required to appropriately reflect the cost associated with the guarantees

Many of the leading VA carriers have either implemented, or are in the process of implementing, some form of hedging to limit their exposure to market movements. In part this has been driven by the market declines subsequent to 2000 and in part reflects NAIC required capital guidelines that result in substantial increases to required capital for most VA business that is not hedged. Both the costs and benefits of a company's hedging program should be reflected in an appraisal analysis. Likewise, the impact of any reinsurance a company may have on guaranteed benefits should be reflected, including the costs, benefits, and impact on reserves and capital requirements.

Embedded options or guarantees in variable contracts may be separately valued through option pricing techniques. For example, the cost of a guaranteed death benefit in a VA contract can be determined by calculating the theoretical cost of the benefit under an option pricing model. Alternatively, the cost of the guarantee could be set based on the actual cost of fully hedging the guarantee by directly reflecting what an investment bank would charge for the hedge, or reflecting the cost of a series of over-the-counter options that would replicate the benefit. Option pricing techniques can be applied to non-variable blocks of business as well, such as determining the theoretical cost of a guaranteed interest rate in a fixed deferred annuity.

The general account option in VAs requires similar considerations to those described in the prior section on fixed deferred annuities. In addition, consideration should be given to the option policyholders have to move funds from separate accounts to the general account, particularly in low interest environments where the fixed account guarantee may be relatively attractive.

4.7 HEALTH AND GROUP LIFE COVERAGES

In this section, a wide range of coverages is discussed, including individual, group, and various situations with aspects of both group and individual coverages. The coverages have been categorized based on the similarity of their general modeling techniques in the following five coverage groupings:

- Traditional group term coverages are one-year term coverages issued by insurance companies. They contain few, if any, guarantees on rates or renewability. Typical products include group life, accidental death and dismemberment (AD&D), long-term disability (LTD), short-term disability (STD), indemnity medical, dental, and medical stop loss. The bulk of group life and health premium sold falls into this category.
- Guaranteed elements within group term coverages create the need for special modeling techniques. These features include portability options, extended rate guarantees, conversion options, and other special benefits.
- Voluntary and worksite coverages cover a broad spectrum from traditional group policies with additional underwriting and guarantees to individual policies with limits on rates, renewability, and underwriting. Benefits under these coverages are often highly unique and customized; however, from a modeling perspective, similar principles apply.
- Group life coverages containing individual life-type guarantees include group universal life, group variable universal life, corporate-owned life insurance, and similar coverages.
- Traditional individual health products span a wide range of benefits provided and rating structures. Typical products include individual disability income (DI), long-term care (LTC), medical, hospital indemnity, dental, critical illness (CI), accident coverages, and others.

The analysis excludes other health-related organizations, such as managed care providers, TPAs, health services providers, pharmacy benefit managers (PBMs), and vision care networks because actuarial methodology is typically not applied in these situations

4.7.1 TRADITIONAL GROUP TERM INSURANCE PRODUCTS

Traditional group is one-year term and contains few, if any, guarantees on rates or renewability Typical products include group life, AD&D, LTD, STD, indemnity medical, dental, and medical stop loss

4.7.1.1 Nature of Group Term Insurance

Group term coverages are driven by considerably different factors than individual life and health products, which have long-term guarantees The projection models used for group term appraisals should be consistent in structure with the way that the group business is managed In particular, group term coverages generally can be re-priced or non-renewed annually

Pricing of group risks is done at the case level, based on a large number of factors, including:

- industry
- underwriting basis (e g , guaranteed issue amounts, plan maximums, pre-existing conditions, exclusions)
- case size
- plan design (e g , benefit options, plan parameters)
- prior experience
- underwriters judgment
- competitive discounting

