Research Brief

YOUR WORKERS COMPENSATION RESOURCE—Comprehensive Data, Objective Analysis, Meaningful Results

May 2014

By Harry Shuford

Understanding What Drives the Underwriting Cycle

The financial performance of the property and casualty (P&C) industry features a little-recognized set of trends and a widely discussed series of cycles. This paper examines both and concludes that each reflects a predictable response to a common driver—the business cycle and economic trends in general and investment income in particular. The paper provides a description of the conceptual link between underwriting and investment results. The challenge of trying to maintain a reasonable balance between these two fundamental measures of financial performance drives the underwriting cycle.

The analysis begins with the familiar underwriting cycle—a real phenomenon that has been attributed to a range of diverse factors. For more than half a century, both academic and industry observers have tried to bring clarity to discussions of this irregular event.[1] To many, the wide swings in underwriting performance reflect irrational market behavior; an irrationality that is baffling to many observers because the industry seems incapable of correcting its behavior.[2] Key themes have included "cash flow underwriting," "excess capacity," "cutthroat competition," and "building market share." The analysis in the initial section of the paper will discuss these elements of the underwriting cycle, and it will become clear that this cycle is merely the predictable outcome of the environment in which the P&C industry operates. Indeed, this analysis clarifies why every hard market has followed an economic recession. The second section highlights the trends in P&C financial performance that underlie the underwriting cycle. Again, economic factors and especially investment returns appear to be the key drivers. The paper concludes with a simple model of financial intermediation to describe the link between underwriting performance and investment returns; describing "everything you need to know to understand the financial drivers of the P&C underwriting cycle".

The Underwriting Cycle Defined

There are at least two popular descriptions of the underwriting cycle: one focuses on underwriting profitability, the other on underwriting terms and conditions. They reflect the perspectives of the two major market participants. Insurers feel the pain when underwriting losses surge; policyholders grimace when insurers raise premium rates and tighten underwriting standards. The former occurs following the onset of the "soft" part of the market cycle, the latter when the market "hardens."

Thus the pattern of underwriting profitability offers one approach to identifying the timing of the underwriting cycle. Chart 1 traces the movement of calendar-year underwriting profit margins for the past 35 years. It indicates that over this period, there have been three periods that due to marked improvement in underwriting performance could be identified as pronounced hard markets (beginning in 1975, 1985, 2001); each was followed by a period of deteriorating underwriting results, the sign of a market softening.

[1] See "Underwriting Cycles: A Synthesis and Further Directions," Mary A. Weiss, *Journal of Insurance Issues,* 2007, for a recent survey of this research.

[2] The underwriting cycle exhibits characteristics often attributed to financial bubbles. Much of the academic literature on financial bubbles has focused on explaining why financial market bubbles are consistent with rational investor behavior. See "Bubbles, Financial Crises, and Systemic Risk," Markus K. Brunnermeier and Martin Oehmke, National Bureau of Economic Research (NBER) working paper 18398, September 2012, for a recent survey of this literature.

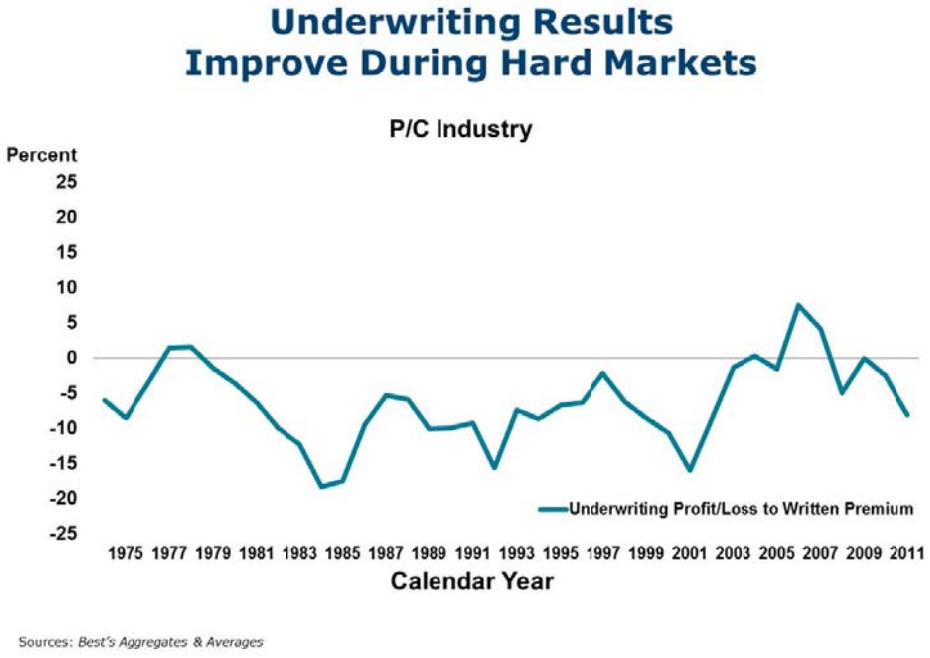


Chart 1

Chart 2 shows that the periods of market hardening were also periods of substantial growth in net written premium. Similarly, periods of modest growth coincide with the soft markets identified in Chart 1.

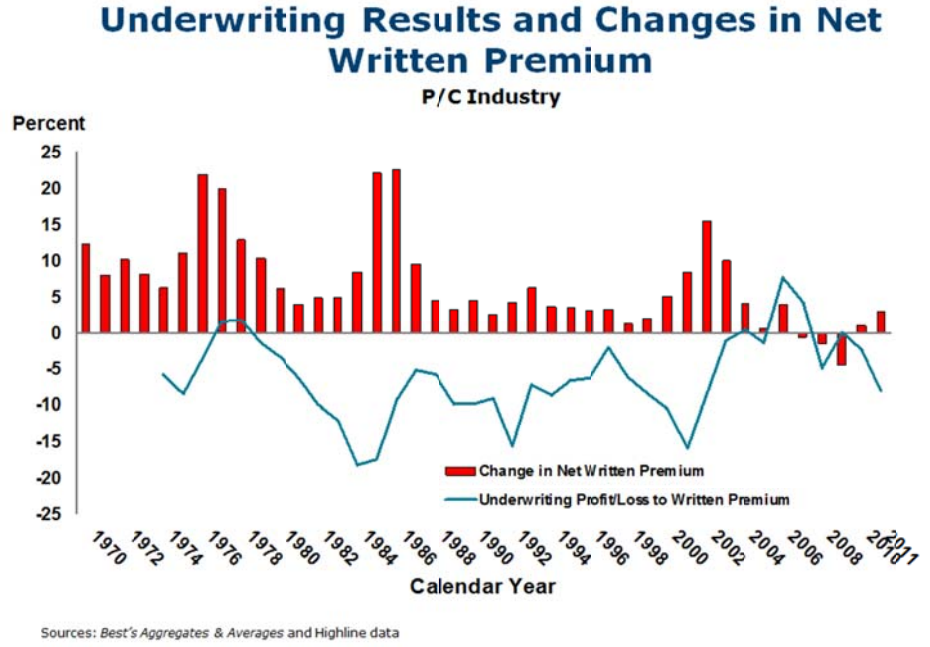


Chart 2

It seems likely that changes in premium rates, a key feature in market conditions, play a central role in the swings in premium growth. We can use the following definition to examine this.

Premium written (P) = Premium rate (r) times Exposure (X)

$P_t = r_t * X_t$

$P_{t+1} = r_{t+1} * X_{t+1}$

$P_{t+1} / P_t = (r_{t+1} * X_{t+1}) / (r_t * X_t)$

It can be shown (see Appendix 1) that the (log) growth rate of the premium rate r is equal to the difference between the (log) growth rate of premium written P and the (log) growth rate of exposure X.[3]

Chart 3 depicts the rates of change in the P&C industry's calendar-year net written premium and the concurrent change in Gross Domestic Product (GDP), a proxy for exposure. It is clear that at times, premium growth is greater than, and at other times less than, the change in exposure. The formula above suggests that the differences likely reflect the growth in premium rates.[4,5] These differences are shown in Chart 4.

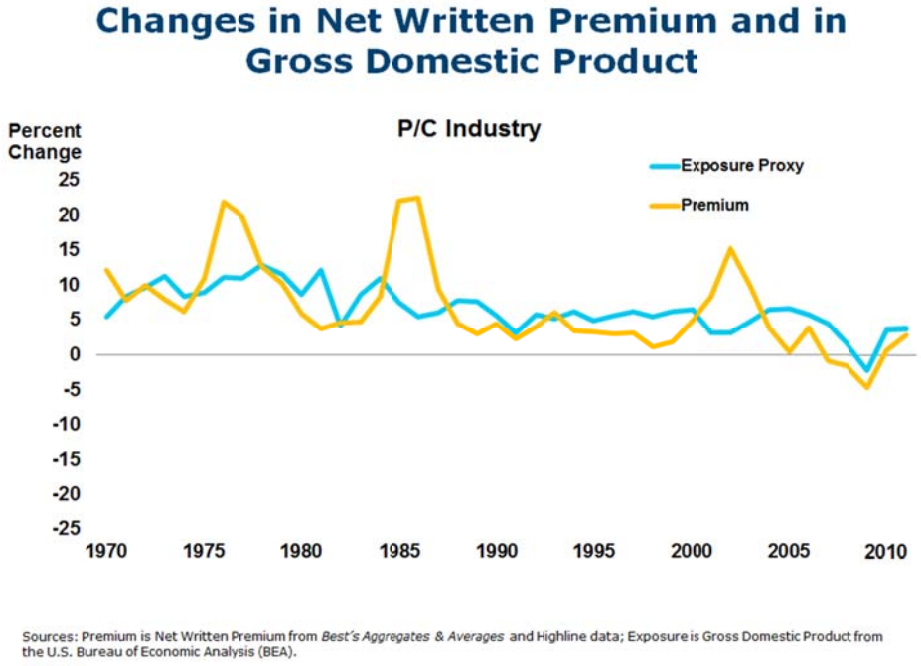


Chart 3

[3] Subtracting the nominal rates of change gives similar results for small values, but the results are only approximations.

[4] Other factors are also likely to influence the numbers: for example, changes in exposure mix—in workers compensation, a decline in high-premium contracting in favor of low-premium office and clerical payroll would have a larger impact on premium than on payroll. This would reflect a change in the average effective premium rate simply because of a relative change in employment.

[5] The estimate of the impact of price changes, termed the "proxy premium rate," captures other factors as well; for example, the impact on the change in premium due to a change in the share of policies that include large deductibles. In addition, the "proxy exposure" is based on a readily available measure that is related to but not necessarily a perfect match for the actual exposure used in calculating actual premium; for example, GDP as the proxy exposure for the total P&C industry. Therefore the "proxies" should not be viewed as being precise measures.

