Implied Cost of Equity Capital in the U.S. Insurance Industry

Doron Nissim*
Columbia Business School

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Abstract

This paper derives and evaluates estimates of the implied cost of equity capital of U.S. insurance companies. During most of the period December 1981 through January 2010, the monthly median implied equity risk premium ranged between 4% and 8%, with a time-series mean of 6.2%. However, during the financial crisis of 2008-2009, the equity premium reached unprecedented levels, exceeding 15% in November 2008. Consistent with investors demanding relatively high expected returns in periods of poor economic performance or high uncertainty, the premium was positively related to the VIX, inflation, and unemployment, and negatively related to the 10-year Treasury yield, production, consumer sentiment, and prior industry stock returns. The cross-sectional correlations between the implied equity risk premium and firm-specific risk factors were similarly consistent with expectations: the equity premium was positively related to market beta, idiosyncratic volatility, and the book-to-market ratio, and negatively related to co-skewness, size and the equity-to-assets ratio. Finally, consistent with the strong correlations between the implied equity risk premium and the macro- and firm-specific risk factors, the premium performed well in predicting stock returns in both time-series (industry) and cross-sectional (stock) tests.

* 604 Uris Hall, 3022 Broadway, New York, NY 10027; phone: (212) 854-4249; dn75@columbia.edu.

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1. Introduction

When pricing equity securities, investors discount expected flows (e.g., dividends, residual income) using required rates of return commensurate with the riskiness of those flows. Therefore, given price and estimates of expected flows to equity holders, one can invert an equity valuation model to obtain an estimate of the average required rate of return used by investors in valuing the stock. From the company's perspective, this estimate reflects the cost of equity capital and is accordingly referred to as the implied cost of equity capital. In this study I derive and evaluate estimates of the implied cost of equity capital (ICEC) for U.S. insurance companies.[1]

The ICEC is useful in various settings. Analysts, investors, and other stakeholders may use it to evaluate risk and expected returns and, under some conditions, calculate intrinsic value. For example, if an analyst perceives his expectations of future flows to be different from those of the market, he may use stock price and estimates of market expectations of future flows to calculate the ICEC, and then use that rate to discount his expectations of future flows to obtain an estimate of intrinsic equity value. Creditors and regulators may use the ICEC as a market-based proxy for the riskiness of the company. The ICEC may also be used to calculate ex-ante estimates of the equity risk premium (e.g., Claus and Thomas 2001, Fama and French 2002), which is fundamental to asset allocation and various other decisions.

The precision of an implied cost of equity estimate depends on the accuracy of the

[1] Over the last decade, the implied cost of capital has been the focus of or primary variable in many studies, including Botosan (1997), Botosan and Plumlee (2002, 2005), Claus and Thomas (2001), Dhaliwal et al. (2005), Easton (2004, 2006), Easton and Monahan (2005), Easton and Sommers (2007), Easton et al. (2002), Fama and French (2002), Francis et al. (2005), Francis et al. (2004), Gebhardt et al. (2001), Gode and Mohanram (2003), Hail and Leuz (2006), and Hribar and Jenkins (2004). As discussed below, an important difference between the current study and prior work is the focus on an industry where the model used to reverse-engineer the cost of equity capital is likely to perform relatively well.

valuation analysis used in deriving the estimate. While equity valuation models such as the dividend discount, discounted cash flow, and residual income (DDM, DCFM, and RIM, respectively) are well-grounded in theory, their empirical counterparts are often very "noisy." In DDM and DCFM valuations, a large portion—often the majority—of the estimated value is captured by the "terminal value," which is a highly stylized calculation (e.g., perpetuity, constant growth, or empirical multiple). This is also the case when using the residual income model to value companies whose book value fails to capture important assets or liabilities, primarily internally-developed intangible assets. In contrast, for financial service companies book value is typically a good starting point for valuation, and accordingly the residual income model performs reasonable well. This is the main motivation for this study's focus on insurance companies.[2]

Equity book value is a reasonable starting point for valuing insurance companies for at least four reasons. First, the book values of many assets and liabilities of insurance companies are relatively close to fair values. Accordingly, book value—the difference between reported assets and liabilities—is reasonably close to intrinsic equity value. Second, unrecognized intangibles are relatively small in the insurance industry, as reflected in the low average price-to-book ratios of insurers. Third, due to regulation, insurers' ability to write premiums and generate income is directly related to their 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; this requirement makes book equity a relatively useful measure of the scale of insurers' operations.

The residual income model is likely to perform well in valuing insurance companies also

[2] In his discussion of the implied cost of capital literature, Easton (2007) calls for future research to investigate new methods or settings that facilitate more precise estimation of the ICEC.

because “steady state” residual income is relatively small for these companies. The insurance industry is highly competitive and thus any abnormal earnings are likely to fade away within a relatively short forecasting horizon. In addition, although the reporting of insurance contracts involves significant distortions, overall insurers’ financial statements are less conservatively biased compared to other industries. Indeed, the average price-to-book ratio of insurance companies is close to one, while for most other industries it is significantly greater than one. With relatively small steady state residual income, explicit forecasts of earnings and book value capture most of the modeled value, and the imprecise “terminal value” has a less significant role.

The ICEC estimates used in this study are obtained by inverting the residual income model, utilizing consensus analysts’ earnings forecasts as proxies for market expectations of future earnings. The sample covers all U.S. insurance companies with available data for any of the months during the period December 1981 through January 2010. The empirical analysis includes an evaluation of the time-series and cross-sectional properties of the implied cost of equity estimates, including average values, time-series variation, correlation with macro factors, ability to predict industry returns, correlation with firm-specific characteristics, and stock return predictability.

During most of the sample period, the monthly median equity risk premium of U.S. insurance companies fluctuated between 4% and 8%. However, during the financial crisis of 2008-2009, the median premium reached unprecedented levels: 21% for Life and Health (LH) insurers, 16% for all insurers, and 11% for Property and Casualty (PC) insurers. The mean over the period December 1981 through January 2010 of the monthly median risk premium was 6.2% for all insurers, 6.3% for LH insurers, and 6.2% for PC insurers. The mean value of the 10-year Treasury yield over the sample period was 6.8%, and thus the mean value of the ICEC was approximately 13% for the three groups.

Time-series tests reveal that the median equity risk premium is strongly related to macro risk factors in a way suggesting that investors demand relatively high returns in periods of poor economic performance or high uncertainty. In particular, the VIX, inflation, unemployment, and capacity utilization are positively related to the risk premium, while the 10-year Treasury yield, production, consumer sentiment, and the industry prior stock return are negatively related to the risk premium. The positive correlation with capacity utilization is possibly due to a correlation between capacity utilization and the demand for—and therefore cost of—equity capital. The negative correlation between the risk premium and Treasury yield is particularly strong, essentially eliminating the correlation between the ICEC and the risk premium.

The cross-sectional correlations between the equity risk premium and firm-specific risk factors are similarly consistent with expectations: the equity premium is positively related to market beta, idiosyncratic volatility, and the book-to-market ratio, and negatively related to co-skewness, size and the equity-to-assets ratio. Finally, consistent with the strong correlations between the equity risk premium and the macro- and firm-specific risk factors, the premium performs well in predicting stock returns in both time-series (industry) and cross-sectional (stock) tests.

The paper proceeds as follow. Section 2 reviews the residual income model, and Section 3 discusses implementation issues. The sample and data are described in Section 4. Results of the time-series (industry) analysis are provided in Section 5, while the cross-sectional analysis is described in Section 6. Section 7 concludes.

2. 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):

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

where r_e is the cost of common equity capital. Equation (1) 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 (1) can be restated in terms of comprehensive income available to common equity holders (Comprehensive Income or CI) and the book value of common equity (Common Equity or CE) by substituting the following relation for NEF_t:

$$NEF_t = CI_t - CE_t + CE_{t-1} \tag{2}$$

This relation postulates that changes in common equity are due to either comprehensive income available to common or to net equity flows. Given the definitions of NEF (discussed above) and comprehensive income (net income plus other comprehensive income), equation (2) accounts for essentially all changes in shareholders' equity, and it therefore provides a reasonable approximation for the actual relationship between net equity flows, earnings and book value.

Substituting equation (2) into (1),

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

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

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

Rearranging terms

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

And, finally, cancelling offsetting terms, we get

$$EV_0 = CE_0 + \sum_{t=1}^{\infty} E_0[CI_t - r_e CE_{t-1}] \times (1+r_e)^{-t+.5} \tag{3}$$

That is, equity value is equal to current book value 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,

$CI_t - r_e CE_{t-1}$.[3]

3. Implementing Residual Income Valuation

As mentioned above, I use consensus analysts' earnings forecasts to invert the residual income model and obtain an estimate of the ICEC (r_e). Unfortunately, this exercise cannot be implemented by inverting Equation (3) because this equation specifies equity value as a function of residual income in all future years, while forecasts are only available for finite horizons. To address this issue, most implementations assume that residual income follows some smooth pattern (e.g., a constant growth rate) after the explicit forecast period. This study uses a similar but slightly refined approach, which is discussed below.

Earnings forecasts are not the only forecasts required for implementing residual income valuation. Residual income is calculated by subtracting from earnings an estimate of the cost of beginning-of-period book value. Thus, to forecast residual income beyond the next year requires predictions regarding book value in addition to earnings. Unfortunately, book value forecasts are much less common than earnings forecasts. This issue is typically addressed by incorporating some payout assumption. To the extent that analysts use a different payout assumption in deriving their earnings forecasts, the book value forecasts and hence the estimated ICEC will be measured with error.

