all changes in common equity and therefore provides a reasonable approximation for the actual relationship between net equity flows, earnings and book value.

Substituting equation (A2) into (A1),

$$EV_0 = \frac{E[CE_0 + CI_1 - CE_1]}{(1+r_e)^{.5}} + \frac{E[CE_1 + CI_2 - CE_2]}{(1+r_e)^{1.5}} + ...$$

For each t = 1, 2, …, adding and subtracting $r_e \times CE_{t-1}$

$$EV_0 = \frac{E[CE_0 + CI_1 - CE_1 + r_e \times CE_0 - r_e \times CE_0]}{(1+r_e)^{.5}} + \frac{E[CE_1 + CI_2 - CE_2 + r_e \times CE_1 - r_e \times CE_1]}{(1+r_e)^{1.5}} + ...$$

Rearranging terms

$$EV_0 = \frac{E[CE_0 \times (1+r_e) + (CI_1 - r_e \times CE_0) - CE_1]}{(1+r_e)^{.5}} + \frac{E[CE_1 \times (1+r_e) + (CI_2 - r_e \times CE_1) - CE_2]}{(1+r_e)^{1.5}} + ...$$

And, finally, cancelling offsetting terms, we get

$$EV_0 = CE_0 + \sum_{t=1}^{\infty} E\left[CI_t - r_e CE_{t-1}\right] \times \left(1 + r_e\right)^{-t+.5} \quad \text{(A3)}$$

That is, equity value is equal to current book value (CE_0) plus the present value of expected residual income in all future years, where residual income is earnings in excess of the return required by common equity investors given the amount (CE) and cost (r_e) of common equity capital, that is, $CI_t - r_e\, CE_{t-1}$.[35]

[35] Similar to the net equity flow model (equation (A1)), which assumes that the present value of price at future date T converges to zero as T goes to infinity, to derive equation (A3) one has to assume that the present value of book value at future date T converges to zero as T goes to infinity. See Ohlson (1995).

Appendix B
Constructing Trailing Four Quarters (TFQ) Data

In quarterly reports, companies provide income statement data in two formats: quarterly, and year-to-date. Prior to 1995, COMPUSTAT collected only the quarterly data. Starting in 1995, both forms of data are available in COMPUSTAT. In contrast, companies report quarterly cash flow information using the year-to-date format only. Cash flow data are available since 1988.

I measure most Trailing Four Quarters (TFQ) data as the year-to-date value plus the previous year annual value minus the previous year's year-to-date value for the same quarter. For the period 1988-1994, this requires that I first estimate the income statement year-to-date values; I do so by aggregating the relevant quarterly data.

For some variables, particularly those related to per share calculations, the process of calculating TFQ data is more complicated. For example, to calculate the weighted average shares outstanding, the data have to be adjusted with respect to stock splits and stock dividends as well as for the fraction of the period to which they relate (e.g., year-to-date data for the third quarter have to by multiplied by ¾ before applying the TFQ calculation).