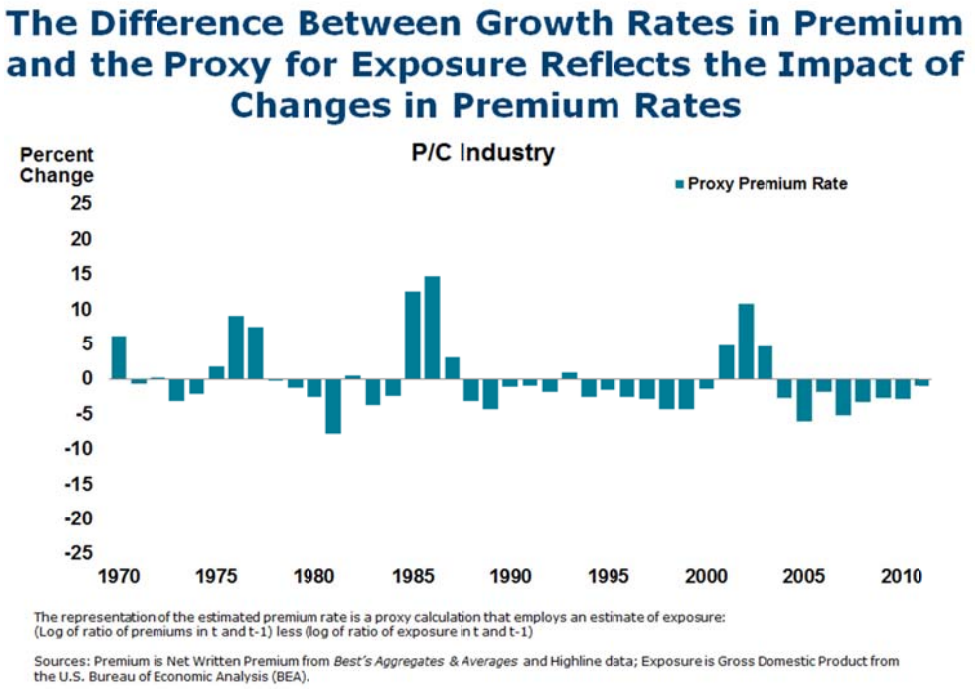


Chart 4

With changes in GDP serving as a proxy for exposure, the estimates of premium rate changes in Chart 4 are rough approximations. Data on workers compensation provide some support for the approach. The estimates of the change in workers compensation premium rates in Chart 5 are based on the differences in the (log) rates of growth in net written premium for the workers compensation line and private sector payrolls. These are consistent with the estimated rate departures for workers compensation reported annually by insurance carriers to NCCI (Chart 6).

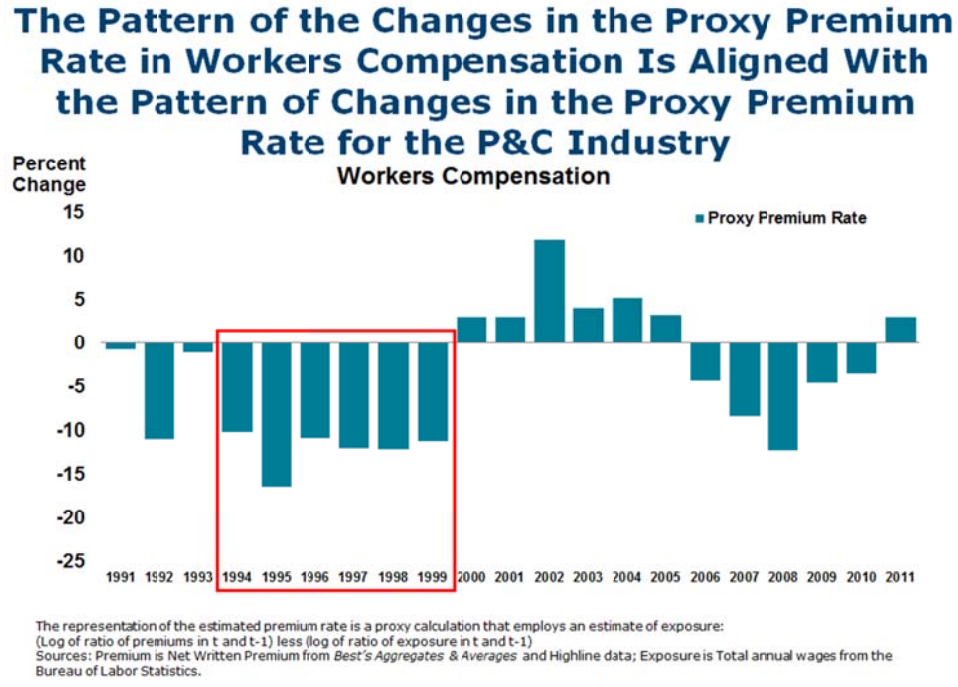


Chart 5

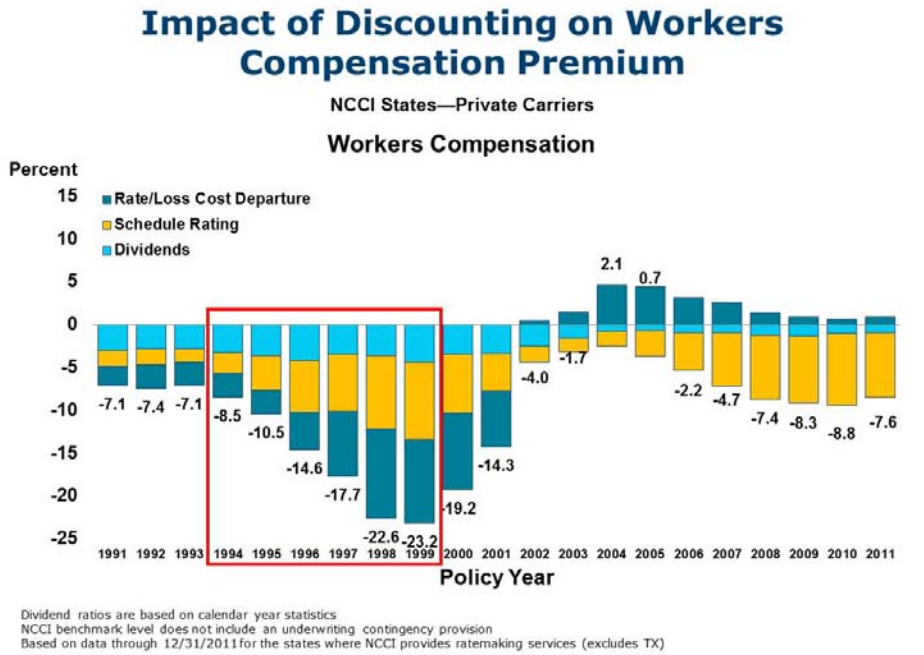


Chart 6

What Drives the Underwriting Cycle?

As mentioned above, there is a range of contributing factors that have been identified for creating the underwriting cycle. This section of the paper examines some of the leading candidates. As Chart 7 indicates, there is likely to be little disagreement over what triggers a market hardening. Each of the hard markets identified above (see page 1) reflects a marked response to weak financial performance. The three periods were preceded by an industry average return on surplus close to or below zero. Each of those periods experienced severe underwriting losses as well (Chart 8). The chart also indicates that underwriting performance improved during the subsequent periods of premium rate increases. The more essential issue is trying to determine why the industry allowed underwriting results to deteriorate in the first place.

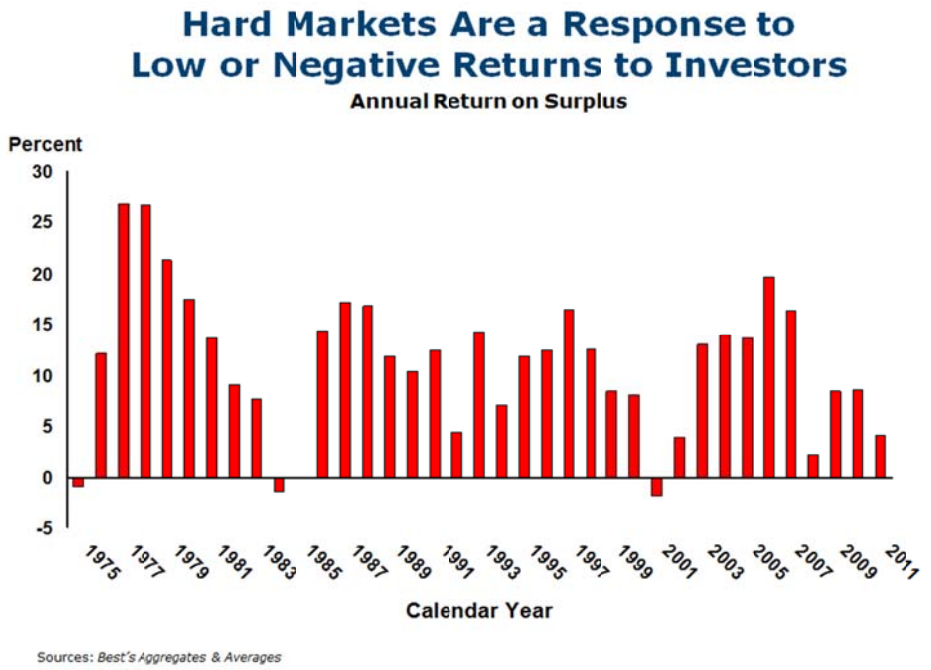


Chart 7

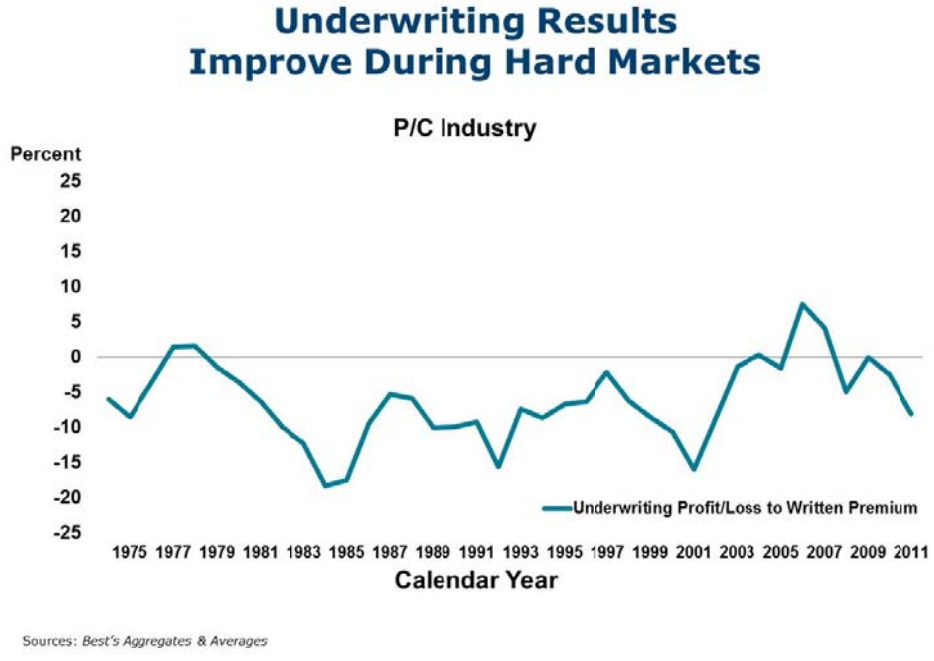


Chart 8

Assessing Excess Capacity

One prevailing notion is that excess capacity is the key driver of soft markets. We can examine this idea by tracking the premium-to-surplus ratio, a standard measure of underwriting capacity. A review of Chart 9 indicates that the premium-to-surplus ratio has been trending lower for more than a quarter of a century. For our study of the underwriting cycle, however, the cyclical movement around this trend is our primary interest.[6] The key feature is the pronounced dip from 1995 to 1999. This coincides with an extremely soft market (see Chart 6 for the workers compensation rate departures during this period). The subsequent rise above the long-term trend in the premium-to-surplus ratio was accompanied by a modest hardening in market conditions.