As a result, the pricing of each case (group) is unique Manual rates are often the starting point, not the ending point, for pricing Pricing is also dynamic in that rate guarantees are generally limited to two years on new business and one year on renewals The underlying risk profile (census) of each case can change each year A substantial amount of judgment and discounting can take place Group insurance is re-priced at each renewal by adjusting rates for the differences in the actual-to-expected loss ratios (e g , morbidity or mortality assumptions), at either the case or the block level This is contrasted against individual products, which have long-term guaranteed prices set at issue

Group term insurance operates in a commodity-like environment that sets practical limits on the pricing flexibility open to an insurer The factors that go into setting appraisal assumptions for group projections include:

- experience loss ratios (e g , morbidity or mortality)
- pricing targets (target loss ratios and profit margins)
- pricing strategy and tactics
- external benchmarks (competitive limitations)

If a company's recent morbidity experience is worse than its target loss ratio, it usually has a plan to raise rates on renewal To the extent that the plan is explicit and the company has a track record of successful implementation of rate increases, it is reasonable to build expected rate increases into the projection assumptions However, competitive pressures restrict the amount of rate increase that is practical to achieve External benchmarks should be used to validate that level In group insurance, the external environment is as important as the company s internal environment in determining appropriate projection assumptions

4.7.1.2 *General Modeling Issues for Group Term Products*

Due to the nature of group term products, there are certain modeling issues that need to be addressed. Some of these considerations are discussed below.

4.7.1.2.1 Projection Period

Group term business is annually renewable; renewals have to be re-sold each year. Therefore, the projection period is generally more limited than that for individual products. A 10-year projection period is common; however, there are no fixed rules.

Another common approach in sellers' appraisals is to set the projection period to be the same for all products (i.e., the longer period used for individual products). However, potential buyers might ignore any incremental value produced by such a longer projection period.

Runout of existing and future claim reserves is guaranteed; thus, projecting the full runout period for long-tail claim reserves (e.g., group life waiver of premium (WP), LTD disabled lives reserve (DLR)) is appropriate. For practical considerations, the claim reserve runout is generally cut off after 20 or 30 years.

4.7.1.2.2 Definitions of Inforce and Sales

In group insurance, a high proportion of a company's business commonly has a January 1 effective date. Sold date is often reported as the date of quote or the date the quote is accepted rather than the effective date. Therefore, for a 12/31 appraisal date, a potentially significant amount of business that has been sold may not be reported in the 12/31 inforce listing. However, trying to model these situations exactly could complicate the modeling process without adding materially to the overall utility of results. Group appraisals generally try to incorporate reasonable approximations to address these types of issues.

It is common to limit sales projections to five or 10 years of new business. Techniques include both the multiple years of issue and the one-year of issue methods mentioned in section 4.5.3.3.

4.7.1.2.3 Acquisition vs. Maintenance Expenses

Group writers vary widely regarding the expenses they classify as acquisition versus maintenance. The critical distinction is to differentiate between expenses that are truly one-time and those that are ongoing. This split can have a material impact on appraisal values. External benchmarks should be consulted regarding the reasonableness of the seller's expense assumptions.

4.7.1.2.4 Value of Renewals and the Impact of Ownership of the Distribution System

If the seller's distribution system does not move to the acquirer, the producer will likely try to re-establish his or her relationships with the case through a new insurance company. Thus, it is critical in "buyer's" appraisals to understand the buyer's distribution strategy and what will happen with any acquired sales capabilities and to adjust the projected lapse rates accordingly.

Blocks of group business are likely to suffer additional shock lapses following the announcement of the sale as competitors try to exploit any uncertainty in the minds of employers or brokers. In particular, this can be a problem when the buyer plans to re-write the group business from the selling company's paper to the buyer's paper. This re-write process generally results in shock lapses as clients are confronted with a decision point they would otherwise not face. The level of shock lapse is often higher for voluntary coverages.

4.7.1.2.5 Reserves and Reserve Margins

A substantial portion of the value of group term business may be implicit in statutory claim reserve margins. Claim reserve margins can also have a substantial and sometimes misleading impact on profitability. Thus, it is critical to understand the dynamics of claim reserves and to reflect them in the model.