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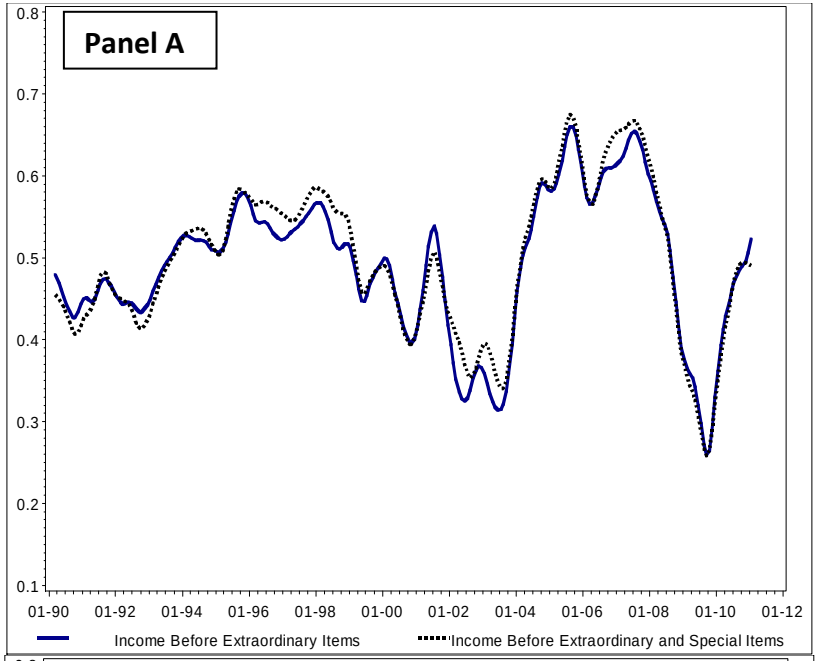
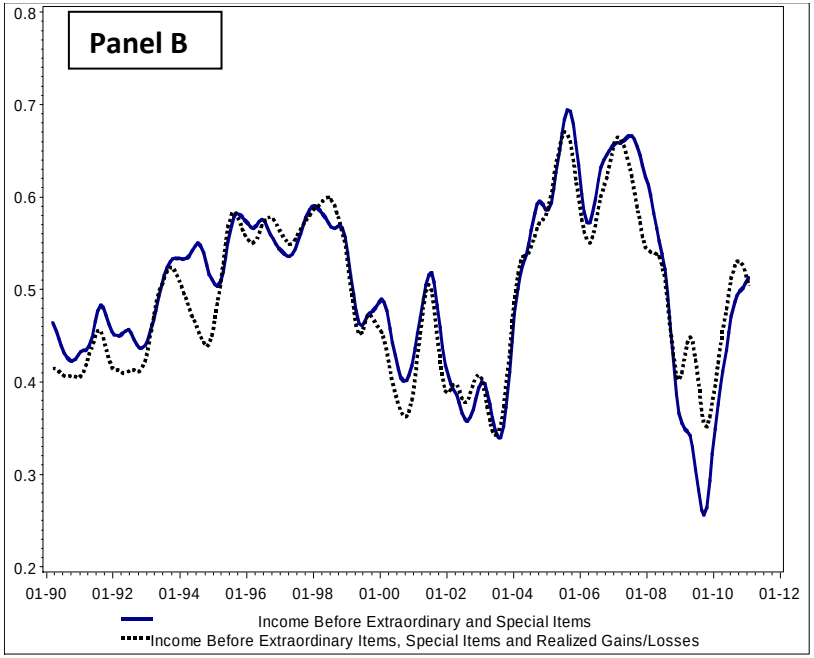
Figure 1: The Proportion of Earnings-Based Price Multiple Valuations that Lie Within 25% of Price each Month





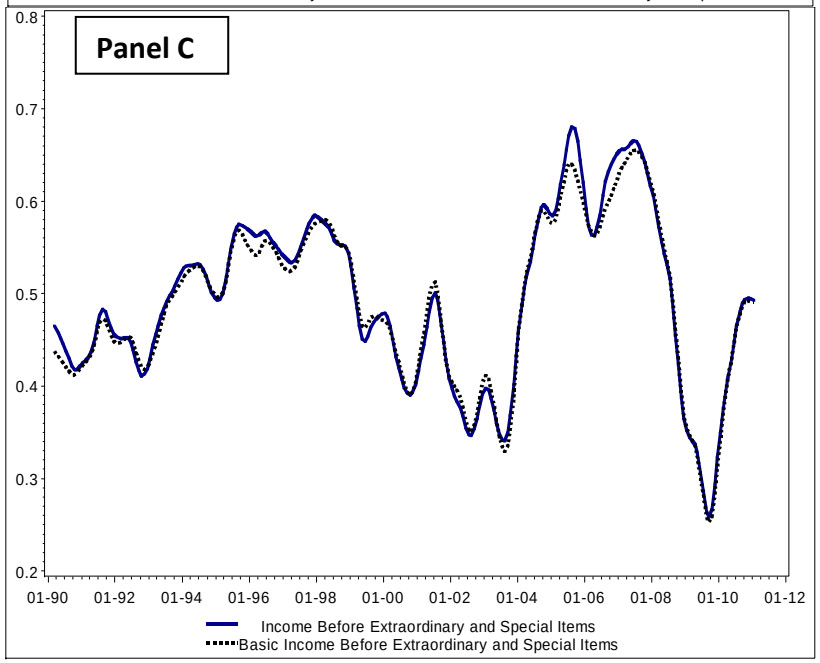
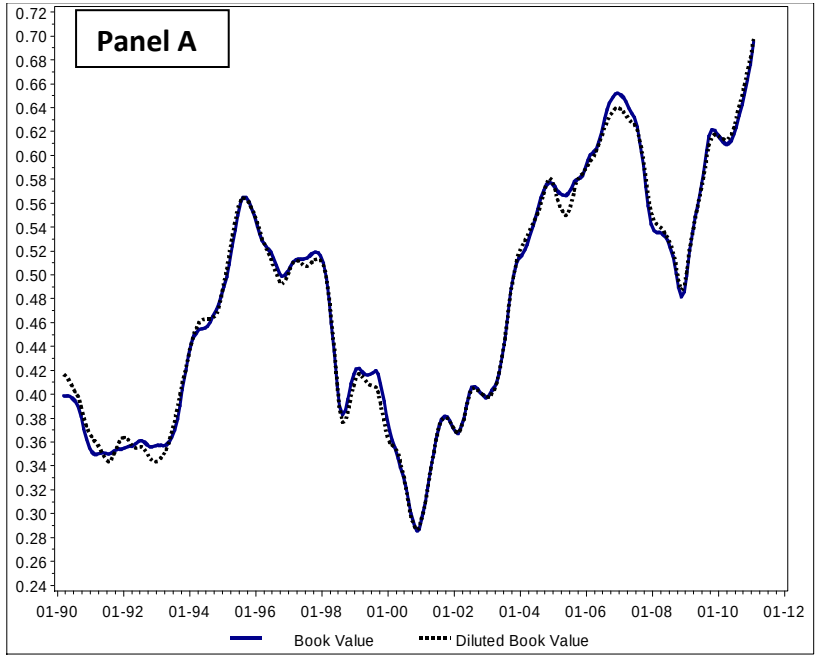