A similar relationship existed in the mid-1980s. Many observers would likely argue that this confirms the excess capacity argument. The case is weakened, however, when one recognizes that much of the cyclical movement in this measure of capacity is actually the result of unrealized gains in insurers' stock portfolios. This can be seen in Chart 10, which tracks surplus relative to premium. This is simply the reverse of the premium to surplus ratio shown in Chart 9. The cyclical decline in Chart 9 now becomes a bulge. Furthermore, when the surplus is recalculated to exclude unrealized gains to highlight the cyclical nature of the surplus increase (Chart 11), the bulge becomes a bubble—a manifestation of the dot-com boom and bust of the last half of the 1990s. Interestingly, the chart also highlights the stock market recovery during the housing bubble in 2006 and 2007 and the stock market surge during the Federal Reserve's period of quantitative easing that began in late 2008. This suggests that the soft market of the mid-1990s might reflect the insurance industry's participation in the "irrational exuberance" popularized by Alan Greenspan[7], and that "cash flow underwriting" in pursuit of investment gains, rather than excess capacity, might be a better candidate as the driver of the underwriting cycle.

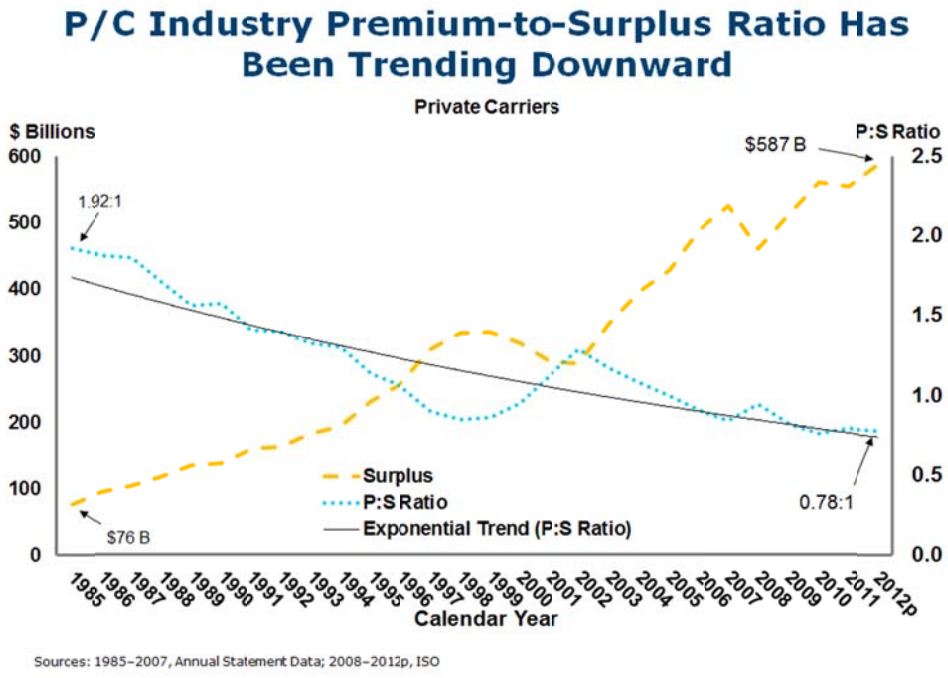


Chart 9

[6] The relative increase in surplus over time also appears in the reserve to surplus ratio. This likely reflects the industry's sense that underwriting has become more risky. Headline events include Hurricane Andrew in 1993 and the terrorist attacks in 2011. But "cat" exposure and losses are a growing concern: wild fires, tornados, flooding, earthquakes, hurricanes. This secular growth in "capacity" is not a driver of the underwriting cycle.

[7] In 2000 Robert Shiller, Nobel laureate in economics, published "Irrational Exuberance", a book that examined the stock market cycle over the last half of the 1990s. The title was inspired by Alan Greenspan, who used this phrase in a speech he gave on December 5, 1996 at the American Enterprise Institute. It has been interpreted to mean that the market was overvalued during the dot-com bubble.

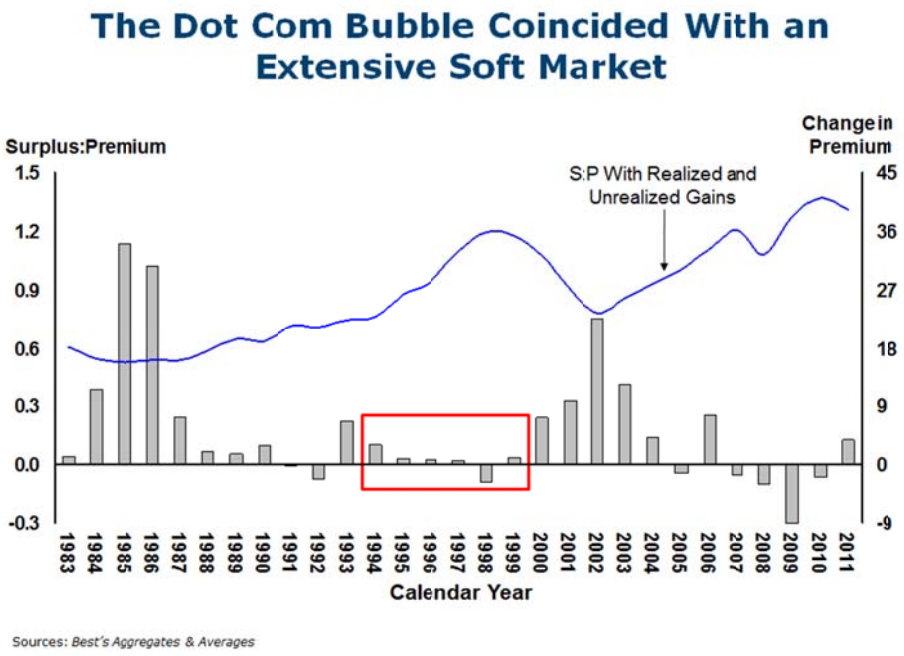


Chart 10

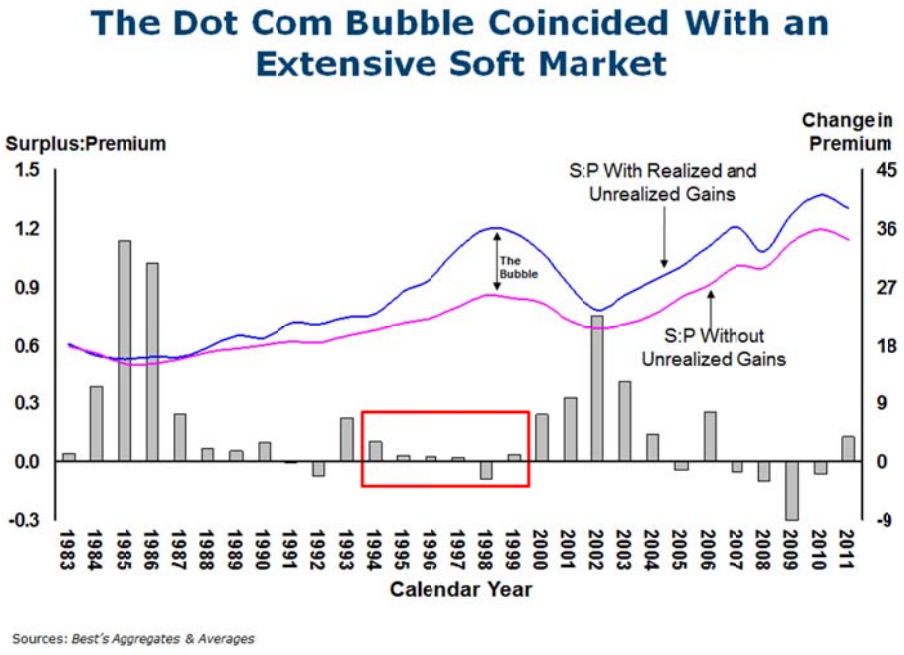


Chart 11

Other factors likely are also influencing the cycle. The easing of market conditions follows periods of strong financial performance characterized by improved underwriting results and coincides with post-recession economic growth. The former presumably can be taken as a signal that pricing can be eased; the market likely also becomes more competitive in response to the growth in exposure during economic expansions. It is not a coincidence that the common element underlying both the growth in unrealized gains and exposure growth is the state of the overall economy. This suggests that

excess capacity is correlated with, but is not the actual driver of, the underwriting cycle. The other leading hypothesis is linked to "cash flow underwriting," the pursuit during a soft market of more premium in order to generate more investment income.

On to Cash Flow Underwriting

The analysis of the role of cash flow underwriting must focus first on interest rates; fixed income securities make up over 80% of P&C insurers' investment portfolios. The observation that the P&C industry seldom earns an underwriting profit (see Chart 1) offers clear evidence that investment income is a critical part of the P&C industry's business model; the industry has made an underwriting profit only four times in the past 35 years. Chart 12 illustrates the singular importance of investment gains to the industry's total operating profit. In marked contrast to underwriting, investment returns are strongly positive and reasonably predictable from year to year. The pursuit of investment returns clearly makes business sense. While there are many moving parts in determining financial performance, there is one clear message: with all else being equal, when interest rates change, premium rates should move in the opposite direction. This suggests that hard markets are associated with declines in interest rates, and soft markets are a response to increases in potential investment returns.

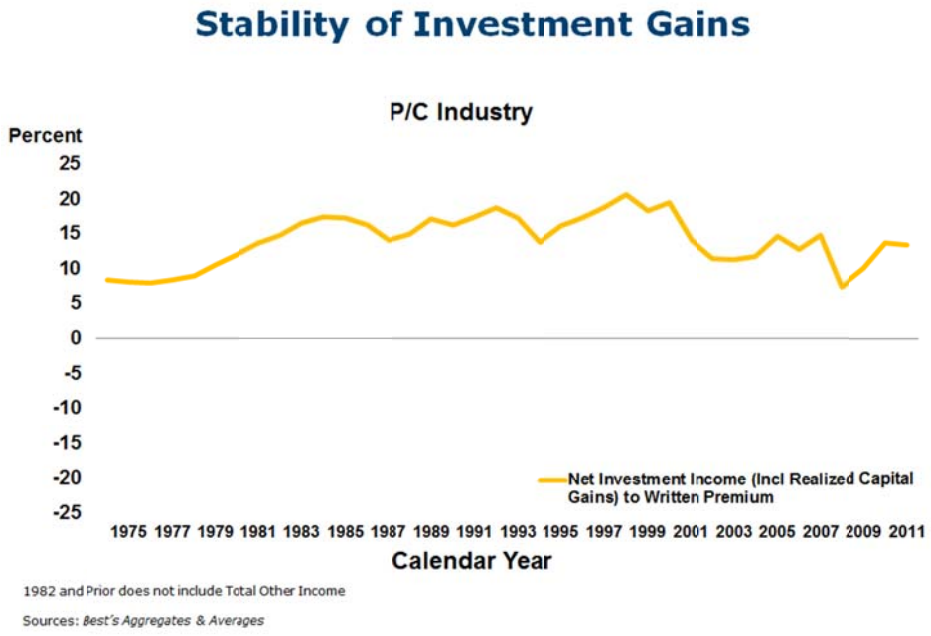


Chart 12

Table 1 and the accompanying graph define market conditions using the proxies for premium rate changes in Charts 4 and C4-C6 (in Appendix 4). The characterization of interest rates is based on Charts 13 and 14, which plot the Federal Funds rate and yields on 10-year Treasury bonds relative to their trends.[8] While there is some variation across lines of insurance, a general pattern is apparent: the three major periods of soft market conditions (red areas in the graph) are associated with tightening monetary policy and interest rates that are above their long-term trend line. Similarly, the three broadly-based hard markets (white areas) coincide with periods of monetary policy easing and interest rates that are below the long-term trend. It also appears that the relationship is a bit more prominent for the longer-tail commercial lines than for personal lines. Additionally, the graph indicates that periods of hard markets typically are relatively short compared to soft markets (i.e., the red bars are more prevalent.)