Another implementation issue is that earnings forecasts are provided primarily on a per share basis, while the derivation of the residual income model involves company-level aggregates. As noted by Ohlson (2005), the clean surplus relation (Equation (2)) does not hold

[3] Similar to the net equity flow model (equation (1)), which assumes that the present value of price at time T converges to zero as T converges to infinity, to derive equation (3) one has to assume that the present value of book value at time T converges to zero as T converges to infinity. See Ohlson (1995).

on a per share basis, which implies that estimates derived from per share implementations of residual income valuation necessarily involve measurement error.

A fourth source of error is the use of consensus analysts' earnings forecasts as proxies for market expectations of future earnings. Extensive research indicates that analysts' earnings forecasts measure market expectations with substantial error (e.g., Elgers and Lo 1994, Easton and Sommers 2007), which in turn affects the estimated cost of equity capital. While this source of error affects all valuation models that incorporate analysts' forecasts, the residual income model has a mechanism that mitigates the impact of the error. In residual income valuation, the earnings forecasts are used not only as proxies for future flows but also as drivers of future book values, which in turn are used in measuring subsequent residual income (residual income is earnings minus the product of the cost of equity capital and beginning-of-period book value). Thus, earnings forecast errors are partially offset by their impact on book value and hence residual income in subsequent periods. For example, overstated earnings in a given period imply overstated book value and hence understated residual income in subsequent periods.

The shortcomings of the residual income model discussed thus far relate to measurement error in the inputs to the model. In addition to these errors, the model itself may be incorrect. The dividend discount model—the starting point for the derivation of the residual income model—is based on simplifying assumptions (e.g., non-stochastic discount rates, no arbitrage), which are not likely to strictly hold. To the extent that these assumptions are violated, estimates of the implied cost of capital will contain error.

Finally, interpreting estimates of the ICEC as proxies for required returns involves some assumptions regarding investors' rationality or market efficiency. At a minimum, it is assumed that stock prices are consistent with market participants' assessments of expected stock returns and net equity flows. If this assumption (which is implied—but does not necessarily imply—market efficiency) does not hold, the ICEC is difficult to interpret.[4]

The above discussion suggests that implied cost of capital estimates necessarily contain measurement error. However, such estimates may still be informative, especially given that other approaches for estimating the cost of capital are not particularly precise. As discussed above, to reduce measurement error this study focuses on insurance companies for which the residual income model is likely to perform relatively well. To further mitigate measurement error concerns, the valuation model is implemented with some restrictions, which are described next.

For each insurer-month observation, I use the following implementation of the residual income model to estimate the ICEC (**r**$_e$):

$$\mathbf{p^c} = \left[\mathbf{BVPS_0} + \sum_{t=1}^{5} \frac{\mathbf{EPS_t} - \mathbf{r_e} \times \mathbf{BVPS_{t-1}}}{(\mathbf{1}+\mathbf{r_e})^{t-.5}} + \frac{\mathbf{1}}{(\mathbf{1}+\mathbf{r_e})^{4.5}} \times \mathbf{max}\left(\mathbf{0}, \frac{(\mathbf{EPS_5} - \mathbf{r_e} \times \mathbf{BVPS_4})(\mathbf{1}+\mathbf{TNX})}{\mathbf{PREM}}\right)\right] \times (\mathbf{1}+\mathbf{r_e})^{\mathbf{T}}$$

Where $\mathbf{P^c}$ (cum-dividend price) is the closing share price on the day IBES reports the consensus analysts' forecasts for that month (typically Thursday before the third Friday of every month), adjusted to include the total dividend per share between the end of fiscal year 0 (the most recent fiscal year for which financial information has been reported) and the price date.[5] The rationale for this adjustment is that the residual income model values each stock relative to the book value

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[4] ICEC estimates are often described as proxies for expected returns. For an ICEC estimate to measure expected returns, another condition (in addition to price consistency) is that the earnings forecasts are informative and unbiased.

[5] For example, assuming a December 31 fiscal year end in both 1999 and 2000, and that earnings are reported in March, the dividend adjustment for the January 2000 observation includes all dividends that become ex during January 1, 1999 through January 19 2000 (the pricing date in IBES for the January 2000 observation), while the dividend adjustment for the April 2000 observation includes dividends that become ex during January 1, 2000 through April 19, 2000 (the pricing date in IBES for the April 2000 observation).

at the beginning of the first residual income period (time 0, the beginning of period 1). Therefore, any dividend paid between time 0 and the price date reduces price but has no direct effect on the valuation.

The other variables are measured as follows. $\mathbf{BVPS_0}$ (book value per share at time 0) is calculated by dividing book value by shares outstanding, and is adjusted for stock splits and stock dividends between time 0 and the subsequent price date. $\mathbf{EPS_t}$ is the consensus (median) analysts' EPS forecast for fiscal year t, t = 1, …, 5, where t = 1 denotes the fiscal year that started at time 0. For many firms, forecasts for t = 3, 4, and 5 are not available. In such cases, I estimate the forecasts by assuming a steady rate of earnings growth equal to the consensus (median) long-term earnings growth forecast. $\mathbf{BVPS_t}$, for t = 1, …, 4, is forecasted using the following relation: $BVPS_t = BVPS_{t-1} + EPS_t - DPS_t$, where $\mathbf{DPS_t}$ is forecasted dividend per share for year t, t = 1, …, 5. DPS_1 is set equal to the indicated annual dividend per share as measured by IBES. DPS_t, t = 2, … , 5, is estimated by assuming that DPS will grow annually at the same rate as the consensus (median) long-term earnings growth forecast.

TNX is the Chicago Board Options Exchange (CBOE) 10-Year Treasury Yield Index, a proxy for the risk free interest rate, measured on the price date. **PREM** is the implied insurer/month-specific risk premium, which is being reverse-engineered. $\mathbf{r_e}$, the ICEC, is equal to the sum of TNX and PREM. The "**max**" term measures the present value of expected residual income in all years after year 5, as of the middle of year 5. It assumes that residual earnings will grow at a constant rate equal to TNX, the risk free rate. The rationale for this assumption is that in steady state firms are generally expected to grow at a rate consistent with the nominal long-term growth in overall economic activity, which in turn should be close to the long-term Treasury yield. The nominal long term growth rate is approximately equal to the total of expected inflation and real growth, while the Treasury yield is approximately equal to the total of expected inflation and the real rate of interest. Thus, to the extent that real interest rates predict real returns, which in turn determine real growth, the Treasury yield can serve as a proxy for nominal long-term growth. Given this assumption, the expression inside the max term should be familiar – it is essentially the Gordon Model applied to residual income.[6]

Because residual income measures return relative to the cost of equity capital, negative residual income means that the firm is generating a negative net return for shareholders, after accounting for the cost of equity capital. In the long run, companies that earn low returns are generally expected to take corrective actions to increase profitability to a level commensurate with the cost of equity capital. I therefore assume that expected residual income after year 5 is non-negative. If this assumption does not hold, the estimated implied equity risk premium of low profitability companies that without the adjustment would have negative expected residual income will be overstated (holding price constant, an overstated residual income implies an overstated discount rate).

The final term in the implied cost of capital equation adjusts the valuation for the expected increase in value from time 0 (the end of the most recent fiscal year for which financial results have been reported) through the current month, where T measures the length of this period.

4. Sample and Data

Insurance contracts are classified as either property and casualty (PC) or life and health (LH).

[6] According to the Gordon model, price is equal to d×(1+g)/(r-g), where d is dividend per share, g is the constant long-term growth rate, and r is the cost of equity capital. If the long term growth rate is equal to the risk free rate, r-g is equal to the risk premium (PREM in the above equation).

Most insurance companies specialize in either PC or LH insurance, but some have significant operations in both segments. In addition, while many insurers underwrite reinsurance policies (insurance sold to insurers), a few focus on reinsurance as their core activity. Insurers increasingly offer products and services which involve little or no insurance protection, such as investment products and fee-based services. The industry also includes companies that provide insurance brokerage services (sourcing of insurance contracts on behalf of customers). Reflecting this variation in activities, the Global Industry Classification (GIC) system classifies insurance companies as follows:

Life and Health Insurers (40301020) – Companies providing primarily life, disability, indemnity or supplemental health insurance (e.g., MetLife, Prudential, AFLAC).

Property and Casualty Insurers (40301040) – Companies providing primarily property and casualty insurance (e.g., Berkshire Hathaway, Allstate, Progressive).

Multi-line Insurers (40301030) – Companies with diversified interests in life, health, and property and casualty insurance (e.g., AIG, Hartford, Lowes).

Reinsurers (40301050) – Companies providing primarily reinsurance (e.g., Reinsurance Group of America, Everest Re Group, PartnerRe).

Insurance Brokers (40301010) – Companies providing insurance and reinsurance brokerage services (e.g., AON, Marsh & Mclennan, Willis).