Figure 2: The Proportion of Book Value-Based Price Multiple Valuations that Lie Within 25% of Price each Month



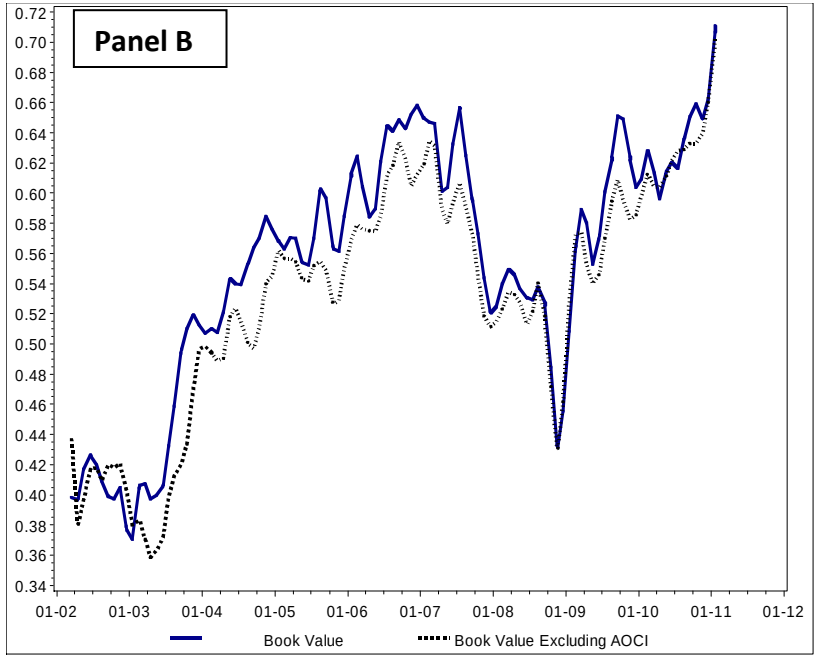
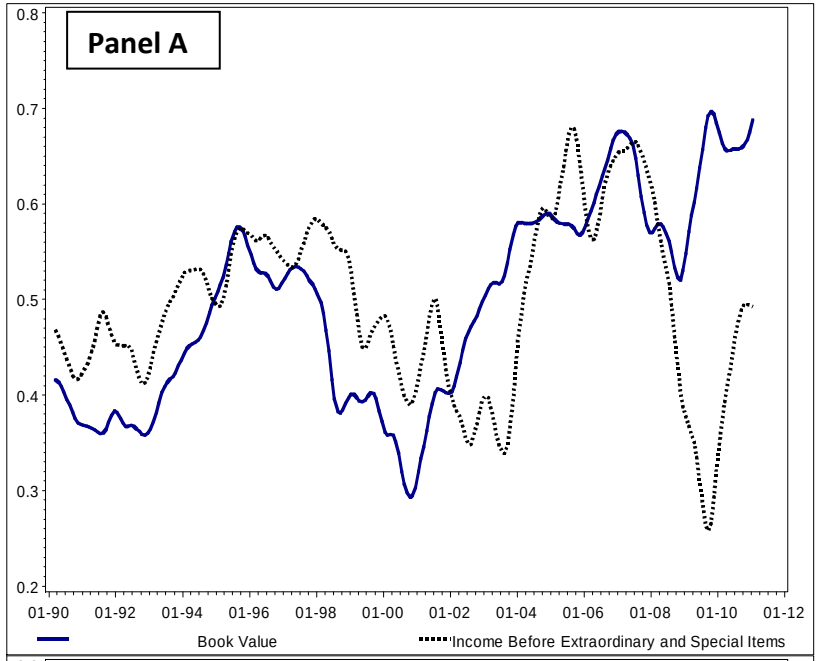
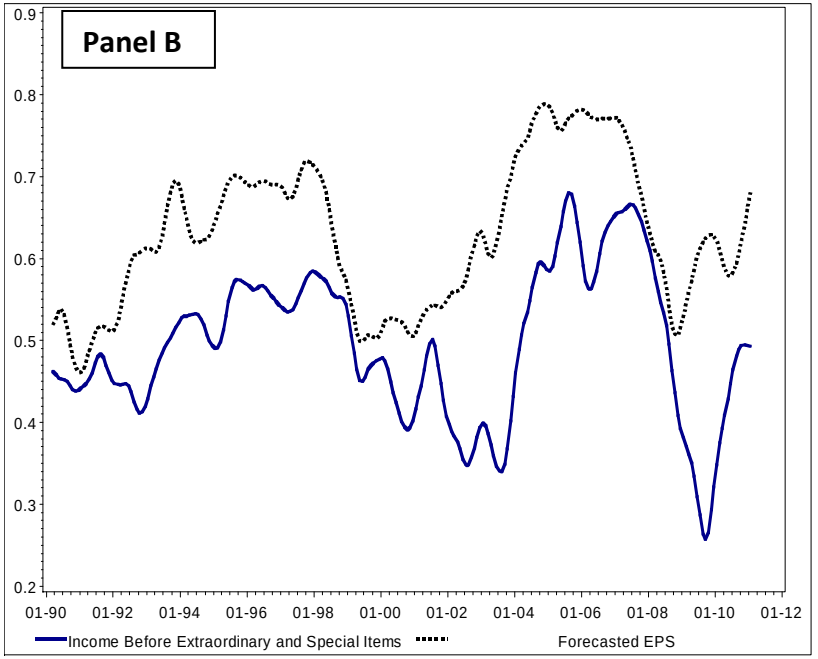