For many group term coverages (e.g., AD&D, STD, Life Death Benefit (DB)), claims are short tail and reserves are based on simple IBNR claim triangles. However, individual company practices vary widely, and it is important to analyze historical claim reserve adequacy tests to understand the seller's specific situation and model it consistently. When buyers make their adjustments to appraisal model results, they often assume they will convert the seller's reserve base to their own (if the difference is material).

Medical, dental, and similar group term coverages also have relatively short-tail claims and use IBNR triangles; however, the situation is more complex than for AD&D. Medical trends, utilization, backlogs, seasonality, and other factors have a material impact on reserve margins. Recent loss ratios (and profitability) can be distorted, which could have a material impact on starting model assumptions. It is important to look at accident year as well as calendar year experience.

Life WP and LTD DLR are long-tail claim reserves; their statutory reserves often contain substantial margins. However, reserving methodologies and assumptions and actual claim run-out experience can vary significantly from company to company. It is not uncommon for claim reserve margins to be much higher in early claim durations relative to later claim durations. This can distort apparent profitability; for instance, a company whose sales growth has slowed can show a dramatic increase in apparent profitability. One way to adjust for this potential problem is to project "no-margin" claim reserves and paid claims, then calculate the statutory, GAAP, and tax reserve margins separately.

Interest margins may be a substantial component of claim reserve margins. Also, tax-to-statutory reserve differentials can have a material impact on value and should be modeled explicitly.

Group term coverages seldom have contract reserves. An exception is when there are extended rate guarantees with inadequate rates. The insurance company should recognize these situations and should hold reserves; however, industry practice in this area is inconsistent. Other situations requiring contract reserves are described in section 4.7.2.

4.7.1.2.6 Investment Income Assumptions

In general, models of group term products assume that premium rates will be adjusted on new and renewal business to react to future changes in interest rates. Thus, other than for potential rate guarantees, the values of new business and future premium renewals are relatively insulated from future interest rate changes. However, life WP and LTD DLR claim reserve interest rates do represent long-term interest commitments, and potential mismatches between asset and liability flows must be reviewed. Also, in cash transactions, the new assets will likely have significantly different yield rates than the seller's assets, and reserves may need to be adjusted.

4.7.2 SITUATIONS WITH ASPECTS OF BOTH GROUP AND INDIVIDUAL COVERAGES

Special modeling considerations within group term coverages include guaranteed elements such as portability options, extended rate guarantees, conversion options, special benefits, etc

Voluntary and worksite coverages cover a broad spectrum, from group policies with additional underwriting and guarantees to individual policies with varying degrees of flexibility in rates, renewability, and underwriting The coverages and benefits are often highly unique and customized; however, from a modeling perspective, the principles are similar

4.7.2.1 *Special Modeling Considerations in Group Term Coverages*

There are several considerations for modeling group term coverages

- Portability and ported lives Portability provisions vary widely. Ported lives generally have substantially higher mortality or morbidity than active lives Often, companies overlook or underestimate potential past and future liabilities
- Group conversions Similar to portability, conversions contain guarantees or options not found in traditional group contracts; corresponding liabilities may be understated
- Beneficiary checking account. Asset spreads on a group life beneficiary checking account represent a potential source of value
- Association, affinity, or other special purpose groups These types of groups often rely on special relationships, the likely continuance of which must be identified and evaluated by the actuary to validate any value
- Other specialty coverages Specialty accident, travel, and other unusual or non-standard coverages require specific expertise and careful investigation to avoid overlooking potential values or liabilities

4.7.2.2 *Voluntary and Worksite Coverages*

As mentioned above, there is a considerable overlap between voluntary and worksite benefits, underwriting, rating, etc The actuary must decide which type of modeling platform (i e , group or individual) is most suitable based on the characteristics of the specific coverage

Individual-type modeling is most suitable when individual lives have rights to renew the coverage separately from the rest of the group or if the policy has issue age-based premiums or individual-level nonforfeiture values This includes most individual policies as well as many group policies such as group universal life (GUL), group variable universal life (GVUL), and group LTC.