The sample used in this study includes all insurance companies with data available in the intersection of three data sets: IBES, CRSP, and COMPUSTAT. Insurance companies are identified primarily using their GIC classification (industry GIC 403010), which is obtained from

COMPUSTAT. I use the current GIC classification but adjust past observations to the extent that information is available in the historical GIC file (for pre-classification observations I extrapolate GIC backwards from the earliest classification). When the GIC classification is not available (e.g., some companies that died before the implementation of GIC), I use the SIC classification instead.[7] To extend the coverage period, I extract stock return information subsequent to the last CRSP date from yahoo finance. I extract the economy-wide variables (e.g., interest rates, inflation, consumer sentiment, VIX) from the Federal Reserve Bank of St. Louis (http://research.stlouisfed.org/) and yahoo finance.

To mitigate the effects of outliers, I trim values of firm-specific variables which lie outside the upper and lower 0.5 percent of their pooled cross-section time-series distributions. Figure 1 plots the number of monthly observations during the sample period, which span December 1981 (the first month with available long-term forecasts from IBES) through January 2010. Separate plots are provided for all insurers ("All") as well as for the two primary sub-industries: Life and Health ("LH"), and Property and Casualty ("PC"). The number of observations from each of these groups varies significantly over the sample period. The average number of insurers is 95, with 27 LH insurers, 47 PC, and the rest classified as either multi-line insurance companies, reinsurers, or insurance brokers.

Table 1 presents summary statistics for characteristics of the insurance companies, including two size measures (book value of assets and market value of equity), the equity-to-

[7] Under the SIC classification, I include companies with two digit SIC 63 (Insurer carriers), other than those with four digit SIC 6324 (medical) and 6371 (pension). I also include companies with two digit SIC 64 (Insurance Agents, Brokers and Service). For the sub-industry tests, I classify four digit SIC 6311 (Life Insurance) and 6321 (Accident and Health Insurance) as LH, and four digit SIC 6331 (Fire, Marine, Casualty Insurance), 6351 (Surety Insurance), 6361 (Title Insurance), and 6399 (Insurance Carriers) as PC insurers. I classify four digit SIC 6411 (Insurance Agents, Brokers and Service) as Insurance Brokers (IB). There is no ML or Re classification under the SIC system.

asset ratio (inversely related to book leverage), the market-to-book ratio, and estimates derived from residual income valuations and market model regressions (discussed below). The book values of assets and equity are obtained from the quarterly COMPUSTAT dataset, and are assigned to the monthly observations based on the earnings report date so that each observation reflects the most recently reported values of the variables as of the end of the month. Market value of equity is measured at the end of the month.

LH insurers have substantially lower equity ratios compared to PC insurers (17.6% versus 29.3%). This suggests that LH insurers are more risky and should therefore have higher cost of equity capital. Such inference is premature, however, for at least two reasons. First, the difference in leverage is partially due to "separate accounts" which inflate the balance sheet of LH insurers. Separate accounts are similar to Assets Under Management (AUM) – insurers do not bear the risk or receive the return associated with these investments. Second, PC insurers are generally exposed to higher operating risks than LH insurers because both the frequency and magnitude of PC claims are more volatile than LH claims. PC losses are highly sensitive to catastrophic events such as hurricanes, earthquakes and terrorism acts, events which typically have limited effect on LH claims. In addition, the required payment for PC insurance claims depends on the insured's loss, while for LH insurance it is often the face value of the policy. Furthermore, the distribution of PC insurance claims at the firm level can be highly skewed and heavy-tailed, implying that stock returns for PC insurers are likely to be particularly non-normal and may therefore command an incremental risk premium.[8]

On the other hand, LH insurers have significant exposures to market factors that have

[8] See, for example, Cummins, Dionne, McDonald, and Pritchett (1990).

relatively little impact on PC insurers. Similar to banks, a significant portion of LH insurers' profits is derived from their spread business, that is, the difference between the yield on investment assets and the cost of the liabilities for future policyholders' benefits and policyholders' accounts.[9] This source of income is highly sensitive to changes in interest rates. In addition, LH insurers increasingly derive income from management and administrative fees on accounts whose balances are highly sensitive to market returns.[10] Finally, many LH insurers have significant non-linear exposure to market returns due to various minimum benefit guarantees, primarily related to variable annuity products.

The above discussion suggests that PC and LH insurers are likely to have different risk premiums. However, the estimates in Table 1 indicate that, at least on average, the equity risk premiums of the two groups are similar. The mean value of the implied equity risk premium across insurers and over time is 6.6% for LH, 6.9% for PC insurers, and 6.8% for all insurers (which also include multi-line, reinsurers and insurance brokers). These estimates were derived by inverting the residual income model as described in Section 3, with the 10-year Treasury yield used as the proxy for the risk free rate.

The variability of the equity risk premium across insurers and over time is not particularly high. For example, the inter-quartile range for all insurers is 3.1% (= 8% - 4.9%). However, there is significant variability in the tails of the distribution. The remainder of this

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[9] The liability for future policy benefits essentially measures past premium payments that are yet to be earned by the insurer (e.g., premium payments in the early years of a whole life policy effectively subsidize later payments and are therefore partially accounted for as an interest-accruing liability). Policyholders' accounts relate primarily to universal life policies and investment products and are similar to bank deposits. See Nissim (2010) for a detailed discussion of accounting by insurance companies.

[10] These include assets under management, separate accounts, and some accounts which are supported by general account assets. The balances in these accounts are affected by capital market performance both directly (the returns) and indirectly (net flows).

study investigates the macro and firm-specific factors which caused (or were correlated with) the variability in the implied risk premium as well as the implications of this variability for subsequent stock returns.

5. The Equity Risk Premium over Time

Figure 2 plots the monthly median values of the risk premium for each of the three groups (All insurers, LH, and PC) over the sample period. Surprisingly (given the differences in leverage, operations, and other characteristics across LH, PC and other insurers), the three plots are very similar for most of the period. However, from the middle of 2008 through late 2009, the equity risk premium of LH insurers increased dramatically to unprecedented levels. The equity risk premium of PC insurance also increased significantly during that period, but by far less than the increase for LH insurers. For most of the sample period, the median equity risk premium for each of the three groups was quite stable, fluctuating between 4% and 8%. However, in the early eighties the median premium was lower than 4% and, as mentioned, in 2008-2009 it reached very high levels. In late 2008 and early 2009, the median premium approached 21% for LH insurers, 16% for all insurers, and 11% for PC insurers.

Table 2 presents summary statistics from the distributions of the median equity risk premium for the three groups (All, LH, and PC), the corresponding median ICEC estimates, and the following macro variables: the **10-Year Treasury Yield** on the IBES date (Thursday before the third Friday of every month); the percentage change in CPI from its level twelve months ago, lagged by one month (**Inflation**);[11] the percentage change in the Industrial Production Index from its level twelve months ago, lagged by one month (**Production**); the previous month

[11] Inflation, production, unemployment, capacity utilization, and consumer sentiment are lagged by one month since their values are disclosed in the following month.

Unemployment rate; previous month **Capacity Utilization**; the previous month value of the University of Michigan **Consumer Sentiment** index; the **VIX** volatility index on the IBES date; the percentage change in the S&P index from its level twelve months ago through the IBES date (**S&P500_ret**); and the value weighted returns on portfolios consisting of the three groups (All, LH, and PC) during the twelve months ending on the IBES date (**All_ret**, **LH_ret**, and **PC_ret**, respectively).

The mean over the period December 1981 through January 2010 of the monthly median risk premium was 6.2% for all insurers, 6.3% for LH insurers, and 6.2% for PC insurers. As noted above, the slight difference between the LH and PC risk premiums is due to the extreme market conditions of 2008-2009. The mean value of the 10-year Treasury yield over the sample period was 6.8%, and thus the mean value of the ICEC was approximately 13% for the three groups. While these statistics are not identical to those derived from the pooled distributions in Table 1, the differences are small.[12]

Table 3 presents Pearson and Spearman correlations for the median equity risk premium, median ICEC, and the macro variables (Pearson below the diagonal, Spearman above). The number of monthly observations is 338 for all correlations except those involving VIX, for which it is 241 (the VIX is available since January 1990). Accordingly, correlation coefficients greater than 0.14 in absolute value are significant at the 1% level (greater than 0.17 for VIX correlations). As expected (given the patterns in Figure 2), the median equity risk premiums of LH and PC insurers are highly correlated with each other. More interestingly, the median premiums are strongly negatively related to the 10-year Treasury yield. Figure 3 demonstrates this correlation by plotting the median ICEC and its two-component—the equity risk premium

[12] The differences between the pooled means and the time-series means of the cross-sectional medians are due to the asymmetry of the monthly premium distributions and unevenness of the distribution of observations over time.

and the Treasury yield—over the sample period. In periods of high interest rates (e.g., the early eighties) the premium declined significantly, offsetting the increase in interest rates. Similarly, the 10 year Treasury rate declined significantly during the financial crises that started in 2007, partially offsetting the increase in the premium. Overall, the negative correlation between interest rates and the risk premium lowers the correlation between the ICEC and the risk premium to nearly zero. In contrast, the correlation between the ICEC and the Treasury rate is highly significant in spite of the negative correlation between the Treasury rate and the equity risk premium.

Figure 3 also indicates a significant negative trend in the ICEC during most of the sample period. This trend was abruptly broken as a result of the financial crisis of 2008-2009. Because the negative trend in the ICEC during the sample period resulted from a negative trend in interest rates, and interest rates have reached very low levels in recent years, any significant future decline in the ICEC can only result from a decrease in the equity risk premium. While the equity risk premium declined significantly since early 2009, as of January 2010 it is still high compared to historical levels, leaving much room for further decreases.