Figure 3: The Proportion of Price Multiple Valuations that Lie Within 25% of Price each Month for Alternative Fundamentals





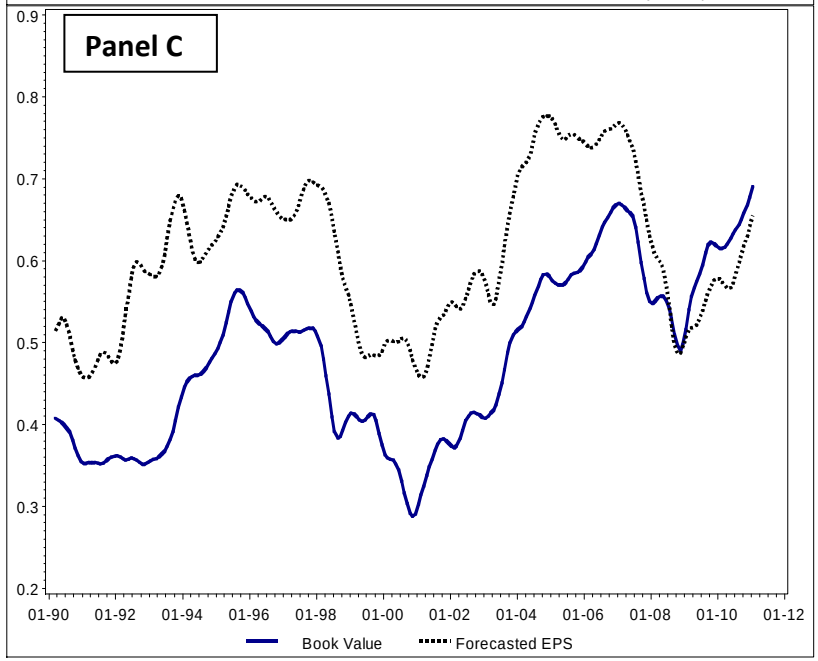


Figure 4: The Proportion of Price Multiple Valuations that Lie Within 25% of Price each Month for Alternative Fundamentals and Comparable Groups