[8] Note that there was a regime change in the early 1980s when Paul Volker became head of the Federal Reserve and imposed tight monetary conditions to bring inflation under control. It resulted in a dramatic reversal in the pattern of interest rates and is why Charts 13 and 14 are split in the early 1980s.

Table 1
Tone of P&C Market and Interest Rates

P&C Industry	Workers Compensation	Other Commercial Lines	Personal Lines	Effective Federal Funds Rate	10-Year Treasury Constant Maturity Rate
Soft Market (proxy premium rates falling)				Above Trend	
1978-1984	1980-1984	1978-1983	1977-1981 1984-1985	1979-1982 1984	1975-1976 1980-1982 1984-1985
1988-1992 1994-2000	1991-1999	1987-1992 1995-2000	1988-1989 1998-2001	1988-1991 1994-2001	1988-1991 1994-2000
2004-2011	2006-2010	2004-2005 2007-2011	2002-2006	2006-2008	2006-2007 2010-2011
Hard Market (proxy premium rates increasing)				Below Trend	
1975-1977	1976-1979	1975-1977	1975-1976 1982-1983	1975-1978 1982-1983	1977-1979 1983
1985-1987	1985-1990	1984-1986	1986-1987	1985-1987	1986-1987
1993		1993-1994	1990-1997	1991-1994	1992-1993
2001-2003	2000-2005 2011	2001-2003 2006	2007-2011	2001-2005 2008-2011	2001-2005 2008-2009

Table 1

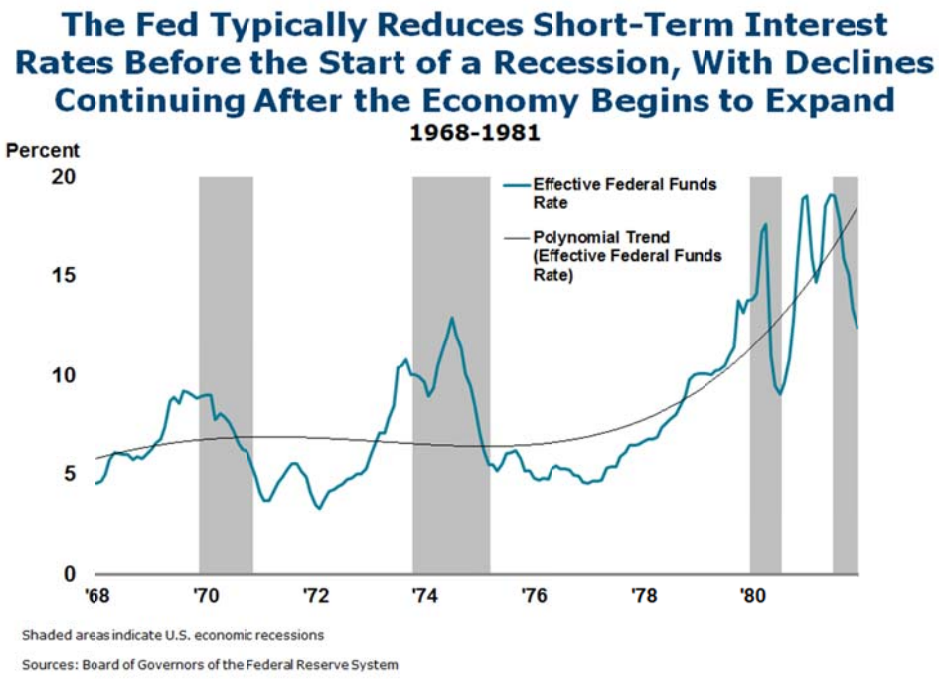


Chart 13a

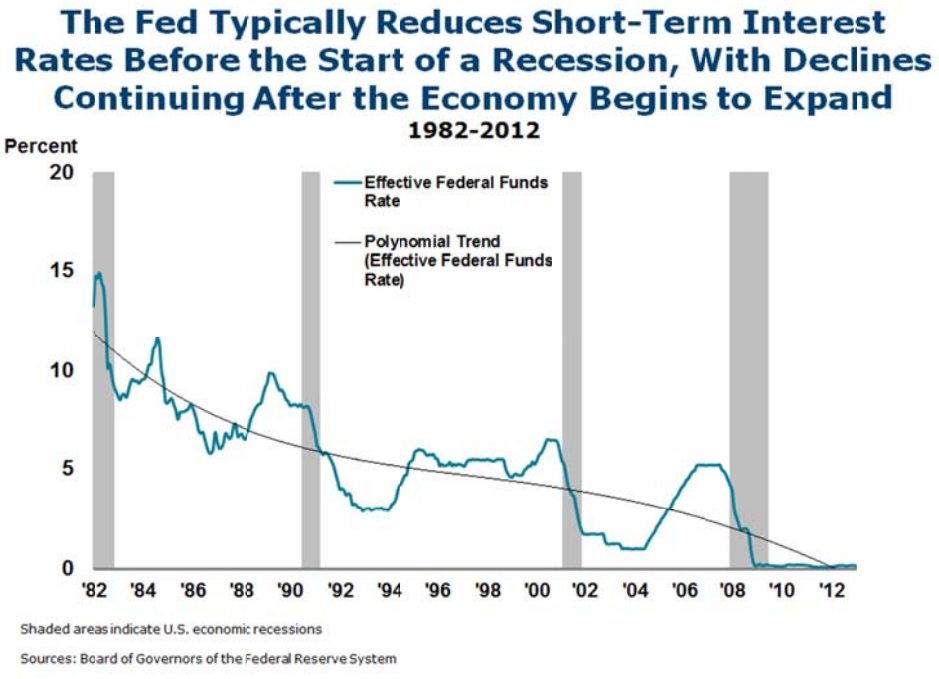


Chart 13b

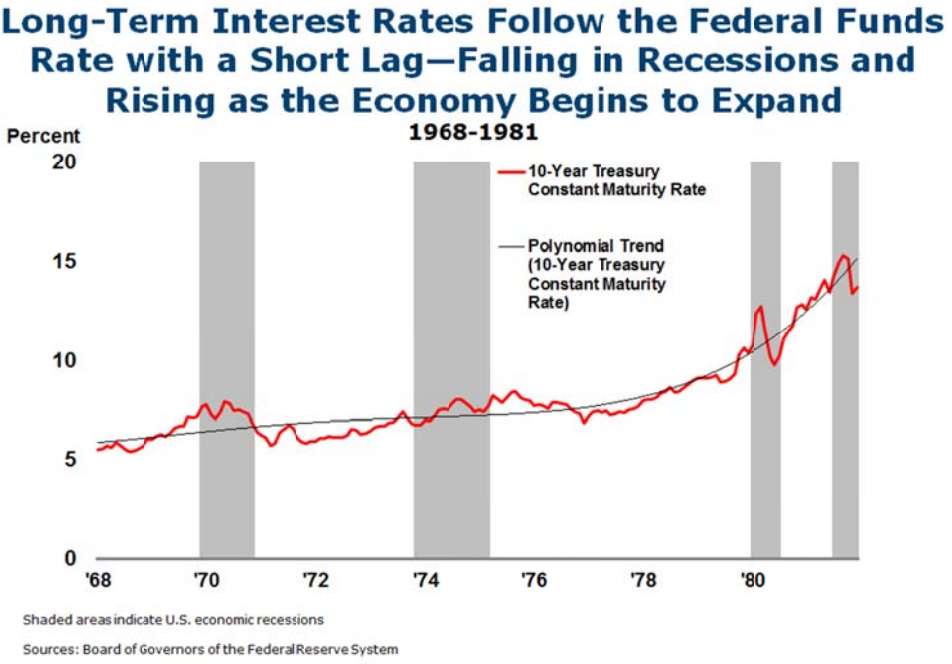


Chart 14a

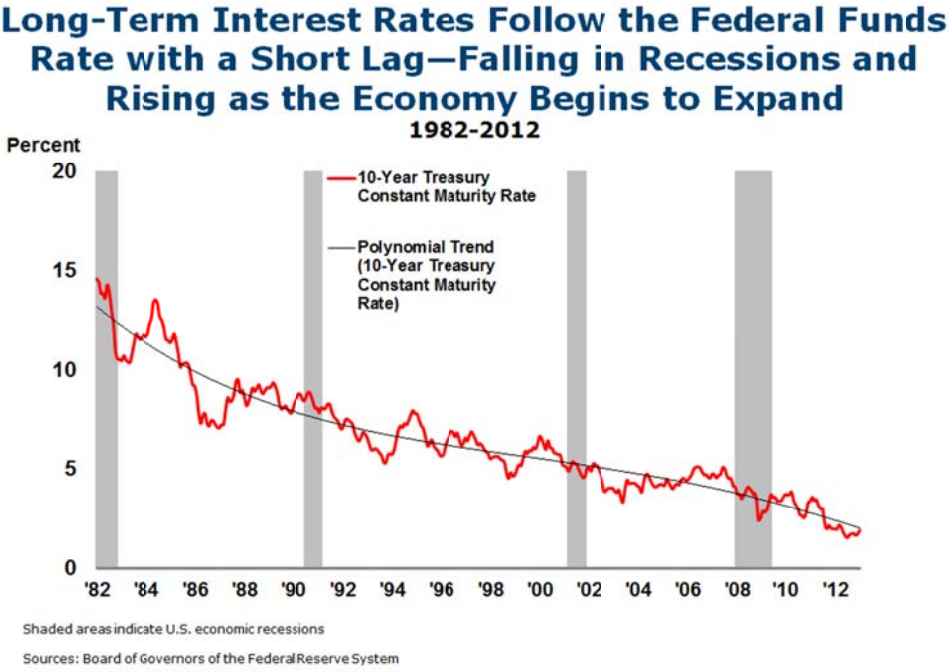


Chart 14b

The previous discussion of the role of unrealized gains in the industry's stock portfolio indicates that investment returns in the stock market have also contributed to changes in insurance market conditions. Indeed, the steady rise in stock market returns that began in the early 1990s (Chart 15) likely played a role in the soft market that characterized most of the 1990s.