Turning back to the correlations in Table 3, the ICEC and its premium and Treasury rate components are highly correlated with several macro variables. A particularly strong positive correlation is observed for VIX. This is expected. At times of uncertainty—as captured by the VIX—investors demand high compensation for taking on risk. Some of the other correlations are also consistent with expectations. However, because many of the macro variables are highly correlated with each other, it is possible that at least some of the correlations between the macro variables and the equity premium are due to indirect relationships. For example, the negative correlation between inflation and the equity risk premium may simply reflect the high correlation between inflation and the 10 year Treasury yield, which in turn is strongly negatively correlated with the risk premium. Therefore, to identify partial correlations, I next regress the three equity premium estimates on the macro variables.

Table 4 reports estimates from seven time-series regressions. The first three include all the macro independent variables and explain each of the three risk premium measures—median equity risk premium across all insurers (All), LH insurers, and PC insurers. The independent variables in these regressions are identical except the measure of prior year industry return, which relates to the same industry or sub-industry as the dependent variable (i.e., All_ret for All, LH_ret for LH, and PC_ret for PC). The next three regressions (All2-All4) focus on All and omit the VIX variable which is available for only a portion of the sample period (January 1990 through January 2010). These three regressions differ in the period of coverage: January 1990 through January 2010 (All2), December 1981 through December 1989 (All3), and the full sample period (All4). The last regression covers the period January 1990 through December 2007, that is, it excludes the recent financial crisis. The dependent variables in all the regressions are measured in percentage points.

An examination of Figure 2 suggests that OLS estimation is likely to be inefficient and yield biased standard errors. The figure clearly demonstrates that there is strong positive autocorrelation in the premium and that there are periods of increased volatility (e.g., 2008-2009). I therefore use Generalized Autoregressive Conditional Heteroscedasticity (GARCH) estimation with autoregressive errors. The reported results reflect the following choice of parameters: AR(2)-GARCH(1,1). The inferences generally remain unchanged when using alternative sets of parameters or OLS.

In each of the seven regressions of Table 4, the 10-year Treasury yield is strongly negatively related to the equity risk premium. Also, the coefficient on VIX is positive and highly significant in each of the regressions that include this variable. While the Treasury yield and the VIX are the most significant explanatory variables, the other variables—except S&P500_ret—are significant in at least some of the regressions. In particular, inflation, unemployment and capacity utilization are positively related to the risk premium, while production, consumer sentiment, and the industry prior stock returns are negatively related to the risk premium. These results are generally consistent with expectations. Investors demand a relatively high risk premium when the economy is doing poorly or when there is high uncertainty. The only coefficient which is inconsistent with this interpretation is that of capacity utilization, which is positive rather than negative. This result may be due to capacity utilization reflecting demand shocks to capital, which in turn increase the cost of capital. The insignificance of S&P500_ret may be due to the high correlation between this variable and the industry stock return.

The coefficients of the AR(2)-GARCH(1,1) disturbance structure are also consistent with expectations and highly significant. In particular, there is a strong positive correlation between adjacent disturbances (the AR1 coefficients, which adjust the disturbance to mitigate autocorrelation, are negative and highly significant). Also, the conditional variance coefficients (ARCH1 and GARCH1) are both positive and significant, consistent with volatility clustering that gradually fades to normal levels.

The estimates in Table 4 indicate that the median equity risk premium is correlated with macro risk factors in a way consistent with the premium capturing expected excess stock returns. I next test this hypothesis more directly. Table 5 presents results from time-series regressions of the subsequent month value-weighted portfolio return corresponding to each of the three groups

(All, LH and PC) on the median equity risk premium and the 10-year Treasury yield. As expected, both coefficients are positive and significant. This result is important given the low predictability of stock returns. Prior studies have generally failed to document return predictability using ICEC estimates.

While the coefficients in Table 5 have the hypothesized sign, their magnitude is much higher than expected. If returns are expected to be earned evenly throughout the year, the coefficients should be slightly less than 10 (the dependent variables are measured in percentage points, unlike the independent variables). The high magnitude of the coefficients could be partially due to the use of medians in measuring the industry premium, which tend to smooth shocks to the firm-specific premiums, while the dependent variables measure value-weighted returns. Another potential explanation is that shocks to risk premiums and interest rates are due primarily to expected near-term volatility. Interestingly, OLS estimation (not reported) cuts the coefficients by half, and inclusion of the macro variables (Table 6) doubles the coefficients. Table 6's results further indicate that none of the macro variables is consistently significant in predicting stock returns, and that controlling for these variables does not attenuate the significance of the equity risk premium or Treasury yield in predicting stock returns.

6. Cross-sectional Analysis of the ICEC

Having examined the time-series properties, determinants, and predictability of the median equity risk premium, I next turn to a cross-sectional analysis. Table 7 presents summary statistics from 338 monthly regressions of two models: the equity risk premium regressed on firm-specific risk proxies, and the subsequent month stock return regressed on the risk premium and risk proxies. Similar to the time-series analysis in the previous section, the purpose of these regressions is to address the following questions: (1) what are the determinants of the ICEC? And, (2) do ICEC estimates predict stock returns? However, here I focus on cross-sectional rather than time-series correlations. I start by discussing the risk proxies and then turn to the regression analysis.

For many years, the most common approach for estimating the cost of equity capital has been the Capital Asset Pricing Model (CAPM), in spite of extensive research that demonstrates problems with this method. The fundamental premise of the CAPM is that the risk of a stock can be decomposed into two components – systematic risk, which is related to the overall market, and non-systematic (idiosyncratic) risk, which is specific to the individual stock. According to the CAPM, idiosyncratic shocks are not priced because their impact can be eliminated by holding a diversified portfolio. Systematic risk, in contrast, cannot be diversified away and therefore commands a risk premium. Under some stringent assumptions, systematic risk can be measured using the average sensitivity of the stock's return to the contemporaneous return on the market portfolio. This metric—called beta—is typically estimated using a time series regression of the stock's return on a proxy for the market return such as the S&P 500 (the "market model").

The CAPM assumes that stock returns are normally distributed or, alternatively, that investors care only about the mean and variance of returns. However, stock return distributions are heavy-tailed, and it appears that investors care about higher moments of the return distribution in addition to the mean and variance. In particular, studies have shown that negative co-skewness—that is, a tendency to perform particularly poorly when the market overall performs poorly—and kurtosis—a measure of the heaviness of the tails of a distribution—are both priced by investors.[13] In addition, contrary to the CAPM premise, idiosyncratic volatility is correlated with expected returns, although the sign of the correlation is negative rather than positive (Ang et al. 2006).

Research has also identified stock return predictors that use information incremental to that in the past distribution of returns. In particular, the market value of the equity (size) has been shown to be negatively related to subsequent stock returns, and this correlation has been attributed to size proxying for risk.[14] Compared to small firms, large firms are 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. In some industries, large companies may be considered "too big to fail." Size is also strongly correlated with stock liquidity. These relationships are in turn due to factors such as economies of scale and scope, bargaining power in input and output markets, life cycle effects (large firms have more mature products), access to capital markets, market attention (analysts, institutional investors), and active trading.

Another factor which should proxy for risk is financial leverage. There are several related reasons for this relationship. First, because creditors generally receive a constant return, the variability of the return generated on borrowed funds is absorbed by equity holders. Thus, financial leverage increases the variability of equity returns, which in turn implies that it increases both systematic and idiosyncratic risk as well as solvency risk. In addition, because debt capacity is restricted, high-debt firms have limited ability to borrow additional funds when

[13] Co-skewness measures the marginal contribution of a stock to the skewness of the market portfolio return, in the same way that the covariance (numerator of beta) represents the marginal contribution of the stock to the variance of the market portfolio return. For evidence regarding the pricing of co-skewness, see Harvey and Siddique (2000). Evidence regarding the pricing of kurtosis is provided by Dittmar (2002).

[14] See Banz (1981), and Fama and French (1996).

the need for such borrowing arises. Relatedly, high-debt firms are dependent on debt markets for continued refinancing and so are more sensitive to changes in interest rates, credit spreads, and funds availability, as was made evidently clear during the recent financial crisis.

Financial leverage also affects operating risks. When a firm's fortune declines, customers and other stakeholders often require additional consideration for transacting with the firm or even cease doing business with the firm, exacerbating the negative shock that caused the initial decline in fortune. Due to the impact of financial leverage on profitability, high leverage firms have an increased likelihood of experiencing a significant negative shock and therefore face greater operating risks than low leverage firms. This is especially true in the insurance industry, where financial stability is a critical element of the product provided by the insurer and, due to extensive regulation, affects its ability to generate business.

While the motivation for using financial leverage as a risk proxy is well grounded in theory, its empirical performance in predicting stock returns has generally been quite weak (e.g., Fama and French 1992). However, for the reasons discussed above, in the insurance industry the return predictability of financial leverage may be more significant.

Another financial ratio that is commonly used as a proxy for expected returns is the book-to-market ratio. Unlike financial leverage, this ratio has performed well in predicting stock returns, including in the financial sector (Barber and Lyon 1997). One explanation for the return predictability of the book-to-market ratio is that book value is a proxy for expected flows (e.g., dividends, earnings), while market value is a proxy for the present value of those flows. Thus, a relatively high book-to-market ratio implies that investors are using a relatively high discount rate in calculating the present value of the expected flows, which in turn implies high expected returns.