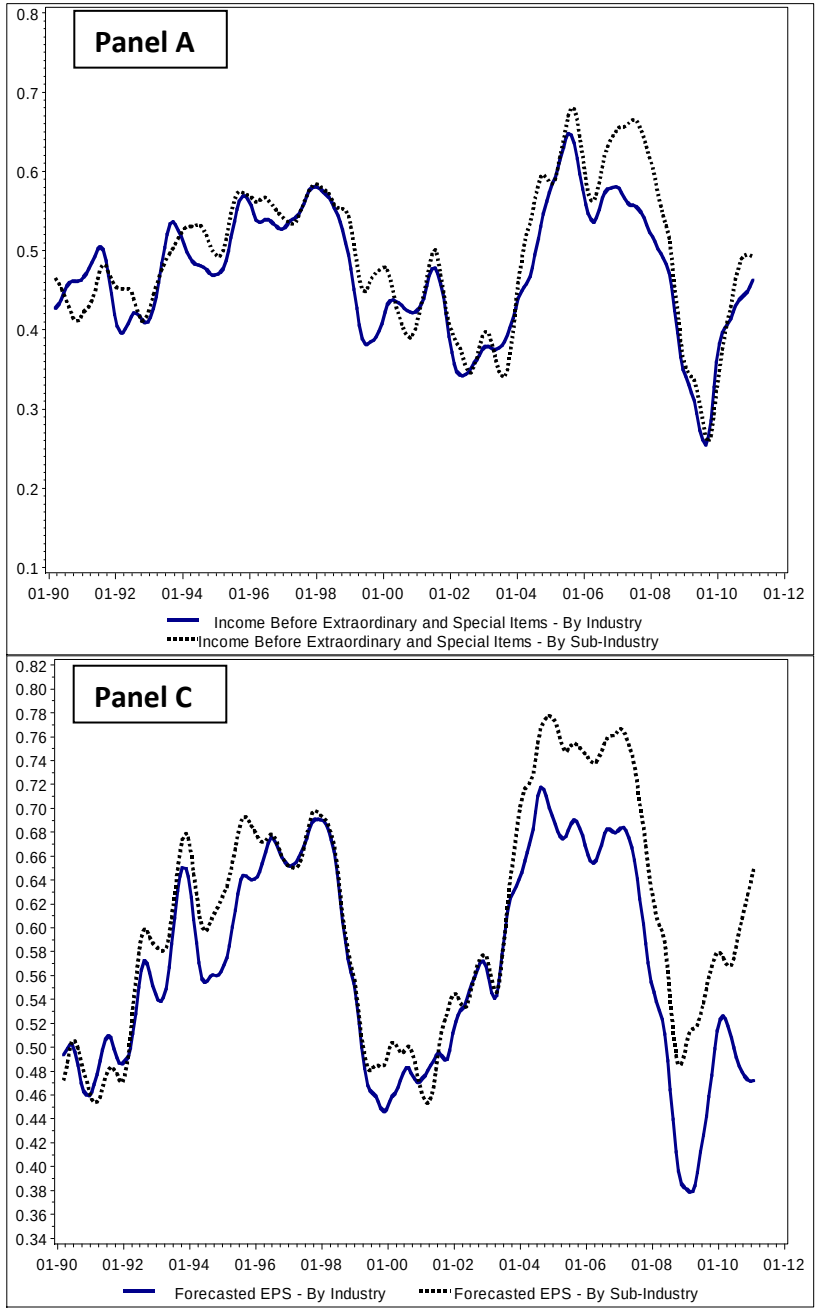


Figure 5: The Proportion of Valuations that Lie Within 25% of Price each Month for Conditional and Price Multiple Valuations