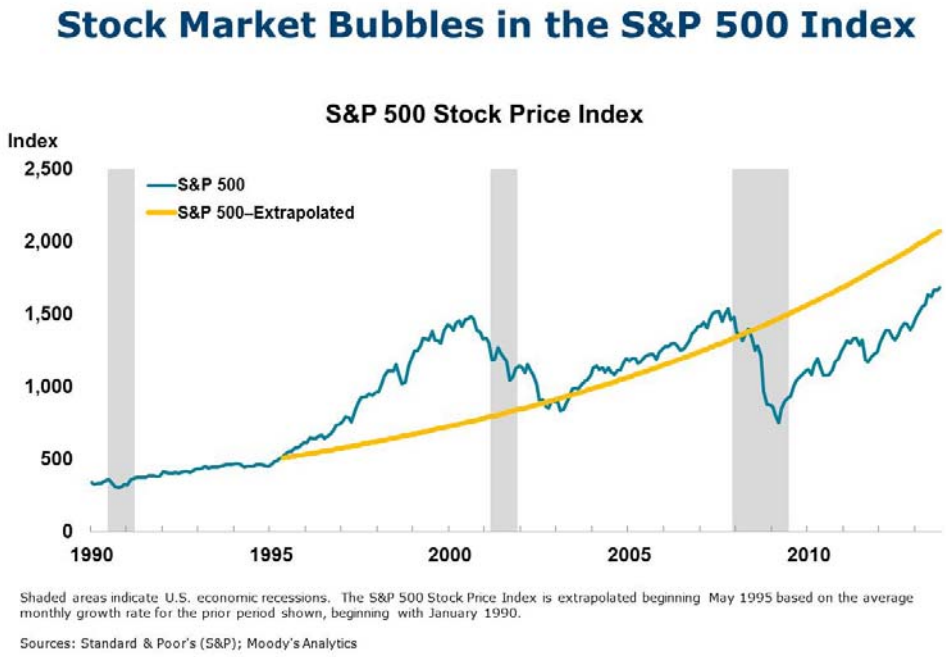


Chart 15

The Underwriting Cycle Tracks the Business Cycle

Insurance rates must respond to changes in financial markets, especially interest rates. More importantly, market forces compel insurers to compete on price, leading to soft market conditions when investment potential appears to be strong. The wide swings in underwriting performance and total profitability indicate that price competition during soft markets is often more than vibrant, but that assessment is much easier to make in hindsight. As indicated above, insurance market conditions are driven by economic conditions, especially by the stance of monetary policy. The Federal Reserve frequently misjudges the timing of changes in economic conditions;[9] it would be surprising if the property and casualty insurance sector were able to consistently out-forecast the Fed. The inability to accurately forecast the timing of financial markets is a major factor in the observed volatility in the industry's underwriting results.

Other factors also influence insurer business decisions. Calendar year financial results are central to external assessments of management performance.[10] Accounting conventions therefore likely come into play. There are several moving as well as non-moving parts to be considered. For example, as suggested above, strong financial markets bring on soft insurance markets. The weakening underwriting results will depress reported earnings; however, unrealized gains on common stock, which typically grow during these periods, are not reflected in earned income but do show up as an addition to reported surplus. This unrealized "income" could reasonably be viewed as an offset to the diminished reported earnings from underwriting. In contrast, fixed income securities are carried at amortized cost rather than at the lower market values linked to increases in interest rates. Thus these unrealized losses do not impact reported income, the asset values on the balance sheet, or reported surplus. On the liability side the reserves for future claim payments typically are also carried at estimated ultimate costs rather than being discounted to reflect the time value of money. These estimated ultimate costs are also

[9] See for example: "Who's to Blame for the Bubble?", D. Quinn Mills, *Harvard Business Review*, May 2001; "Greenspan Concedes that the Fed Failed to Gauge the Bubble," Sewell Chan, *New York Times*, March 18, 2012; "A Historical Analysis of Monetary Policy Rules," John B. Taylor, in *Monetary Policy Rules*, John B. Taylor, editor, National Bureau of Economic Research, University of Chicago Press, January 1999.

[10] While reported calendar year results are a primary focus of external stakeholders, accident year and policy year results are the prime focus for underwriting and other internal management assessments.

uncertain and frequently are adjusted to reflect reserve strengthening (adding to underwriting losses) or reserve releases (which improve reported underwriting performance.)

It's not easy to manage a business in such an uncertain but competitive environment. In reality, the P&C industry has been remarkably effective at managing its return on surplus over the underwriting cycle. This assessment is based on the analysis of longer-term trends in the financial performance of the P&C industry.

From Cycles to Trends

The ultimate measure of financial performance in the insurance industry is return on surplus (ROS). Chart 16 depicts the contribution of underwriting to the annual return on surplus from 1975 through 2012. It shows the same pattern as Chart 1—consistent but highly cyclical underwriting losses. These are mirrored in the industry's return on surplus, also shown in the chart. This confirms that underwriting is the key driver of the swings in the industry's ROS. The spread between the two lines reflects the contribution of investment gain, which is shown in Chart 17.

The period from 1975 to 1985 illustrates two key findings in the analysis of the underwriting cycle above. First, underwriting, and therefore ROS, rebounded from the negative ROS in 1975, peaking at an ROS of just under 30% in 1978. Second, underwriting then turned negative, and ROS began to fall as investment gain relative to surplus grew steadily through 1985.

Notice, however, that beginning with 1986, investment gain relative to surplus began a steady decline as evidenced by the shrinking distance between the two lines. Chart 18 highlights the fact that this downtrend is mirrored by a cyclical, but nevertheless clear, improvement in underwriting performance. The message is that over the long-term, as well as over the underwriting cycle, investment markets drive the need for underwriting profits—as investment gain opportunities deteriorate, disciplined profitable underwriting results materialize. Undoubtedly many industry observers will find this unsettling in that it appears to place underwriting in a secondary position to investment management.

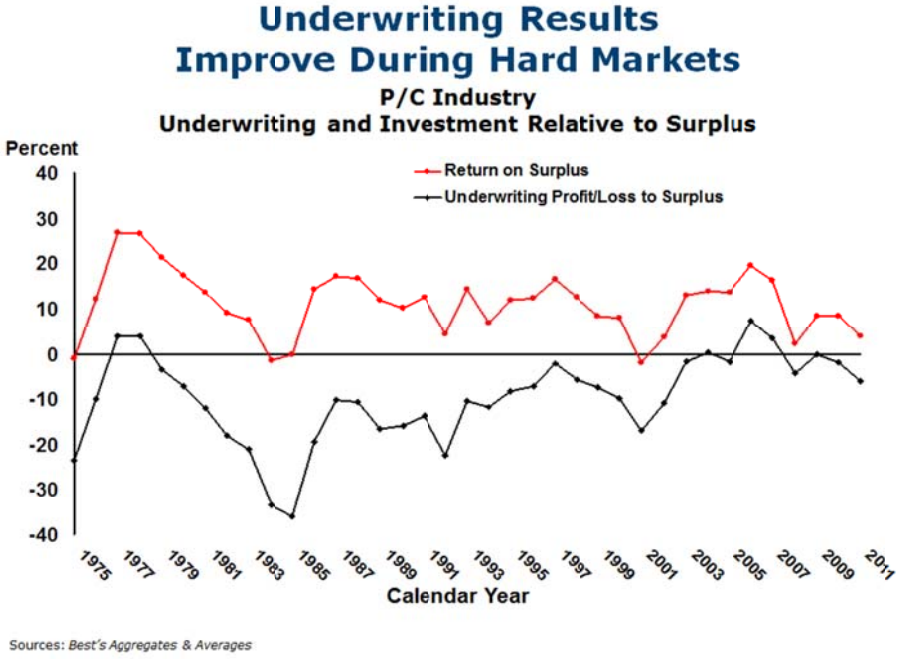
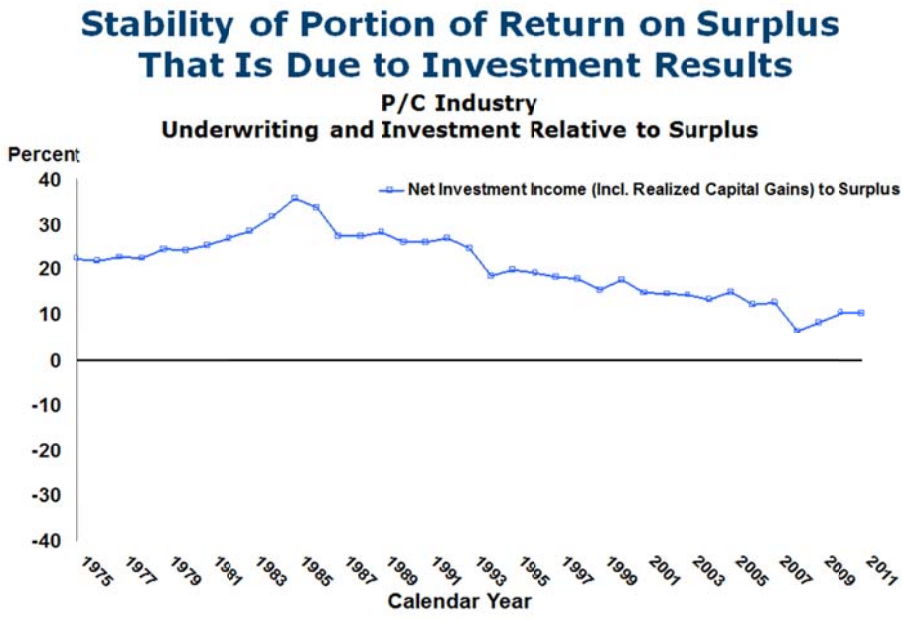
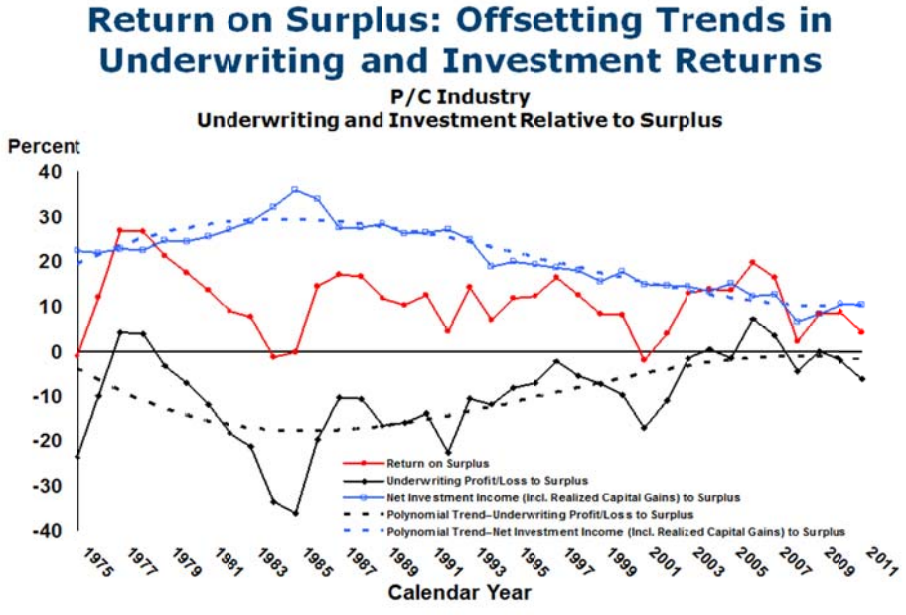


Chart 16



Sources: *Best's Aggregates & Averages*

Chart 17



Sources: *Best's Aggregates & Averages*

Chart 18

Defining the Role of Underwriting

In discussions about the financial sector, the P&C insurance industry is typically termed a "financial intermediary," putting it in a category that includes banks, savings and loan associations, and credit unions. This likely seems confusing to many; the other institutions accept deposits—a financial transaction—while the P&C industry sells insurance.[11] These seem like very different activities. However, the comparison actually helps to explain the role of underwriting in managing the financial performance of the P&C industry.

In the most basic business model, banks take on liabilities in the form of deposits and then convert them into income-generating assets. The interest paid on the deposits is the banks' cost of funds. Following this framework, P&C companies take on liabilities by selling insurance policies and then converting them into income-generating assets. Underwriting losses are the cost of funds for the P&C industry.[12] The role of underwriting and claims administration is to manage the P&C firms' cost of funds. These functions are not secondary; they are essential. This is a much more difficult task than that faced by banks managing their cost of funds. Most bank deposits have a fixed term and a fixed rate of interest; for those with variable rates there is a clear link to the rates on the bank's assets. Claim costs, on the other hand, are remarkably uncertain and vulnerable to economic, regulatory, and environmental shocks.