In addition to financial leverage and the book-to-market ratio, other fundamentals such as the cash flow-to-price ratio, earnings momentum, accruals, and asset growth have also been shown to predict stock returns (e.g., Subrahmanyam 2009). However, whether these factors are proxying for risk or market inefficiency is subject to debate. In addition, at least some of these variables are less relevant for financial service companies (e.g., cash flow versus accruals). Therefore, I focus here on size, leverage, book-to-market, and the return-based metrics (beta, idiosyncratic volatility, co-skewness and kurtosis) as the firm-specific proxies for risk and expected returns. Because the business risks of LH and PC insurance companies are quite different (see discussion in Section 4), I also include in the regressions dummy variables for LH and PC insurers.

The return-based metrics are derived from market model regressions, estimated using daily stock returns during the last twelve months (including the observation's month) and the return on the S&P 500 index. Beta is measured as the slope of the market model regression, idiosyncratic volatility is the RMSE of the regression, co-skewness is calculated using the market model residuals and the excess of S&P 500 returns over their mean (see Harvey and Siddique 2000), and kurtosis is the standardized fourth moment of the market model residual.

For each month during the period December 1981 through January 2010 (338 cross-sections), I run cross-sectional regressions of the equity risk premium and the subsequent month return on the risk proxies, where the subsequent stock return regression also includes the equity risk premium as an explanatory variable. Table 7 reports the time series means and t-statistics of the cross-sectional coefficients, where the t-statistics are calculated using Newey-West (1987) corrected standard errors.[15] Focusing first on the risk premium regressions, the results are consistent with expectations: the equity premium is positively related to market beta, idiosyncratic volatility, and the book-to-market ratio, and negatively related to co-skewness, size and the equity-to-asset ratio. The only insignificant variable is the kurtosis. The most significant correlation is with the equity-to-asset ratio, consistent with the importance of leverage in the insurance industry. The coefficients of the LH and PC dummy variables are both negative and significant, suggesting that LH and PC insurers are less risky than other insurance companies (multi-line insurance companies, reinsurers, and insurance brokers). Controlling for the risk proxies, the risk premium of LH insurers is smaller than that of PC insurers but the difference is insignificant.

Turning to the return predictability regressions, the results are only partially consistent with expectations. The equity risk premium and the book-to-market ratios are positively related to subsequent stock returns, but size is insignificant and the equity-to-asset ratio is positively related to subsequent stock returns. Consistent with prior studies, beta is insignificant and idiosyncratic volatility is negatively related to subsequent stock returns (Ang et al. 2006). The difference in the coefficient of idiosyncratic volatility between the two regressions is particularly large. It appears that ex-ante investors are pricing the volatility, but ex-post stock returns are significantly lower for high volatility firms. One possible explanation for this perplexing result is that analysts' earnings forecasts for high volatility firms are biased upward. Such a bias would strengthen the positive ex-ante correlation and create a negative ex-post correlation to the extent that it subsequently unfolds.

[15] The Newey-West standard errors are calculated with 11 lags, consistent with the 11 month overlap of successive observations in the returns used to derive the independent variables. The results are similar when using alternative lags.

7. Conclusion

This paper derives and evaluates estimates of the ICEC of U.S. insurance companies by inverting the residual income model, utilizing consensus analysts' earnings forecasts as proxies for market expectations of future earnings. During most of the period December 1981 through January 2010, the monthly median implied equity risk premium ranged between 4% and 8%, with a time-series mean of 6.2%. However, during the financial crisis of 2008-2009, the equity premium reached unprecedented levels, exceeding 15% in November 2008. Consistent with investors demanding relatively high stock returns in periods of poor economic performance or high uncertainty, the premium was positively related to the VIX, inflation, and unemployment, and negatively related to the 10-year Treasury yield, production, consumer sentiment, and prior industry stock returns. The premium was also positively correlated with capacity utilization, possibly reflecting a correlation between capacity utilization and the demand for—and therefore cost of—equity capital.

The cross-sectional correlations between the implied equity risk premium and firm-specific risk factors are similarly consistent with expectations: the equity premium is positively related to market beta, idiosyncratic volatility, and the book-to-market ratio, and negatively related to co-skewness, size and the equity-to-asset ratio. Finally, consistent with the strong correlations between the implied equity risk premium and the macro- and firm-specific risk factors, the premium performed well in predicting stock returns in both time-series (industry) and cross-sectional (stock) tests.

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Figure 1
Number of Monthly Observations