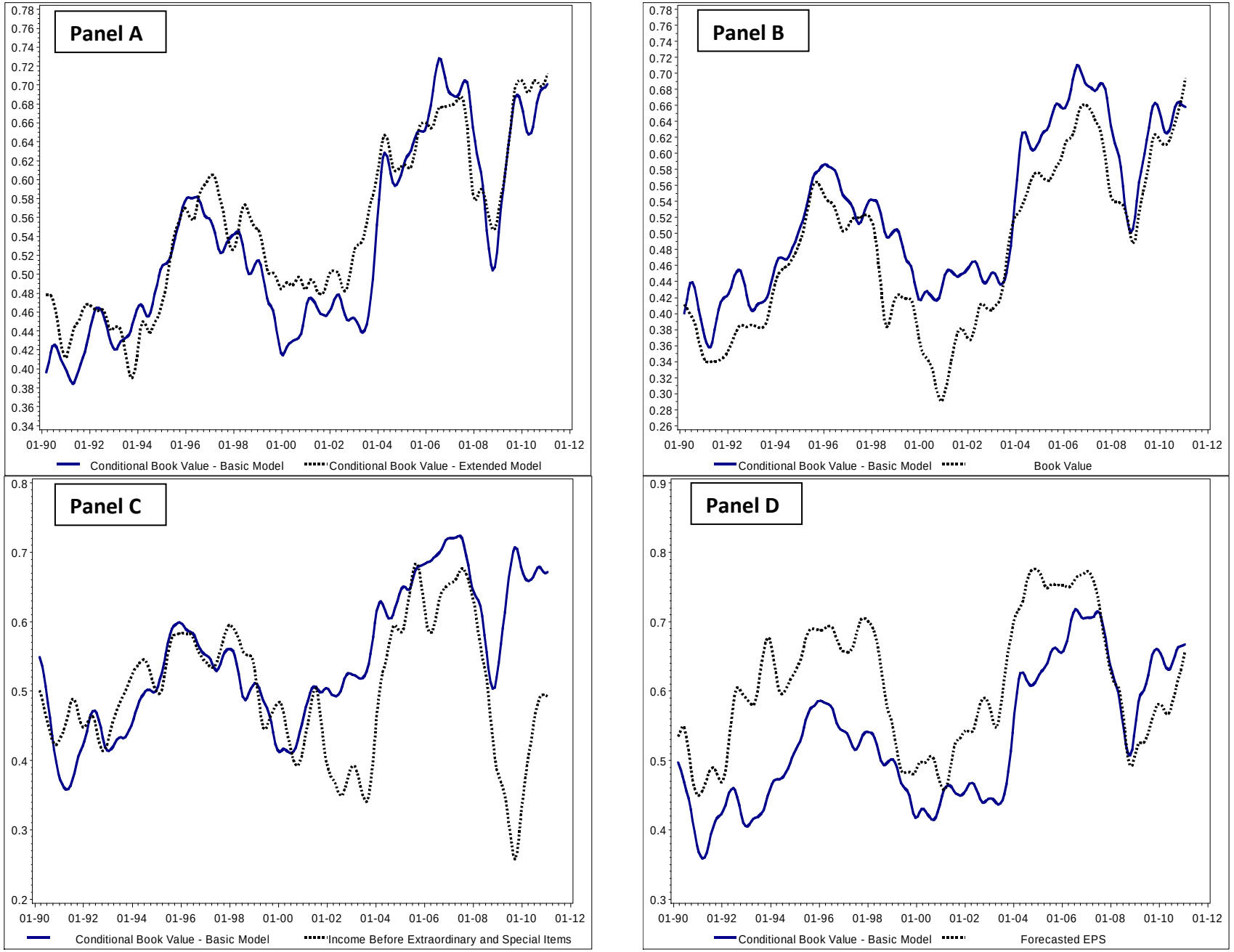


Table 1
Summary Statistics

	Obs.	Mean	SD	5%	25%	Med.	75%	95%
Fundamental-to-price ratios								
Income before extraordinary items	31,060	0.072	0.066	-0.041	0.051	0.076	0.103	0.160
Income before extraordinary and special items	31,096	0.074	0.062	-0.028	0.053	0.077	0.103	0.161
Income before extraordinary items, special items, and realized gains/losses	31,088	0.071	0.061	-0.029	0.050	0.074	0.099	0.156
Basic income before extra. and special items	31,099	0.076	0.064	-0.028	0.053	0.078	0.105	0.165
Book value	31,665	0.825	0.445	0.266	0.537	0.752	1.016	1.634
Diluted book value	31,662	0.811	0.438	0.261	0.529	0.737	1.000	1.604
Book value excluding AOCI	12,117	0.877	0.463	0.328	0.592	0.780	1.056	1.734
Forecasted EPS	31,638	0.098	0.041	0.044	0.073	0.092	0.116	0.170
Other variables								
Recurring ROE	30,761	0.134	0.124	-0.054	0.081	0.134	0.184	0.321
Recurring Revenue / Equity	31,517	1.535	1.022	0.363	0.913	1.322	1.856	3.549
Recurring Revenue Growth	29,023	0.105	0.203	-0.151	0.001	0.076	0.181	0.466
Asset growth	31,368	0.127	0.191	-0.080	0.027	0.091	0.180	0.483
Equity-to-assets ratio	31,983	0.270	0.169	0.061	0.144	0.240	0.356	0.601
Log of Equity	31,903	6.399	1.685	3.637	5.321	6.314	7.596	9.115
Market beta	31,969	0.660	0.469	0.030	0.325	0.617	0.919	1.464
Idiosyncratic volatility	31,809	0.021	0.012	0.009	0.014	0.018	0.026	0.044

The summary statistics are derived from the pooled cross-section time-series distributions of insurer/month observations during the period March 1990 through January 2011. Book value excluding AOCI is consistently available starting March 2002. Price and EPS forecasts are measured as of the IBES date (Thursday before the third Friday of the month). Accounting data are measured on a Trailing Four Quarters (TFQ) basis using the most recently disseminated information as of the IBES date. Market beta and idiosyncratic volatility are derived from market model regressions, estimated using daily returns during the 252 trading days ending on the IBES date and the total return on the S&P 500 index. Variable definitions are provided in Sections 3 and 4.5.