Managing the cost of funds for the P&C industry is a daunting task. The industry has performed well in absolute terms and astonishingly well compared to other financial intermediaries. The thrift industry (savings and loans and mutual savings banks) has been bankrupt at least twice since the 1970s. The recent federal "bail out" of the banking industry reflects management as well as regulatory shortcomings in the banking sector. In contrast, the P&C industry just keeps on doing business as usual—through financial crises, environmental trauma, underwriting cycles, and all.

As with all financial intermediaries, the challenge in managing the P&C marketplace lies in achieving a balance between the cost of funds and the return on investments. The ultimate measure is the return on surplus. Chart 19 clearly indicates that through the trends and cycles of the marketplace, the P&C industry has handled this challenge well. The balance between underwriting performance and investment gain has generated a long-term trend line for the industry's ROS in excess of 10%.

Summary

All you need to know to understand the property and casualty underwriting cycle:

- Cashflow underwriting in pursuit of investment gains is more of a driver of the underwriting cycle than excess capacity
- As investment gain opportunities deteriorate, disciplined profitable underwriting results materialize
- As interest rates decrease, hard markets follow. As interest rates increase, soft markets follow.
- Underwriting results are the key driver of the direction of return on surplus

[11] By definition, a financial intermediary is a middleman, collecting and pooling funds from, for example, savers, and then lending or otherwise investing those funds with borrowers. The pooling typically provides risk sharing on both the asset and liability sides of the intermediary's balance sheet.

[12] An advantage of the P&C industry—when investment potential is low, it actually has the ability to earn a profit on its source of funds. At today's low interest rates, many banks pay virtually nothing on deposits, earn a bit by holding balances in the Federal Reserve, and try to earn a small profit by charging fees for banking services.

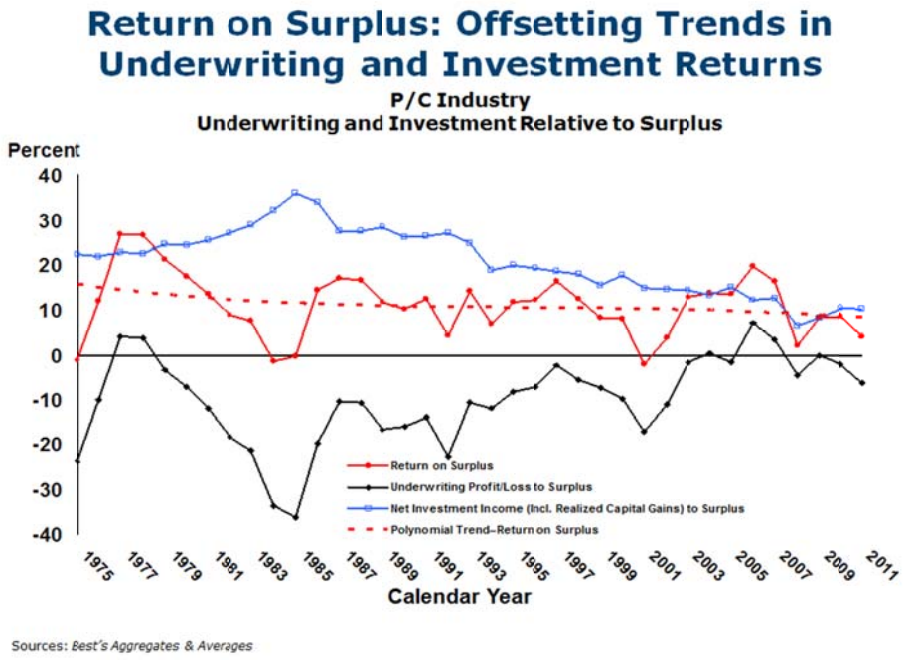


Chart 19

Appendix 1—The Additive Nature of Log Rates of Growth

$P_{t+1} / P_t = (r_{t+1} * X_{t+1}) / (r_t * X_t)$

Take the log

$\ln(P_{t+1} / P_t) = \ln((r_{t+1} * X_{t+1}) / (r_t * X_t))$

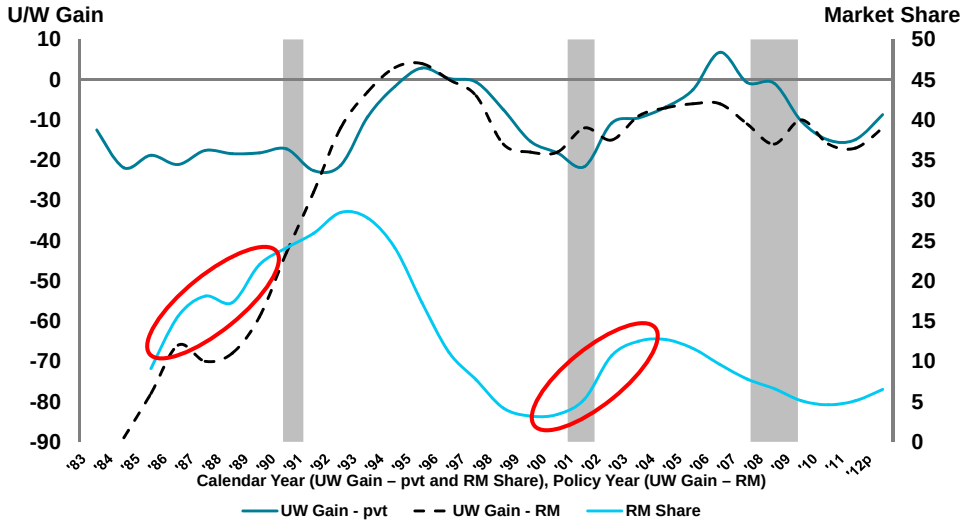
rearrange

$\ln(r_{t+1} / r_t) = \ln(P_{t+1} / P_t) - \ln(X_{t+1} / X_t)$

Appendix 2—The Workers Compensation Residual Market Is an Indicator of Changes in Market Conditions

Charts A1 a and b trace the path of the voluntary and residual markets from 1985 through 2012. They reveal that during the two hard markets (1985 to 1990 and 2000 to 2005), the residual market grew as a share of the total workers compensation market as underwriting standards were tightened. Interestingly, the underwriting performance of the residual market, as measured by the combined ratio, improved as policyholders moved from the voluntary market. This is consistent with the belief that as insurers tighten their standards, they drop the policyholders that they deem less attractive; it appears that typically these are better than the average policies already in the residual market. During the soft markets, the patterns were reversed.

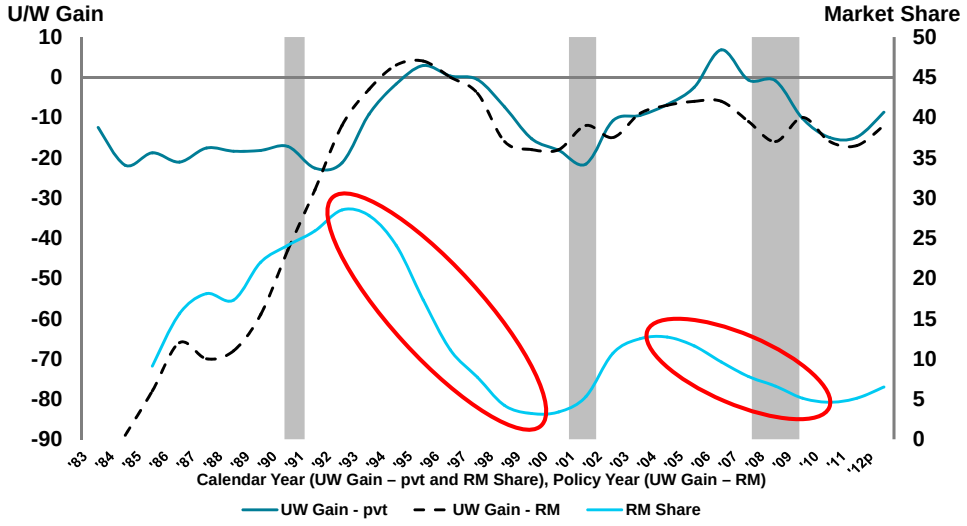
Residual Market Share of the WC Market Grew During Hard Markets



The gray shaded regions represent periods of economic recession in the U.S.
Underwriting gain is defined as 100 minus the combined ratio. Market share is in percent.

Chart A1a

Residual Market Share of the WC Market Fell During Soft Markets



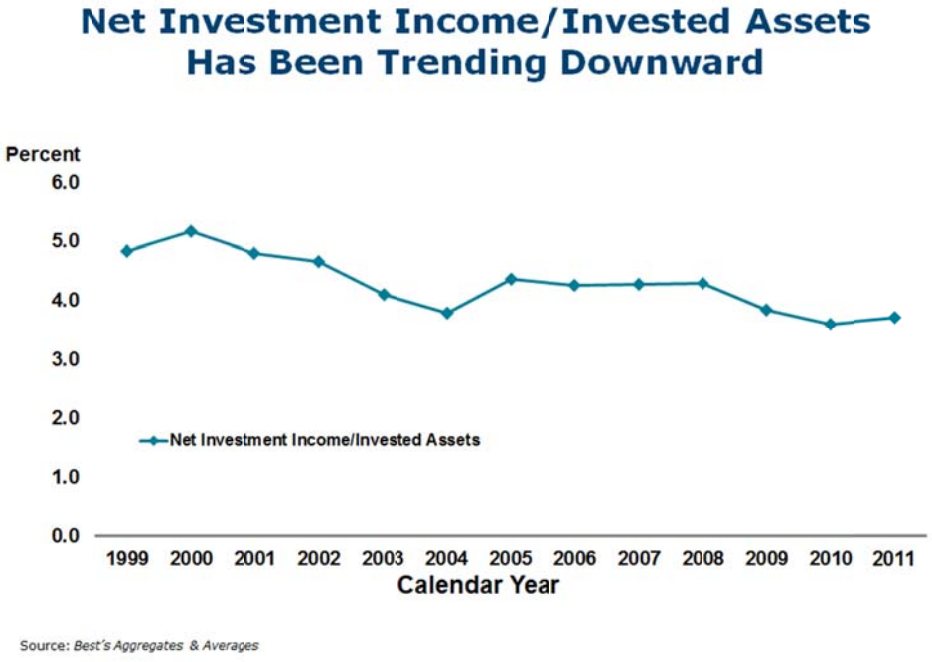
The gray shaded regions represent periods of economic recession in the U.S.
Underwriting gain is defined as 100 minus the combined ratio. Market share is in percent.