Group modeling platforms are most appropriate when the attained rates are age-based and the coverage ceases when the group policy terminates This generally includes coverages linked to an underlying group term policy as well as some stand-alone voluntary group or community-rated coverages.

4.7.3 GROUP LIFE COVERAGES THAT INCLUDE INDIVIDUAL-LIFE-TYPE GUARANTEES

This category includes GUL, GVUL, corporate-owned life insurance (COLI), bank-owned life insurance (BOLI), trust-owned life insurance (TOLI), group whole life (GWL), and similar group products These products have guarantees and other features (e g , cash values) that require individual modeling techniques

In general, these types of coverages use individual life modeling platforms and entail similar considerations as described in section 4 6. These products may have considerations worthy of reflecting in the modeling, such as testing that GVUL contracts have not exceeded permitted funding levels or identifying potential tax considerations of COLI, BOLI, and TOLI-type contracts

4.7.4 INDIVIDUAL HEALTH COVERAGES

This section addresses individual health products issued by insurance companies. These contracts can include a wide range of rate and renewability guarantees. Typical products include DI, LTC, medical, hospital indemnity, dental, CI, and accident coverages. This section also applies to group health coverages, such as group LTC, that utilize an individual-type modeling platform.

4.7.4.1 Morbidity Assumptions

The structure of individual health morbidity assumptions can span a wide range. DI and LTC products tend to use claim incidence and termination rates. Medical and dental coverages tend to use claim costs.

Health morbidity experience can vary widely from company to company and situation to situation. A variety of methods can be used to set appraisal assumptions. Often adjustment factors are applied to industry experience tables to match to recent company experience. Other times the seller's pricing assumptions are adjusted as appropriate. When selecting appropriate adjustment factors, attention should be given to the credibility and volatility of the seller's data, and the results compared against industry benchmarks.

Sometimes improvements in morbidity are anticipated based on recent or projected changes in claim management or underwriting practices. These should be carefully evaluated and quantified by the appraising or reviewing actuary. Likewise, assumptions for trend can be critical and should be supported by experience reports and comparisons to external benchmarks.

4.7.4.2 Rate Guarantees, Rate Increases, and Renewability

Individual health coverages vary widely as to the contractual provisions and policyholder expectations regarding rate increases and renewability. For some products, rate increases are common and accepted. For most coverages, rate increases are rare and unpopular. Non-cancelable products may not increase rates. When projecting any rate increases, the following factors should be considered:

- company's history of rate increases, including timeliness and percent of target achieved
- regulatory approval process, including potential delays and reductions
- lapse and antiselection on lapse
- impact of potential bad publicity on reputation and sales
- lawsuit potential

Many potential buyers are apprehensive about future rate increases and may discount much of the value generated by them.

4.7.4.3 Reserves and Reserve Margins

Individual health coverages generally have both contract and claim reserves. Considerations related to claim reserves are generally similar to those described under group term products described in section 4.7.1.2.5.

Considerations related to contract reserves are generally similar to those described for individual life contracts in section 4.6. One major difference is that morbidity experience tends to exhibit significant variations from company to company and situation to situation, much more so than individual life mortality experience tends to do. Thus, it is critical to examine or perform experience studies and appraisal assumptions accordingly.

4.7.4.4 Lapse Rates

In general, individual health lapses are modeled using techniques similar to individual life products; however, the impact can be much different. Individual health pricing is often lapse-supported; this is particularly true for DI and LTC coverages. DI and LTC contracts commonly have steep claim costs by age and no nonforfeiture values. If ultimate lapse rates are lower than pricing, the value of the business can disappear or even turn negative.