Table 2
Earnings Multiples

	Valuations within				
	10% of price	25% of price	50% of price	75% of price	90% of price
Panel A					
Income before extraordinary items	21.3%	49.0%	76.9%	89.7%	94.3%
Income before extraordinary and special items	21.7%	49.7%	78.3%	90.6%	94.8%
Difference	-0.5%	-0.7%	-1.4%	-0.8%	-0.5%
t-statistic	-1.7	-2.1	-5.6	-4.7	-3.4
Panel B					
Income before extraordinary and special items	21.7%	50.1%	78.6%	90.9%	95.0%
Income before extraordinary items, special items, and realized gains/losses	21.6%	49.3%	78.3%	90.7%	94.9%
Difference	0.1%	0.8%	0.4%	0.2%	0.1%
t-statistic	0.2	1.2	0.6	0.4	0.2
Panel C					
Income before extraordinary and special items	21.4%	49.3%	77.6%	90.0%	94.5%
Basic income before extra. and special items	21.1%	48.9%	77.5%	89.8%	94.2%
Difference	0.4%	0.4%	0.1%	0.2%	0.2%
t-statistic	1.9	2.1	1.0	2.8	3.9

The table reports summary statistics from time-series distributions of monthly proportions of valuations that lie within a given percentage of price for various relative valuation choices. Each panel compares two alternative approaches. A positive (negative) difference indicates that the first (second) approach produces more precise valuations. For each comparison, each month valuations are calculated using the two alternative approaches for all insurers that satisfy the data requirements for both approaches. The monthly proportions are then calculated. The first two lines in each panel report the time-series means of the monthly proportions for the two approaches. The third (fourth) line reports the time-series means (t-statistics) of the differences in monthly proportions between the two approaches. The t-statistics are calculated using Newey-West corrected standard errors allowing for 11 lags (the maximum overlap in accounting information).

Table 3
Book Value Multiples

	Valuations within				
	10% of price	25% of price	50% of price	75% of price	90% of price
Panel A					
Book value	20.3%	47.5%	78.4%	92.3%	95.1%
Diluted book value	20.4%	47.5%	78.2%	92.4%	95.1%
Difference	-0.1%	0.1%	0.2%	-0.1%	0.0%
t-statistic	-1.0	0.7	2.2	-0.7	0.5
Panel B					
Book value	23.9%	55.3%	83.8%	93.8%	95.8%
Book value excluding AOCI	23.1%	53.2%	81.9%	92.7%	95.0%
Difference	0.8%	2.0%	1.9%	1.1%	0.7%
t-statistic	2.1	5.3	5.7	8.0	7.5

The table reports summary statistics from time-series distributions of monthly proportions of valuations that lie within a given percentage of price for various relative valuation choices. Each panel compares two alternative approaches. A positive (negative) difference indicates that the first (second) approach produces more precise valuations. For each comparison, each month valuations are calculated using the two alternative approaches for all insurers that satisfy the data requirements for both approaches. The monthly proportions are then calculated. The first two lines in each panel report the time-series means of the monthly proportions for the two approaches. The third (fourth) line reports the time-series means (t-statistics) of the differences in monthly proportions between the two approaches. The t-statistics are calculated using Newey-West corrected standard errors allowing for 11 lags (the maximum overlap in accounting information).

Table 4
Comparisons across Fundamentals

	Valuations within				
	10% of price	25% of price	50% of price	75% of price	90% of price
Panel A					
Book value	21.8%	49.7%	79.7%	93.3%	96.0%
Income before extraordinary and special items	21.5%	49.4%	77.7%	90.1%	94.6%
Difference	0.3%	0.2%	2.1%	3.2%	1.5%
t-statistic	0.3	0.1	1.1	3.8	3.2
Panel B					
Income before extraordinary and special items	21.5%	49.5%	77.7%	90.1%	94.6%
Forecasted EPS	30.6%	62.8%	89.1%	96.3%	98.0%
Difference	-9.2%	-13.3%	-11.4%	-6.2%	-3.4%
t-statistic	-9.1	-9.1	-7.4	-6.5	-5.9
Panel C					
Book value	20.6%	47.9%	78.8%	92.6%	95.3%
Forecasted EPS	29.5%	60.7%	87.1%	95.3%	97.3%
Difference	-8.9%	-12.8%	-8.3%	-2.7%	-2.0%
t-statistic	-8.1	-8.1	-7.4	-5.7	-6.2

The table reports summary statistics from time-series distributions of monthly proportions of valuations that lie within a given percentage of price for various relative valuation choices. Each panel compares two alternative approaches. A positive (negative) difference indicates that the first (second) approach produces more precise valuations. For each comparison, each month valuations are calculated using the two alternative approaches for all insurers that satisfy the data requirements for both approaches. The monthly proportions are then calculated. The first two lines in each panel report the time-series means of the monthly proportions for the two approaches. The third (fourth) line reports the time-series means (t-statistics) of the differences in monthly proportions between the two approaches. The t-statistics are calculated using Newey-West corrected standard errors allowing for 11 lags (the maximum overlap in accounting information).