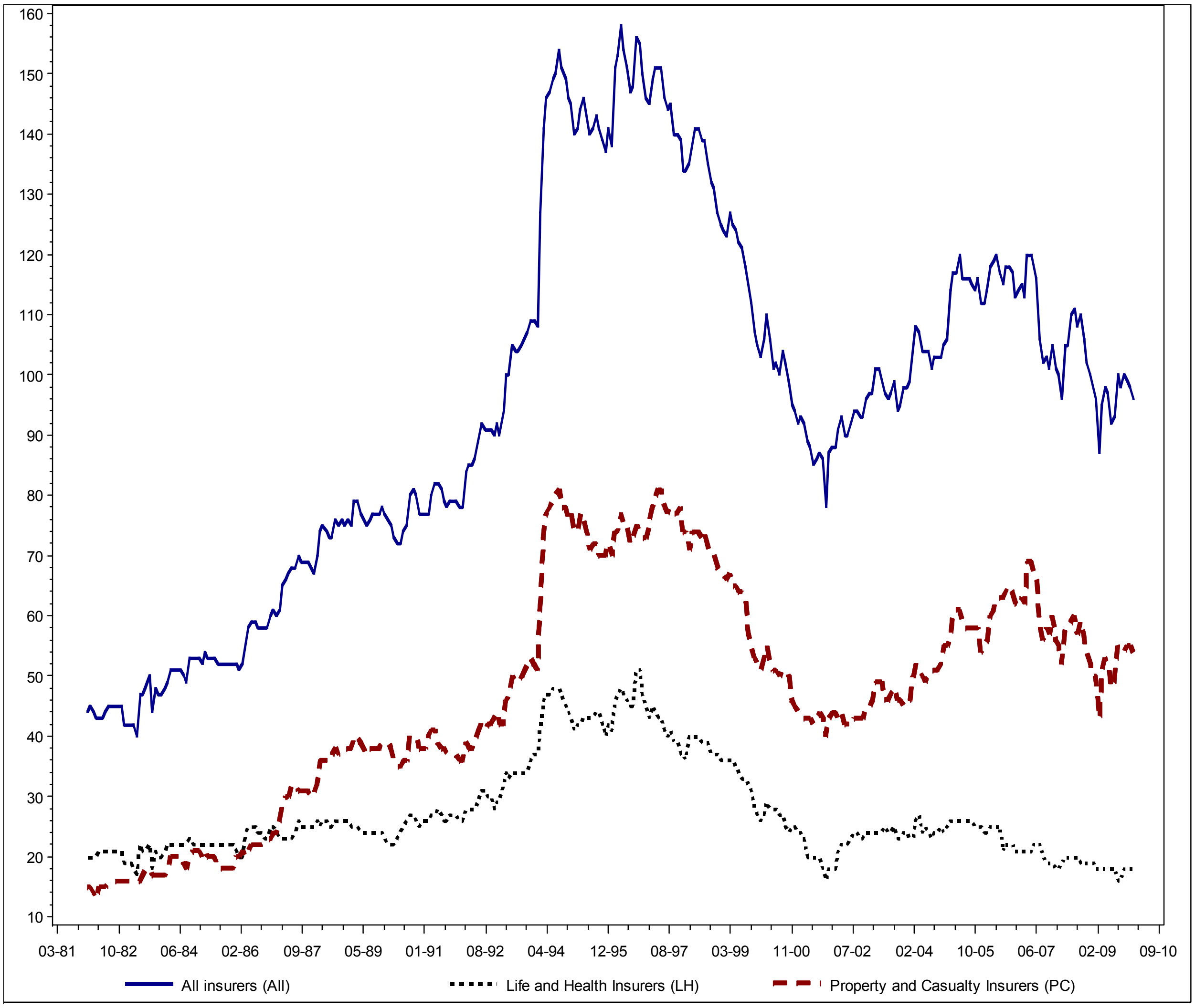

Figure 2
U.S. Insurers' Monthly Median Equity Risk Premium

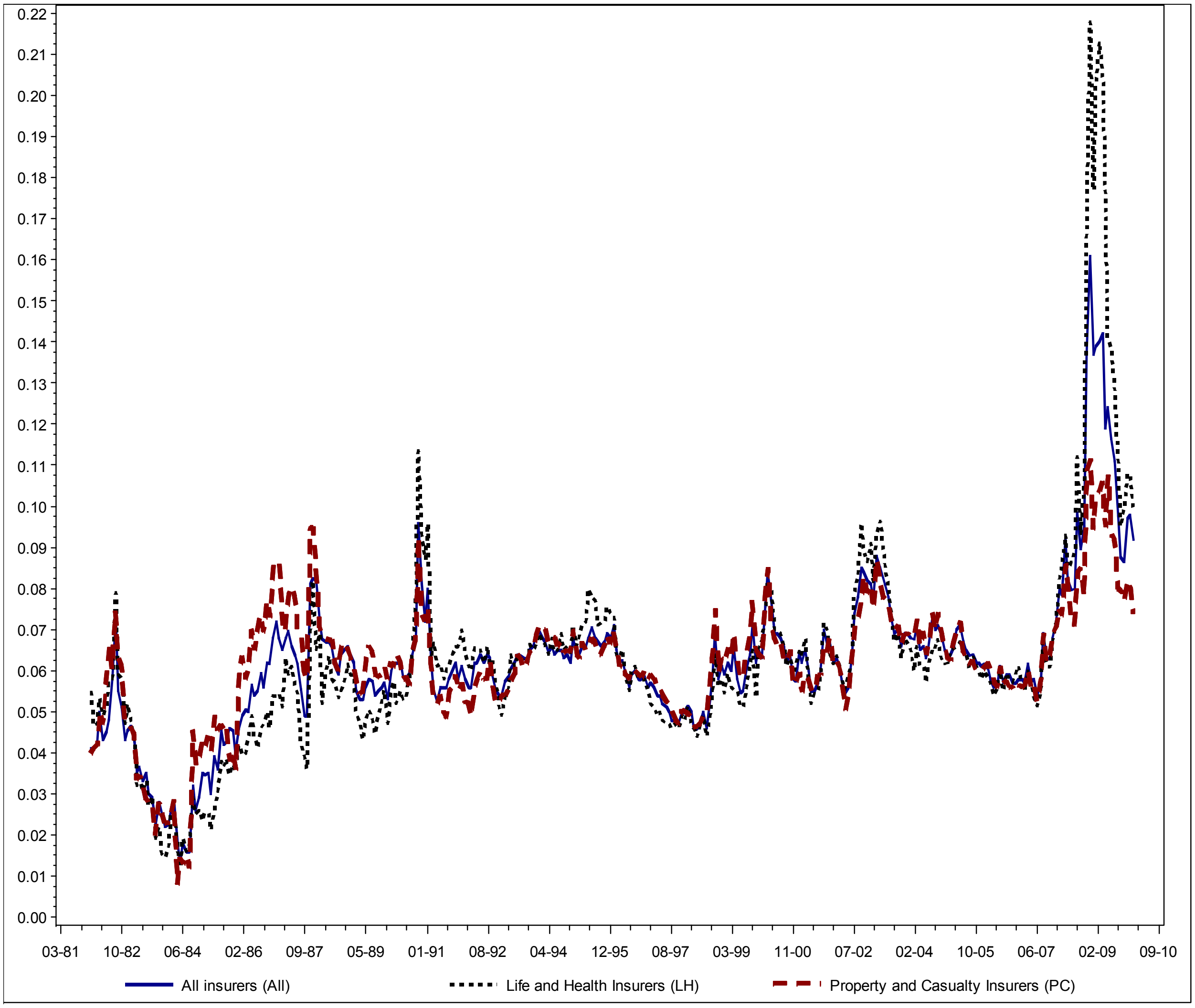

Figure 3
U.S. Insurers' Monthly Median Implied Cost of Equity Capital

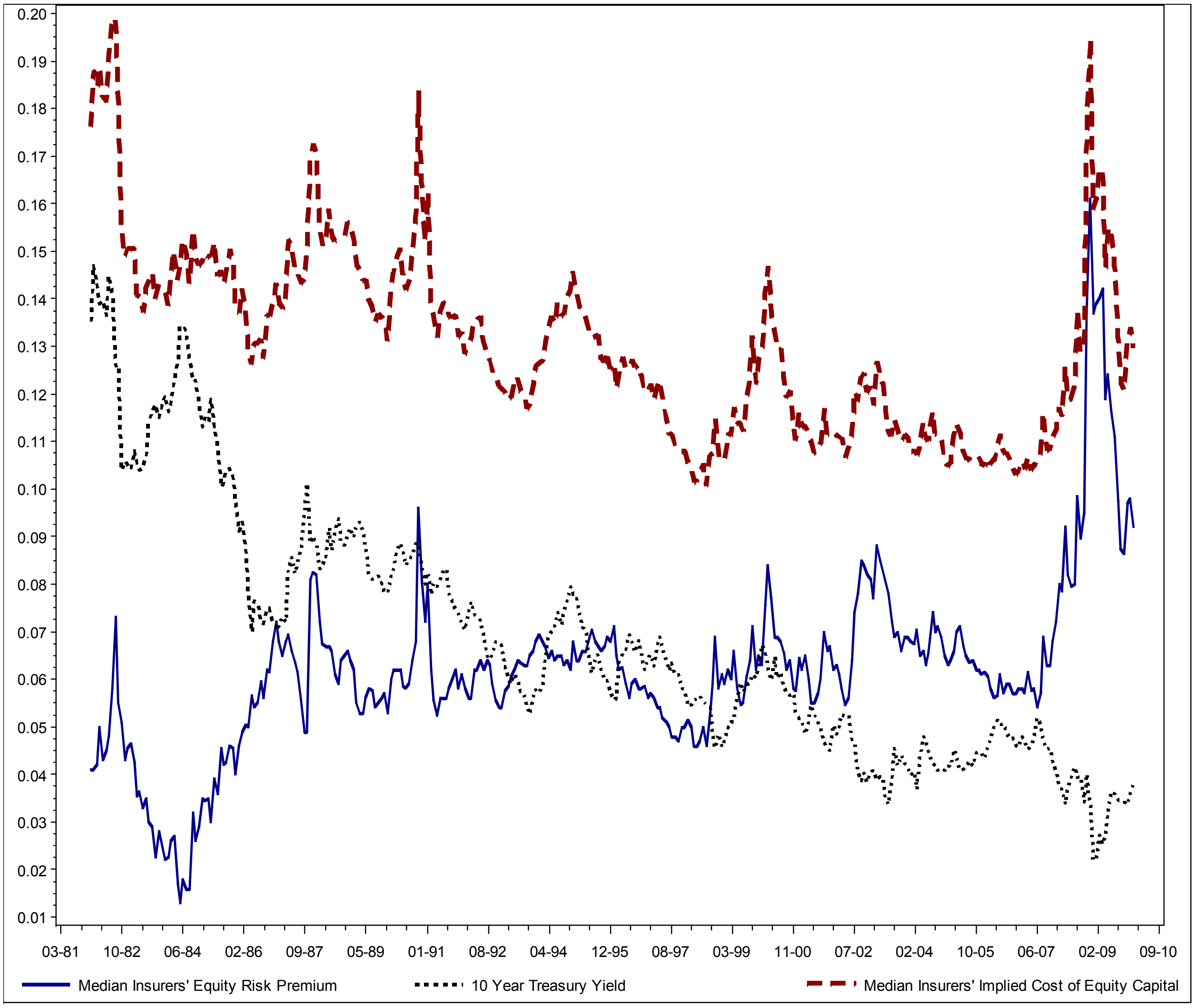

Table 1
Summary Statistics

	Mean	SD	5%	25%	Median	75%	95%
All insurers (29,525 observations)							
Total assets	19,099	59,665	159	888	3,104	12,132	82,677
Equity-to-assets ratio	0.261	0.163	0.062	0.141	0.227	0.343	0.589
Market value of equity	2,931	6,443	73	320	943	2,728	12,297
Book-to-market ratio	0.989	1.899	0.270	0.524	0.737	0.989	1.796
Equity risk premium	0.068	0.033	0.026	0.049	0.062	0.080	0.132
Implied cost of equity capital	0.130	0.033	0.090	0.108	0.124	0.144	0.194
Equity beta	0.664	0.391	0.092	0.375	0.638	0.904	1.356
Idiosyncratic volatility	0.020	0.010	0.010	0.013	0.017	0.023	0.040
Co-skewness	-0.029	0.157	-0.292	-0.122	-0.025	0.069	0.218
Kurtosis	5.526	8.436	0.461	1.485	2.820	5.801	20.274
Life and Health (LH) Insurers (8,376 observations)							
Total assets	29,953	73,446	211	1882	7,710	23,470	120,344
Equity-to-assets ratio	0.176	0.127	0.047	0.085	0.141	0.225	0.455
Market value of equity	3,013	5,689	78	309	1,100	3,058	12,683
Book-to-market ratio	1.149	2.005	0.351	0.599	0.820	1.123	2.434
Equity risk premium	0.066	0.035	0.018	0.046	0.060	0.078	0.130
Implied cost of equity capital	0.132	0.033	0.093	0.109	0.126	0.146	0.196
Equity beta	0.714	0.394	0.125	0.426	0.704	0.946	1.407
Idiosyncratic volatility	0.020	0.010	0.009	0.013	0.017	0.023	0.041
Co-skewness	-0.032	0.162	-0.302	-0.124	-0.031	0.065	0.237
Kurtosis	5.928	9.383	0.480	1.471	2.811	5.968	22.340
Property and Casualty (PC) insurers (13,942 observations)							
Total assets	9,183	21,607	175	810	2,134	6,587	50,613
Equity-to-assets ratio	0.293	0.143	0.115	0.193	0.266	0.368	0.590
Market value of equity	2,717	6,583	65	290	761	2,320	11,376
Book-to-market ratio	0.851	0.742	0.343	0.557	0.744	0.961	1.573
Equity risk premium	0.069	0.032	0.030	0.050	0.063	0.081	0.133
Implied cost of equity capital	0.128	0.033	0.088	0.106	0.122	0.141	0.195
Equity beta	0.635	0.380	0.073	0.351	0.604	0.881	1.296
Idiosyncratic volatility	0.020	0.009	0.010	0.014	0.018	0.024	0.037
Co-skewness	-0.031	0.155	-0.294	-0.123	-0.026	0.068	0.214
Kurtosis	5.128	7.841	0.445	1.473	2.730	5.433	18.171

The summary statistics were derived from the pooled cross-section time-series distributions of insurer/month observations during the period December 1981 through January 2010. The book value of assets and equity were obtained from the quarterly COMPUSTAT datasets and assigned to the monthly observations based on the earnings report date so that each observation reflects the most recently reported values of the variables as of the end of the month. Market value of equity is measured at the end of the month. The implied cost of equity and equity risk premium estimates were calculated by inverting the residual income model as described in Section 3. The return-based metrics were derived from market model regressions, estimated using daily returns during the last twelve months (including the observation's month) and the return on the S&P 500 index. These statistics are market beta (the slope of the market model regression), idiosyncratic volatility (the RMSE), co-skewness (a statistic derived using the market model residuals and excess S&P 500 returns over their mean, calculated as in Harvey and Siddique 2000), and the kurtosis (the standardized fourth moment of the market model residual).