Experience and modeling assumptions must be examined closely. Comparison to external benchmarks is critical. Models frequently have to be refined to adequately capture the variety of coverages and variations in experience within blocks of DI and LTC.

4.7.4.5 Investment Income

In most respects, considerations for the modeling of investment income are consistent with those for individual life products. There are a few significant differences, however:

- DI and LTC contracts have long coverage periods and long-tail claims. Combined with the fact they commonly do not have cash values, the average duration of liabilities is very long.
- Some companies try to lock in yields on future premium flows through hedging vehicles, which must be evaluated and modeled. For long-tail health coverage, which can extend beyond 30 years, it may not be possible to match cash flows; instead, companies will manage durations and, potentially, partial durations over time.
- Some companies do not hedge or match future liability durations closely; the potential reaction of a buyer to the related volatility of future earnings or the cost of restructuring the asset portfolio should be considered.

The combination of high renewal premium flow, steep claim curves, and low lapse rates can make the earnings on the long tail health liabilities highly sensitive to investment earnings. Therefore, this assumption is typically analyzed further through sensitivity testing with respect to future economic environments.

4.8 ISSUES RELATED TO SALE OF A BLOCK OF LIFE OR HEALTH BUSINESS

In addition to the M&A market of insurance companies, there is an active market in the purchase and sale of blocks of business. In general, the motivations of buyers and sellers of blocks of business are the same as for transactions involving entire companies. However, the sale of a block of business is often driven by the desire of an insurance company to exit a particular line of business while retaining the corporate entity to pursue its remaining business lines. This section primarily relates to the sale of 100% of a line of business, although comparable analysis would apply to a quota share sale of a portion of a block. For reinsurance transactions, the seller is referred to as the ceding company and the buyer as the assuming company.

4.8.1 REINSURANCE APPROACHES

The sale of a block of business is accomplished through a reinsurance mechanism. The primary alternatives are the following:

1) Assumption reinsurance: Under assumption reinsurance, the underlying policyholder contracts are transferred from the seller's books to the buyer's books. In order to accomplish this, policyholder notification is required. In a number of states, affirmative consent by the policyholder is necessary to transfer the policy; in the majority of states, lack of non-consent is sufficient. Assumption reinsurance is the cleanest approach, since the ceding company is no longer part

of the structure However, due to the legal and regulatory complexity, assumption reinsurance is relatively uncommon In addition, there are some tax disadvantages to assumption reinsurance, discussed later in this section.

2) Indemnity coinsurance: Under an indemnity coinsurance structure, the financial interest in the contracts is transferred to the assuming company but the policies remain as policies of the ceding company While the purchaser may choose to notify the policyholders, there is not a requirement to do so The advantage to a coinsurance structure is that it can be accomplished quickly with no disruption to policyholders other than potential service-related disruptions if policy administration is transferred Coinsurance generally requires more limited regulatory approval than assumption reinsurance or a company acquisition, although some states require significant approval processes The disadvantage is that the ceding company remains in the middle of the transaction, which may be an issue if there are concerns about the ceding company s credit The assuming company s credit is important as well because the original writing company (ceding company) retains the contractual obligation to the policyholder. Trust accounts may be used to limit the credit exposure to buyer or seller. Coinsurance structures are typically used for the sale of a block of business.