Table 5
Industry versus Sub-Industry

	Valuations within				
	10% of price	25% of price	50% of price	75% of price	90% of price
Panel A					
Income before extraordinary and special items – By Industry	20.4%	47.2%	75.5%	89.3%	94.1%
Income before extraordinary and special items – By Sub-Industry	21.4%	49.3%	77.6%	90.0%	94.5%
Difference	-1.0%	-2.1%	-2.1%	-0.7%	-0.4%
t-statistic	-2.2	-3.4	-3.9	-2.3	-1.8
Panel B					
Book value – By Industry	19.7%	45.6%	74.7%	90.6%	94.8%
Book value – By Sub-Industry	20.3%	47.5%	78.3%	92.3%	95.1%
Difference	-0.5%	-2.0%	-3.7%	-1.7%	-0.3%
t-statistic	-1.4	-3.7	-5.8	-4.5	-1.6
Panel C					
Forecasted EPS – By Industry	26.2%	56.7%	85.6%	95.1%	97.3%
Forecasted EPS – By Sub-Industry	29.4%	60.5%	86.9%	95.1%	97.2%
Difference	-3.2%	-3.8%	-1.3%	0.0%	0.1%
t-statistic	-4.8	-4.9	-3.5	-0.1	0.8

The table reports summary statistics from time-series distributions of monthly proportions of valuations that lie within a given percentage of price for various relative valuation choices. Each panel compares two alternative approaches. A positive (negative) difference indicates that the first (second) approach produces more precise valuations. For each comparison, each month valuations are calculated using the two alternative approaches for all insurers that satisfy the data requirements for both approaches. The monthly proportions are then calculated. The first two lines in each panel report the time-series means of the monthly proportions for the two approaches. The third (fourth) line reports the time-series means (t-statistics) of the differences in monthly proportions between the two approaches. The t-statistics are calculated using Newey-West corrected standard errors allowing for 11 lags (the maximum overlap in accounting information).

Table 6
Summary Statistics from Cross-Sectional Regressions of the Book-to-Price Ratio on Proxies for Its Determinants, Controlling for Sub-Industry Fixed Effects

	Basic Model	Extended Model
Recurring ROE	-1.580	-1.406
	-23.5	-19.9
Recurring Revenue / Equity		-0.025
		-4.4
Recurring Revenue Growth		-0.129
		-6.1
Asset growth		-0.151
		-7.3
Equity-to-assets ratio		-0.214
		-10.5
Log of Equity		-0.002
		-0.9
Market beta		-0.122
		-8.3
Idiosyncratic volatility		13.161
		14.7
Mean R-squared	0.338	0.499
Mean number of observations	122	109

The table reports time-series means and t-statistics of coefficients from 251 cross-sectional monthly Fama-MacBeth regressions (March 1990 through January 2011). The t-statistics are calculated using Newey-West corrected standard errors allowing for 11 lags (the maximum overlap in accounting information). Variable definitions are provided in Sections 3 and 4.5.

Table 7
Conditional Valuation

	Valuations within				
	10% of price	25% of price	50% of price	75% of price	90% of price
Panel A					
Conditional book value – basic model	22.7%	53.2%	83.5%	94.1%	95.8%
Conditional book value – extended model	24.1%	54.9%	83.6%	93.6%	95.4%
Difference	-1.3%	-1.7%	0.0%	0.5%	0.4%
t-statistic	-2.8	-2.5	-0.1	1.7	1.4
Panel B					
Conditional book value – basic model	22.4%	52.5%	82.6%	93.4%	95.2%
Book value	20.4%	47.9%	78.6%	92.5%	95.1%
Difference	2.0%	4.6%	4.0%	0.9%	0.1%
t-statistic	4.5	7.9	6.9	3.1	0.5
Panel C					
Conditional book value – basic model	23.6%	54.5%	83.9%	93.9%	95.6%
Income before extraordinary and special items	21.7%	49.8%	78.0%	90.2%	94.7%
Difference	2.0%	4.7%	5.9%	3.7%	0.9%
t-statistic	1.7	2.3	3.6	4.5	1.9
Panel D					
Conditional book value – basic model	22.7%	52.9%	82.9%	93.6%	95.5%
Forecasted EPS	29.6%	61.0%	87.4%	95.4%	97.4%
Difference	-6.8%	-8.1%	-4.5%	-1.8%	-1.9%
t-statistic	-6.2	-5.5	-5.1	-4.0	-5.8

The table reports summary statistics from time-series distributions of monthly proportions of valuations that lie within a given percentage of price for various relative valuation choices. Each panel compares two alternative approaches. A positive (negative) difference indicates that the first (second) approach produces more precise valuations. For each comparison, each month valuations are calculated using the two alternative approaches for all insurers that satisfy the data requirements for both approaches. The monthly proportions are then calculated. The first two lines in each panel report the time-series means of the monthly proportions for the two approaches. The third (fourth) line reports the time-series means (t-statistics) of the differences in monthly proportions between the two approaches. The t-statistics are calculated using Newey-West corrected standard errors allowing for 11 lags (the maximum overlap in accounting information).