Chart A1b

Appendix 3—Trends Within the Trends

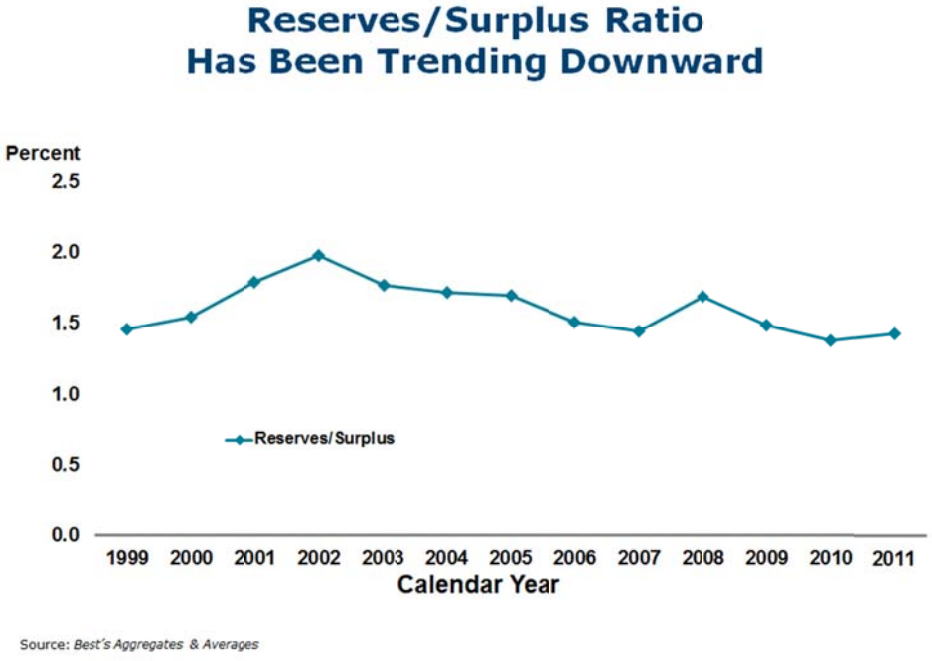
Chart 18 illustrates the long-term trends in investment gain and underwriting results relative to surplus. Other significant trends are embedded in these. Charts B1 and B2 depict two that contribute to the downtrend in investment gains: both the average return on assets and the reserve-to-surplus ratio have been trending downward. Reserves are the primary source of funds for investment. The former reflects the broad downtrend in interest rates over this period; much of this decline is

due to the easing of expected inflation. Underwriting profit margins (essentially 1 minus the combined ratio) are measured relative to premium (Chart 1). A given underwriting loss will have a less negative effect on the ROS as the premium-to-surplus ratio (Chart 9) falls. It should be noted that these are related—both ratios are impacted by the relative increases in surplus.



Source: *Best's Aggregates & Averages*

Chart B1

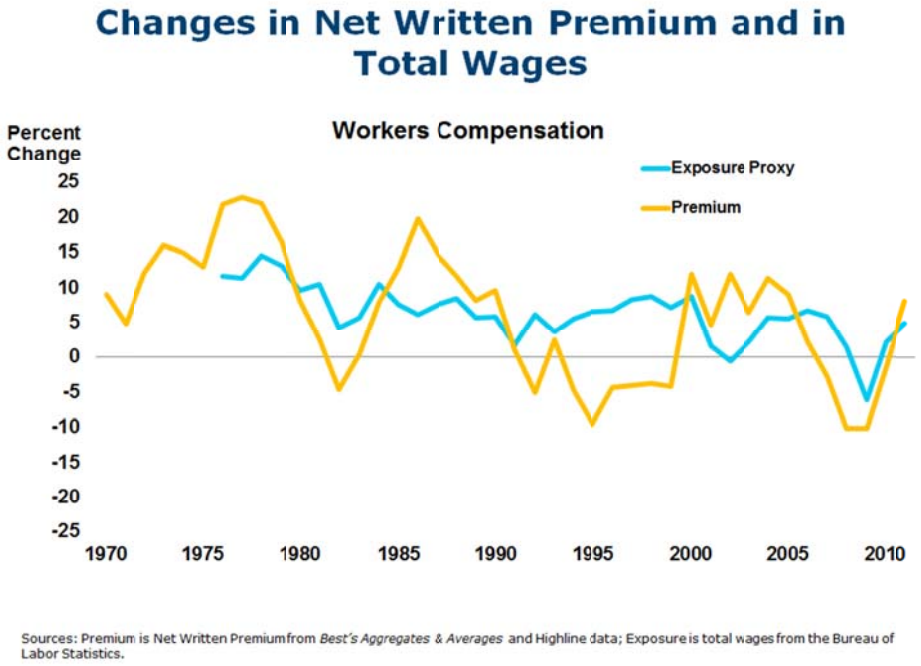


Source: *Best's Aggregates & Averages*

Chart B2

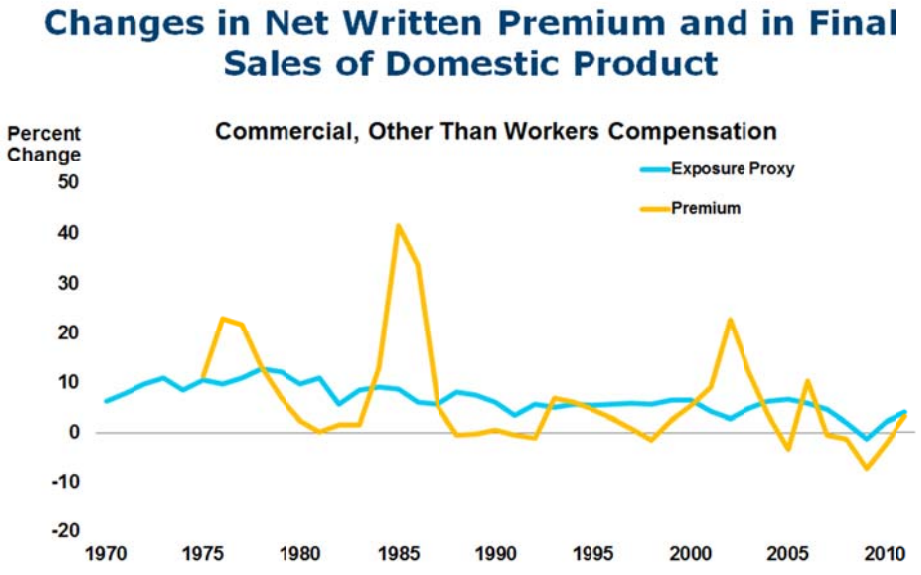
Appendix 4—Exhibits By Line

The discussion was largely limited to financial performance of the total P&C industry. Similar estimates of proxies for premium rate changes were calculated for workers compensation, commercial lines other than workers compensation, and personal lines. The proxies for changes in exposure were, respectively, changes in Total Annual Wages—All Industries, Private Ownership; Final Sales of Domestic Product; and Owner-Occupied Real Estate at Market Value. Charts C1–C6 contain the series on by-line changes in net written premium, proxy exposure, and the proxy estimate of changes in premium rates.



Sources: Premium is Net Written Premium from *Best's Aggregates & Averages* and Highline data; Exposure is total wages from the Bureau of Labor Statistics.

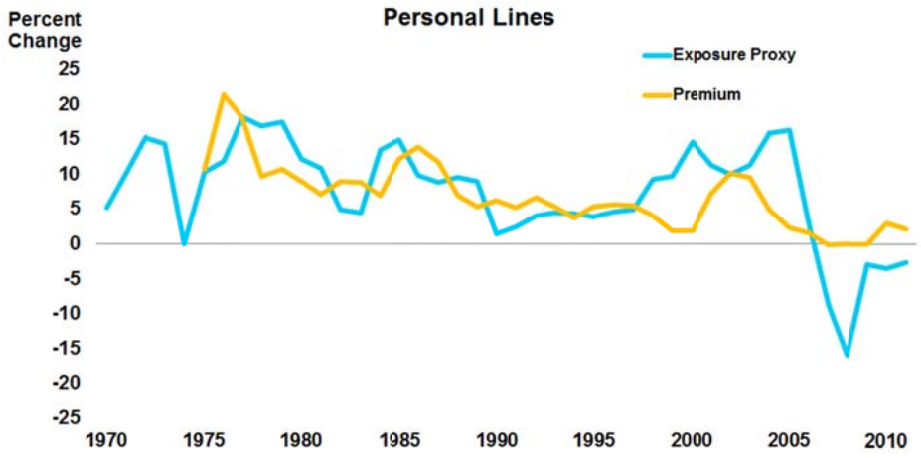
Chart C1



Sources: Premium is Net Written Premium from *Best's Aggregates & Averages* and Highline data; Exposure is final sales of domestic product from the U.S. Bureau of Economic Analysis.

Chart C2

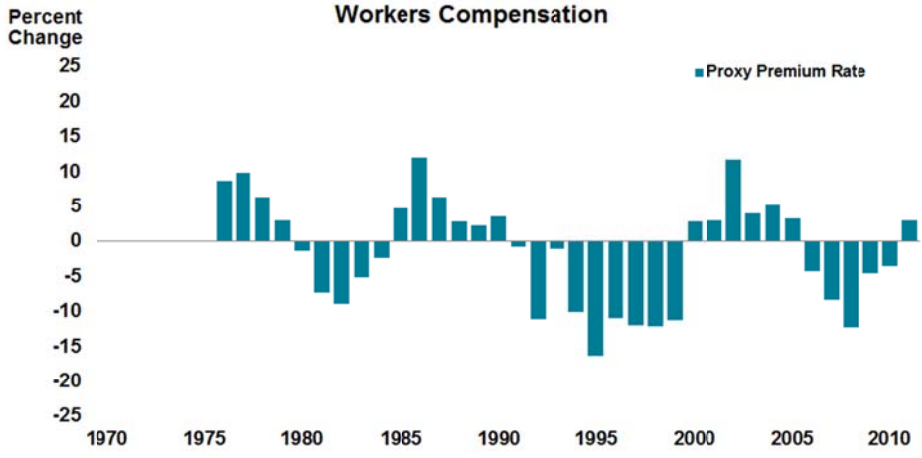
Changes in Net Written Premium and in Owner-Occupied Real Estate at Market Value



Sources: Premium is Net Written Premium from *Best's Aggregates & Averages* and Highline data; Exposure is Flow of Funds: Households - Owner-Occupied Real Estate At Market Value from the U.S. Board of Governors of the Federal Reserve System (FRB): Z.1 Flow of Funds

Chart C3

The Difference Between Growth Rates in Premium and the Proxy for Exposure Reflects the Impact of Changes in Premium Rates

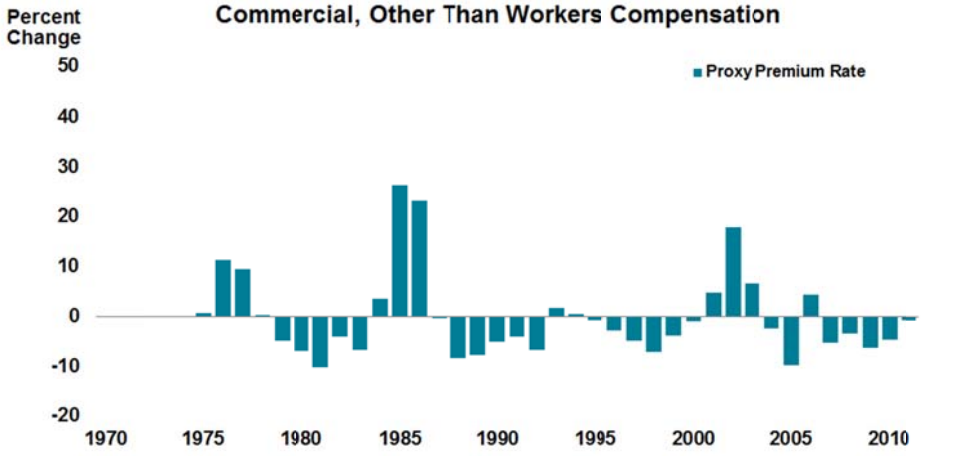


The representation of the estimated premium rate is a proxy calculation that employs an estimate of exposure: (Log of ratio of premiums in t and t-1) less (log of ratio of exposure in t and t-1)

Sources: Premium is Net Written Premium from *Best's Aggregates & Averages* and Highline data; Exposure is total wages from the Bureau of Labor Statistics.