Table 2
Time-Series Distribution of U.S. Insurers' Median Equity Risk Premium, Median Implied Cost of Equity Capital, and Selected Macro Variables

	Mean	SD	5%	25%	Median	75%	95%
Median equity premium – All	6.2%	1.9%	3.0%	5.5%	6.2%	6.8%	9.2%
Median equity premium – LH	6.3%	2.7%	2.6%	5.1%	6.0%	6.7%	10.0%
Median equity premium – PC	6.2%	1.5%	3.4%	5.6%	6.2%	6.9%	8.6%
10 year Treasury yield	6.8%	2.7%	3.6%	4.7%	6.3%	8.3%	12.3%
Implied cost of capital – All	13.1%	2.0%	10.6%	11.2%	12.9%	14.3%	16.7%
Implied cost of capital – LH	13.1%	2.4%	10.4%	11.1%	12.9%	14.1%	18.7%
Implied cost of capital – PC	13.0%	2.1%	10.4%	11.2%	12.6%	14.4%	16.5%
Inflation	3.2%	1.5%	1.2%	2.3%	3.0%	4.0%	5.5%
Production	2.0%	4.2%	-6.4%	0.5%	2.5%	4.6%	7.7%
Unemployment	6.1	1.6	4.2	5.0	5.7	7.0	9.7
Capacity utilization	79.8	3.7	72.2	78.1	80.6	82.8	84.4
Consumer sentiment	88.8	12.0	65.4	82.7	91.4	95.6	106.8
VIX	20.3	8.8	11.3	14.3	18.4	23.7	35.9
S&P500_ret	9.1%	17.8%	-22.0%	-1.0%	10.9%	21.2%	34.3%
All_ret	13.7%	22.0%	-19.7%	-0.2%	13.1%	27.6%	50.3%
LH_ret	15.6%	23.9%	-23.2%	-0.4%	17.6%	30.5%	53.5%
PC_ret	14.6%	21.6%	-18.2%	0.1%	13.9%	28.9%	53.1%

All variables are measured at monthly frequency. For all variables except VIX, the sample period is December 1981 through January 2010 (338 observations). For VIX the sample period is January 1990 through January 2010 (241 observations). The equity risk premium is derived by inverting the residual model, utilizing consensus analysts' earnings forecasts, as described in Section 3. "**All**" denotes the median across all insurance companies. "**LH**" ("**PC**") denotes the medians across all companies for the Life and Health (Property and Casualty) insurance sub-industry. The **10-Year Treasury Yield** is measured using TNX—the CBOE 10-Year Treasury Yield Index. **Inflation** is the percentage change in the "Consumer Price Index for All Urban Consumers: All Items Seasonally Adjusted (CPIAUCSL)" from its level twelve months ago. **Production** is the percentage change in the "Industrial Production Index Seasonally Adjusted (INDPRO)" from its level twelve months ago. **Unemployment** is the "Civilian Unemployment Rate Seasonally Adjusted (UNRATE)." **Capacity Utilization** is the "Capacity Utilization: Total Industry Seasonally Adjusted (TCU)." **Consumer Sentiment** is the "University of Michigan: Consumer Sentiment Not Seasonally Adjusted (UMCSENT)." **VIX** is the ticker symbol for the Chicago Board Options Exchange Volatility Index, which measures the implied volatility of the S&P 500 index. **S&P500_ret** is the percentage change in the S&P index from its level twelve months ago. **All_ret** is the value weighted return on a portfolio consisting of all the sample insurance companies during the last twelve month. **LH_ret** (**PC_ret**) is the value weighted return on a portfolio consisting of all the sample LH (PC) insurance companies during the last twelve month.

Table 3
Time-Series Correlations of U.S. Insurers' Median Equity Risk Premium, Median Implied Cost of Equity Capital, and Selected Macro Variables

			V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12	V13	V14	V15	V16	V17
V1	=	Median equity premium – All	.	0.91	0.92	-0.62	-0.05	0.05	-0.16	-0.24	-0.15	-0.14	-0.1	-0.3	0.26	-0.4	-0.59	-0.57	-0.57
V2	=	Median equity premium – LH	0.96	.	0.75	-0.61	-0.08	0.12	-0.22	-0.19	-0.21	-0.09	-0.12	-0.41	0.2	-0.46	-0.57	-0.55	-0.52
V3	=	Median equity premium – PC	0.92	0.8	.	-0.51	0.05	0.08	0.01	-0.25	-0.16	-0.08	-0.11	-0.21	0.31	-0.29	-0.57	-0.57	-0.58
V4	=	10 year Treasury yield	-0.66	-0.58	-0.61	.	0.7	0.59	0.81	0.55	0.19	0.41	0.24	0.12	-0.25	0.21	0.25	0.17	0.22
V5	=	Implied cost of capital – All	0.07	0.14	0.06	0.7	.	0.95	0.94	0.49	-0.09	0.6	-0.02	-0.24	0.17	-0.17	-0.22	-0.29	-0.24
V6	=	Implied cost of capital – LH	0.33	0.47	0.21	0.45	0.91	.	0.84	0.47	-0.14	0.6	-0.06	-0.35	0.19	-0.28	-0.31	-0.38	-0.31
V7	=	Implied cost of capital – PC	-0.17	-0.15	-0.05	0.82	0.93	0.73	.	0.5	0.02	0.53	0.08	-0.09	0.08	-0.02	-0.1	-0.19	-0.14
V8	=	Inflation	-0.33	-0.29	-0.29	0.62	0.52	0.36	0.58	.	-0.05	0.12	0.14	-0.23	-0.2	-0.19	0	-0.01	0.01
V9	=	Production	-0.49	-0.54	-0.39	0.2	-0.2	-0.37	-0.04	0.11	.	-0.3	0.7	0.6	-0.26	0.21	0.05	0	0
V10	=	Unemployment	-0.1	0.01	-0.19	0.49	0.56	0.54	0.49	0.08	-0.42	.	-0.5	-0.48	-0.15	-0.08	0.01	0.05	0.05
V11	=	Capacity utilization	-0.28	-0.35	-0.17	0.1	-0.13	-0.28	0.01	0.23	0.76	-0.62	.	0.47	-0.27	0.28	0.16	0.03	0.09
V12	=	Consumer sentiment	-0.44	-0.53	-0.3	0.01	-0.4	-0.57	-0.2	-0.22	0.66	-0.54	0.54	.	-0.01	0.38	0.27	0.17	0.18
V13	=	VIX	0.66	0.66	0.6	-0.33	0.41	0.53	0.16	-0.16	-0.43	0.04	-0.41	-0.23	.	-0.29	-0.37	-0.39	-0.39
V14	=	S&P500_ret	-0.52	-0.57	-0.4	0.16	-0.27	-0.45	-0.08	-0.07	0.39	-0.04	0.37	0.48	-0.55	.	0.71	0.64	0.61
V15	=	All_ret	-0.64	-0.65	-0.57	0.24	-0.29	-0.45	-0.11	0.06	0.26	0.01	0.27	0.4	-0.53	0.77	.	0.94	0.96
V16	=	LH_ret	-0.64	-0.65	-0.59	0.19	-0.35	-0.5	-0.18	0.06	0.22	0.06	0.17	0.29	-0.54	0.7	0.94	.	0.92
V17	=	PC_ret	-0.57	-0.55	-0.55	0.2	-0.27	-0.38	-0.14	0.04	0.15	0.08	0.15	0.27	-0.45	0.64	0.96	0.91	.

Pearson (Spearman) correlations are reported below (above) the diagonal. For all correlations except those involving VIX, the sample period is December 1981 through January 2010 (338 observations). For correlations involving VIX the sample period is January 1990 through January 2010 (241 observations). See Table 2 for variables definitions.