3) Modified coinsurance: A mod-co structure is similar to indemnity coinsurance but the assets backing the liabilities remain with the ceding company Typically the assets under a mod-co structure would be put into a trust so that the assuming company can retain control over the portfolio Mod-co structures are relatively uncommon for the sale of a block but may be used in some situations, such as the reinsurance of variable products

Until the early 1990s, assumption reinsurance was the favored means of acquiring a block of business because policyholder approval was not required and because the tax treatment of the purchase price was favorable However, the change in law to require policyholder approval for assumption reinsurance, together with tax law changes, subsequently tilted the balance in favor of coinsurance as the predominant mechanism for acquiring a block

4.8.2 REGULATORY AND TAX ACCOUNTING

The basic financial analysis and valuation of a coinsurance transaction follows the same procedures as the actuarial appraisal of a company Typically, no capital, surplus, or AVR is transferred with the business In addition, due to the structure, there are several key adjustments that are made in the development of appraisal values:

1) The asset portfolio that is transferred is marked-to-market as a result of the transaction The IMR related to the business, as well as IMR associated with the mark-to-market, is also transferred

2) There are several adjustments to taxes. In particular, the ceding commission (on a tax basis) is deductible by the purchaser

3) From the seller s perspective, the gain on the transaction on a statutory or GAAP basis is deferred and amortized into income over time

These items are discussed further in the remainder of this section.

4.8.2.1 Mark-to-Market and Transfer of IMR

Under a reinsurance structure, statutory liabilities are generally transferred to a purchaser on the same basis as was held by the seller In particular, the statutory liabilities are not updated to current year minimum statutory valuation rates and tables, although a buyer may have the opportunity to reduce any reserves that are in excess of statutory minimums An exception might be on structured settlements or other payout annuities sold in an interest rate environment that

resulted in valuation rates no longer consistent with the yields on the underlying assets Assets, on the other hand, are transferred at market value as of the date of the transaction. As a result of this mismatch, NAIC model regulations for reinsurance transactions require that a new IMR be established on the books of the purchaser as if the portfolio had actually been liquidated and a capital gain or loss were realized. In addition, the model regulations require that any historic IMR associated with the business on the books of the seller be transferred

The mark-to-market of the asset portfolio and establishment of IMR does not affect the actual coupon and principal cash flows from the investment portfolio In fact, the net effect of the mark-to-market of the asset portfolio and the establishment of the IMR is that investment income will continue to reflect the historic book yields of the seller, with two exceptions First, there is an economic loss from paying tax on the gain in the portfolio immediately, rather than as the investment income is earned. Second, if there were an unrealized loss in the portfolio that exceeds any positive IMR on the books of the purchaser, there would be an economic loss since total IMR is not allowed to fall below zero for statutory accounting purposes

4.8.2.2 Reinsurance Taxes

There are several adjustments to taxable income as a result of a reinsurance transaction From the purchaser's perspective, the following adjustments are made:

1) The DAC proxy tax is based on the ongoing net consideration received by the assuming company. For coinsurance, this would typically be premiums less claims and commissions In addition, DAC proxy tax is payable based on the initial net consideration paid, i.e., the assets transferred backing liabilities less ceding commission For assumption reinsurance, DAC proxy tax continues to be paid based on premium because the policyholders merely switch to become direct policyholders of the purchaser

2) The mark-to-market on the asset portfolio creates an immediate taxable gain or loss to the purchaser

3) The excess ceding commission on a tax basis is deductible The excess tax ceding commission can be calculated as follows:

Excess Tax Ceding Commission = Purchase Price (statutory ceding commission)
- (Statutory Reserve - Tax Reserve)
- Mark-to-Market of Assets
- DAC Proxy Tax on Initial Consideration

The period over which the excess tax ceding commission is deductible varies based on structure and type of business In addition, companies may take different approaches in filing with the IRS General approaches used are:

- For assumption reinsurance, the entire amount is deductible straight-line over 15 years
- For coinsurance, amounts associated with new business or goodwill are deductible straight-line over 15 years
- For coinsurance of inforce business subject to DAC proxy tax, the excess tax ceding commission associated with inforce business is deductible immediately
- For coinsurance of inforce business not subject to DAC proxy tax, for example qualified annuities, the amount is deductible over the life of the business.