Chart C4

The Difference Between Growth Rates in Premium and the Proxy for Exposure Reflects the Impact of Changes in Premium Rates

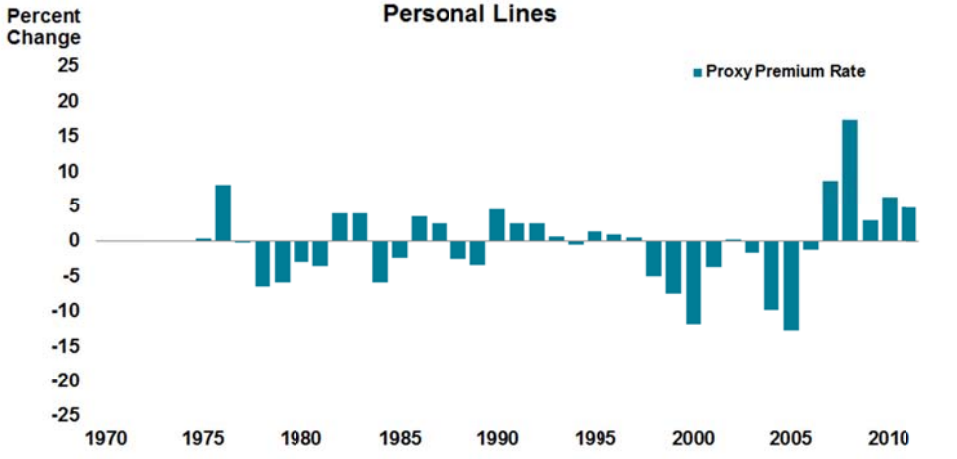


The representation of the estimated premium rate is a proxy calculation that employs an estimate of exposure: (Log of ratio of premiums in t and t-1) less (log of ratio of exposure in t and t-1)

Sources: Premium is Net Written Premium from *Best's Aggregates & Averages* and Highline data; Exposure is final sales of domestic product from the U.S. Bureau of Economic Analysis.

Chart C5

The Difference Between Growth Rates in Premium and the Proxy for Exposure Reflects the Impact of Changes in Premium Rates



The representation of the estimated premium rate is a proxy calculation that employs an estimate of exposure: (Log of ratio of premiums in t and t-1) less (log of ratio of exposure in t and t-1)

Sources: Premium is Net Written Premium from *Best's Aggregates & Averages* and Highline data; Exposure is Flow of Funds: Households - Owner-Occupied Real Estate At Market Value from the U.S. Board of Governors of the Federal Reserve System (FRB): Z.1 Flow of Funds

Chart C6

By-Line Financial Triggers for a Hard Market

Return on surplus is the appropriate measure for judging profitability for the total P&C industry. An alternative for by-line analysis is pretax operating gain. This is more appropriate because it does not require an allocation of surplus by line. Charts D1 through D4 show pretax operating gain on a by-line basis; pretax operating gain for the total P&C industry is also shown for comparison. The circled areas on the charts indicate periods of hard markets.

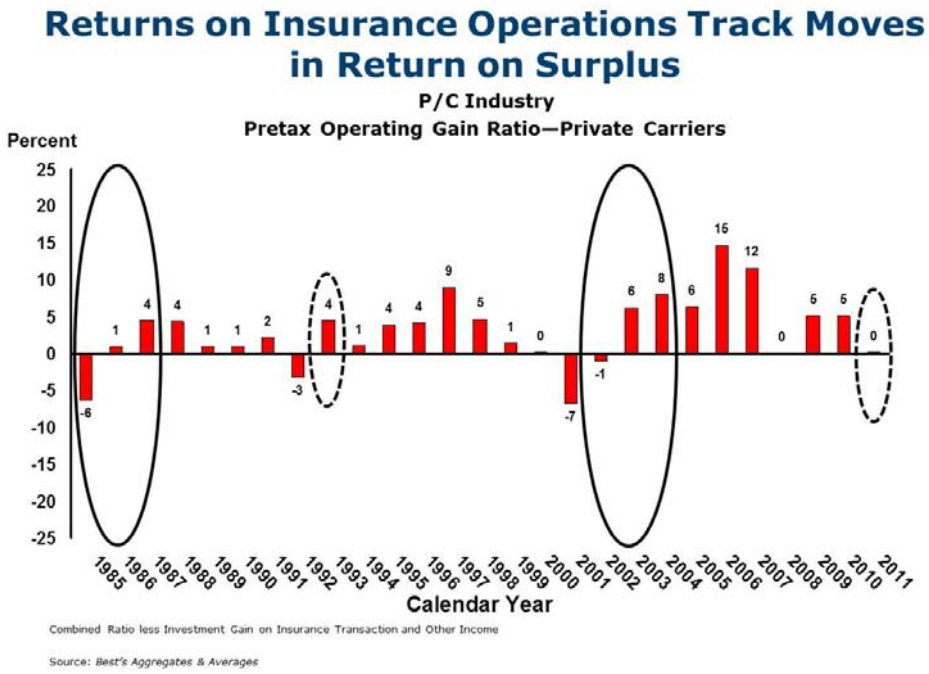


Chart D1

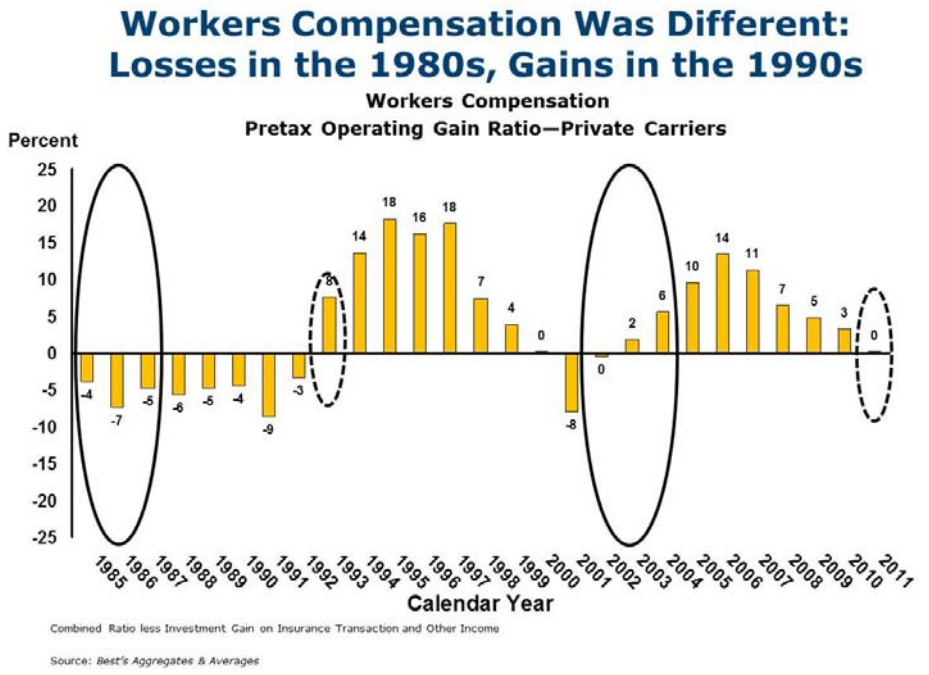


Chart D2

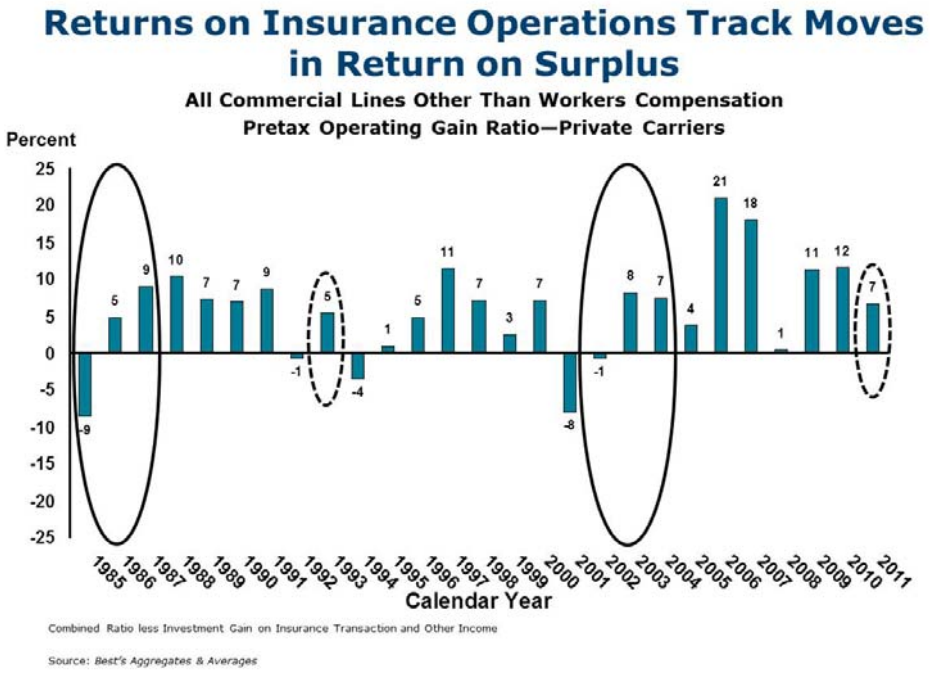


Chart D3

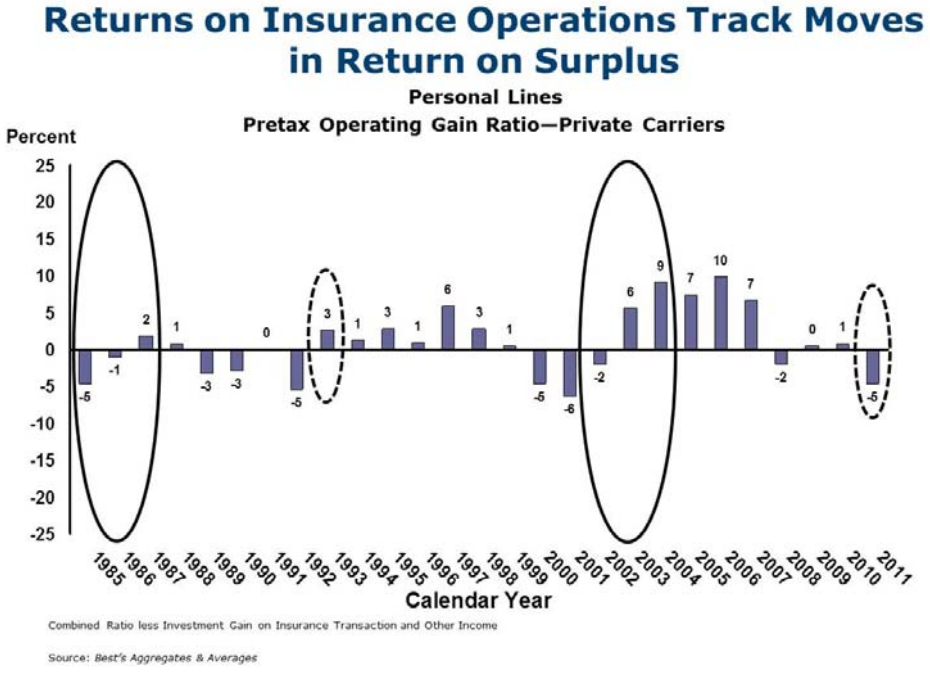


Chart D4