Table 4
Time-Series Regressions of U.S. Insurers' Median Equity Risk Premium on Selected Macro Variables

	All	LH	PC	All2	All3	All4	All5
Intercept	-4.641	-1.473	-3.292	6.244	10.710	0.878	-4.031
	-1.1	-0.3	-0.6	1.1	0.8	0.2	-0.9
10 year Treasury yield	-51.882	-62.759	-42.863	-59.559	-71.878	-65.486	-45.371
	-7.5	-5.9	-4.7	-8.5	-9.3	-18.1	-5.3
Inflation	23.154	6.779	14.356	9.207	13.110	15.687	22.880
	4.8	0.9	2.3	1.3	0.9	2.4	3.4
Production	-7.761	-1.882	-7.261	-0.656	-8.332	-5.034	-2.138
	-2.7	-0.4	-1.7	-0.2	-1.6	-1.5	-0.6
Unemployment	0.301	0.270	0.104	-0.123	-0.020	0.230	0.337
	2.3	1.4	0.7	-1.0	-0.1	2.4	2.2
Capacity utilization	0.150	0.106	0.133	0.042	0.061	0.093	0.139
	3.0	1.4	1.9	0.6	0.4	1.6	2.4
Consumer sentiment	-0.010	0.002	0.000	0.003	-0.033	0.003	-0.012
	-2.2	0.4	-0.1	0.6	-1.8	0.5	-2.3
VIX	0.057	0.047	0.046				0.045
	12.0	8.2	7.5				7.7
S&P500_ret	0.288	-0.871	0.742	-0.459	-0.902	-0.266	0.758
	0.5	-1.1	1.1	-0.8	-0.8	-0.4	1.3
All_ret / LH_ret / PC_ret	-2.120	-0.690	-2.079	-1.089	-2.519	-1.458	-2.290
	-5.9	-1.5	-4.6	-2.7	-2.8	-3.1	-6.0
AR1	-0.823	-0.949	-0.671	-0.967	-0.906	-0.937	-0.892
	-10.7	-10.2	-7.5	-12.3	-7.3	-13.7	-8.1
AR2	-0.052	0.033	-0.240	0.012	0.301	0.036	-0.005
	-0.7	0.4	-2.7	0.2	2.8	0.5	0.0
ARCH0	0.065	0.026	0.018	0.004	0.075	0.016	0.063
	7.2	2.3	1.5	1.4	6.8	2.8	7.3
ARCH1	0.815	0.483	0.181	0.568	0.000	0.530	0.459
	3.8	4.5	2.0	3.7	0.0	4.8	2.4
GARCH1	0.000	0.528	0.709	0.630	0.570	0.594	0.000
	0.0	5.7	5.3	8.4	294.3	8.0	0.0
R-squared	0.939	0.920	0.883	0.889	0.933	0.920	0.844
Observations	241	241	241	241	97	338	216

The table reports summary statistics from time-series regressions. The sample period for the first four regressions is January 1990 through January 2010. For the other regressions, the sample period is December 1981 through December 1989 (All3), December 1981 through January 2010 (All4), and January 1990 through December 2007 (All6). Variable definitions are provided in Table 2. The dependent variables are measured in percentage points. AR1 and AR2 are the coefficients on the corresponding lagged values of the error terms, required to correct for autocorrelation in the residual (a negative coefficient corrects for positive autocorrelation). ARCH0 is used to model the unconditional variance, while ARCH1 (GARCH1) captures short-term (long-term) persistence in the variance.

Table 5
Time-Series Regressions of Subsequent Month Value-Weighted Portfolio Returns for U.S. Insurers on Components of the Median Implied Cost of Equity Capital

	All	LH	PC
Intercept	-5.845	-3.577	-3.784
	-2.1	-1.3	-1.6
Median equity risk premium – All / LH / PC	68.375	55.33	44.31
	2.3	1.9	1.7
10 year Treasury yield	48.232	29.637	36.585
	2.8	1.6	2.4
AR1	-0.187	-0.172	-0.146
	-3.0	-2.4	-2.5
AR2	0.078	0.046	0.057
	1.2	0.6	0.9
ARCH0	4.152	2.975	2.605
	2.5	1.8	1.9
ARCH1	0.404	0.231	0.212
	3.8	3.3	2.9
GARCH1	0.495	0.721	0.692
	4.2	8.0	6.7
R-squared	0.014	0.034	0.023
Observations	338	338	338

The table reports summary statistics from time-series regressions for the period December 1981 through January 2010. Variable definitions are provided in Table 2. The dependent variables are measured in percentage points. AR1 and AR2 are the coefficients on the corresponding lagged values of the error terms, required to correct for autocorrelation in the residual (a negative coefficient corrects for positive autocorrelation). ARCH0 is used to model the unconditional variance, while ARCH1 (GARCH1) captures short-term (long-term) persistence in the variance.

Table 6
Time-Series Regressions of Subsequent Month Value-Weighted Portfolio Returns for U.S. Insurers on Components of the Median Implied Cost of Equity Capital and Selected Macro Variables

	All	LH	PC	All2	All3	All4	All5
Intercept	15.16	52.13	9.048	20.98	-57.19	-23.28	-38.62
	0.7	1.9	0.4	0.9	-0.5	-1.5	-1.4
Median equity risk premium – All / LH / PC	123.7	118.0	151.9	96.93	48.66	63.27	153.6
	2.1	2.0	2.7	1.8	0.4	1.4	2.3
10 year Treasury yield	126.5	119.9	114.2	100.8	91.56	44.37	-9.696
	2.4	2.0	2.4	2.1	0.8	1.3	-0.2
Inflation	-43.71	-35.39	-6.872	-32.02	-116.2	-23.86	22.85
	-0.9	-0.7	-0.2	-0.7	-1.0	-0.6	0.4
Production	25.30	13.75	14.68	21.43	-44.78	-4.779	7.381
	1.3	0.6	0.8	1.1	-1.0	-0.3	0.3
Unemployment	-0.905	-1.771	-0.088	-0.798	0.767	0.205	0.286
	-1.5	-2.3	-0.2	-1.4	0.3	0.4	0.4
Capacity utilization	-0.198	-0.501	-0.328	-0.242	0.525	0.214	0.367
	-0.7	-1.6	-1.3	-0.9	0.4	1.2	1.2
Consumer sentiment	-0.095	-0.150	0.034	-0.083	0.072	0.004	-0.047
	-1.7	-2.4	0.7	-1.5	0.4	0.1	-0.8
VIX	0.059	-0.081	-0.039				0.154
	0.9	-1.1	-0.7				2.4
S&P500_ret	3.147	6.453	2.437	3.790	-5.859	-0.091	2.584
	0.8	1.4	0.7	1.1	-0.8	0.0	0.7
All_ret / LH_ret / PC_ret	0.249	0.379	1.696	-0.589	0.096	-0.025	0.669
	0.1	0.1	0.6	-0.2	0.0	0.0	0.2
AR1	-0.109	-0.087	-0.077	-0.101	-0.199	-0.182	-0.007
	-1.3	-0.9	-1.0	-1.2	-1.6	-2.7	-0.1
AR2	-0.019	0.001	-0.045	0.020	0.151	0.079	-0.111
	-0.2	0.0	-0.5	0.2	1.3	1.1	-1.7
ARCH0	3.306	0.823	2.575	2.843	24.92	4.110	10.61
	1.9	1.1	1.8	1.9	6.5	2.3	5.7
ARCH1	0.494	0.264	0.260	0.433	0.000	0.346	0.507
	3.0	3.7	2.7	2.8	0.0	3.4	3.2
GARCH1	0.455	0.767	0.627	0.516	0.000	0.539	0.000
	3.2	12.8	5.0	3.8	0.0	4.4	0.0
R-squared	0.066	0.061	0.048	0.060	0.121	0.030	0.073
Observations	241	241	241	241	97	338	216

The table reports summary statistics from time-series regressions. The sample period for the first four regressions is January 1990 through January 2010. For the other regressions, the sample period is December 1981 through December 1989 (All3), December 1981 through January 2010 (All4), and January 1990 through December 2007 (All6). Variable definitions are provided in Table 2. The dependent variables are measured in percentage points. AR1 and AR2 are the coefficients on the corresponding lagged values of the error terms, required to correct for autocorrelation in the residual (a negative coefficient corrects for positive autocorrelation). ARCH0 is used to model the unconditional variance, while ARCH1 (GARCH1) captures short-term (long-term) persistence in the variance.

Table 7
Regressions Examining the Determinants and Stock Return Predictability of Firm-Specific Equity Risk Premium Estimates

	Equity Risk Premium	Next Month Stock Return
Intercept	11.24	1.082
	8.0	1.2
Equity risk premium		0.087
		2.7
Market beta	0.885	-0.212
	2.4	-0.7
Idiosyncratic volatility	69.83	-54.63
	4.3	-4.5
Co-skewness	-1.055	-0.518
	-4.1	-1.1
Kurtosis	-0.013	0.014
	-1.1	1.0
Log of market value of equity (size)	-0.403	0.009
	-3.8	0.1
Log of the book-to-market ratio	0.555	0.325
	3.1	1.9
Equity-to-asset ratio	-2.686	1.119
	-5.5	2.2
Dummy for LH insurers	-0.762	0.260
	-5.4	1.8
Dummy for PC insurers	-0.531	0.239
	-3.9	1.5
Mean R-squared	0.385	0.241
Mean number of observations	82	81

The table reports time-series means and t-statistics of coefficients from 338 cross-sectional monthly Fama-MacBeth regressions (December 1981 through January 2010). The t-statistics are calculated using Newey-West corrected standard errors. Variable definitions are provided in Table 1. The dependent variables are measured in percentage points.