Table 4.8 illustrates the appraisal value for the UL business in the UL Sample Company under a reinsurance structure

UL SAMPLE COMPANY
Tax Benefit Under Coinsurance
As of December 31, 2004
(in millions)

Component of Value	Discount Rate 10.0%	12.0%	14.0%
Initial Statutory Liability	803.4	803.4	803.4
Initial Tax Liability	782.4	782.4	782.4
After Tax After Cost of Capital Value of EB	122.9	99.2	80.4
After Tax After Cost of Capital Value of FB	79.0	44.1	20.6
DAC Proxy Tax on Initial Consideration	51.7	54.0	55.7
Mark-to-Market on Asset Portfolio	0.0	0.0	0.0
Excess Tax Ceding Commission on EB	59.1	27.4	3.2
Tax Benefit from 338 (h) (10) Election :			
DAC Proxy Tax on Initial Consideration	11.1	10.7	10.2
Elimination of Exisiting DAC Proxy Tax Balance	(12.7)	(11.9)	(11.1)
15-Year Deduction on EB	10.5	4.3	0.5
15-Year Deduction on FB	17.0	8.3	3.4
Total Tax Benefit	25.9	11.5	3.0
Adjusted Book Value	100.0	100.0	100.0
Total Value of Inforce	131.8	102.4	79.9
Total Value of New Business	96.1	52.4	24.0
Total Actuarial Value	327.8	254.8	204.0

TABLE 4.8

4.8.2.3 *Amortization of Ceding Commission for Selling Company*

Under a coinsurance transaction, for statutory purposes the ceding commission (purchase price) results in an immediate gain in surplus. For statutory income purposes, however, the gain is amortized into income over the life of the business, i.e., the expected future profits of the business, with an equal offset in surplus.

For purposes of US GAAP reporting, the ceding commission from a coinsurance transaction results in a deferred gain presented as a liability on the balance sheet. The deferred gain is amortized into income, and therefore equity, over the life of the business.

4.9 P&C INSURANCE COMPANY VALUATION ISSUES

For P&C insurance companies, the sell-side actuarial appraisal has not always been a staple among the financial information available in the data room. Property and casualty insurance products have two distinct features that increase the complexity of the actuarial appraisal and the uncertainty of the resulting sell-side actuarial appraisal value.

First, the renewal assumptions have greater uncertainty than for life and health insurers. Almost all P&C insurance products are one-year contracts. Due to the competitive nature of the personal lines market and the distribution system prevalent for the commercial markets, the persistency and new business assumptions have a greater uncertainty than those for life and health companies.

Second, the timing and amount of the liabilities for P&C insurance products have significantly more variability than life insurance or group health insurance products. In general, P&C insurance liabilities are paid out over a shorter time than for life insurance liabilities. Each type of P&C exposure has a different claim reporting and loss payment pattern. The resulting cash

flows for property casualty loss and loss adjustment expenses may differ significantly for two insurance companies writing the same exposure due to diverse claim handling philosophies As a result, the selling company's P&C actuary typically devotes a significant amount of time gathering data to support the company's estimated loss and loss adjustment expense (LAE) reserves and the implied historical loss ratios The differences in opinion relating to the estimate of the liabilities for property casualty insurers significantly reduce the certainty of the appraisal value

In the 1980s and 1990s there were far fewer P&C insurance company transactions than life company transactions The majority of the P&C acquisitions were strategic acquisitions as opposed to financial acquisitions, which may have led to a greater divergence between the actuarial appraisal value and the purchase price The actuarial appraisal value represents the economic value of the company being sold The purchase price, or the amount the buyer is willing to pay, includes numerous factors including the added value from synergies and embedded options, less any transition costs For strategic buyers, the value of embedded options and synergies may significantly enhance the value of the P&C insurer Therefore, the economic value developed for the sell-side actuarial appraisal may understate the potential market value of the company

While sell-side actuarial appraisals are not always readily available, transactions are very rarely consummated without the principals involved having determined the company's value The purchase price must allow the buyer to meet its target return on investment, and the seller should not be willing to accept an offer significantly below the economic value. Due to the uncertain nature of the liabilities, the most important components for determining the value of a P&C insurer are assessing the adequacy of the loss reserves and estimating the historical and prospective accident year loss ratios

The Casualty Actuarial Society (CAS) has published many papers regarding issues relating to the valuation of P&C insurance companies, which include valuation techniques to address the unique nature of P&C insurance products and the variability inherent in the cash flows The following sections highlight some of the valuation issues that are unique to P&C insurance companies including valuation models, loss and LAE reserving techniques, cash flow assumptions, management assumptions, and other P&C valuation issues These sections provide a summary of the key issues

4.9.1 DISCOUNTED CASH FLOW VS. ECONOMIC VALUE ADDED METHODS

The uncertainty of the P&C insurance exposure creates significant challenges when developing an actuarial appraisal During due diligence, the investor's actuary will develop an independent estimate of the loss and LAE reserves Many times the investor's estimate is materially different than that presented by the selling company due to differences in methods used, selection of key parameters, and differences in actuarial judgment This is especially true for long-tailed commercial lines of business Given the difficulty in reaching agreement on the estimated value of the unpaid losses and loss ratios for accident years that have already expired, actuarial appraisals for P&C insurers that include long-term projections of future earnings on business yet to be written can be met with skepticism

Property and casualty actuaries often use the economic value added (EVA) method in an actuarial appraisal Traditional discounted cash flow (DCF) determines the value of the firm as the present value of distributable cash flows, which is defined as after-tax earnings minus the increase in required capital measured on a statutory accounting basis Under the EVA model, the value of the company equals the adjusted statutory book value (ABV) plus the present value of future earnings less the cost of capital. Blackburn provides examples to show that both methods produce the same results for an infinite time horizon under either static or constant growth assumptions

The most significant difference between the DCF and the EVA approaches relates to the ter-

minal value The terminal value is the remaining value added after the initial forecast period Under the DCF approach the terminal value is a significant portion of the appraisal value because it includes the remaining capital value of the company that will eventually flow back to the investor in perpetuity Therefore, the terminal value increases as the initial forecast period decreases

Under the EVA approach, the initial capital requirement is immediately recognized, and the terminal value represents only the portion of earnings that exceeds the investor s cost of capital Under the simplifying assumption that the target company s long-term returns will equal the investor s cost of capital, the terminal value under the EVA approach is zero Due to the uncertainty in estimating the amount and timing of unpaid loss and LAEs, investors tend to be more comfortable with the short-term projections Since the terminal value of the EVA method is much smaller, it allows the investor to gain a better understanding and have more control of the assumptions relating to late emerging profits

4.9.2 ADJUSTMENTS TO BOOK VALUE

For P&C insurance companies, many of the adjustments made to the statutory capital and surplus for life insurers as discussed in section 4 5 1 are equally applicable to the P&C insurers, including deferred tax assets and non-admitted assets For P&C insurance company valuations, the following additional adjustments to statutory capital and surplus should be considered:

Adequacy loss and LAE reserves—The most significant adjustment to the statutory capital and surplus for P&C insurers usually relates to differences in the estimated adequacy of the recorded loss and LAE reserves The methods and issues relating to estimating these liabilities are discussed in detail in section 4 9 3. The book value adjustment equals the difference between the recorded reserves and the valuation actuary's best estimate of the loss and LAE reserves, on an undiscounted basis, with no additional margin for risk The economic value of these liabilities will be captured in the valuation model cash flows. The risk inherent in estimating loss and LAE liabilities is implicitly considered by discounting these cash flows at the selected cost of capital Statutory reserves that are deemed to be in excess of the best estimate indications should also be included as a book value adjustment

Goodwill—Under the Code, P&C insurers are allowed to carry goodwill and an admitted asset, subject to certain limitations The value of goodwill is eliminated for the purposes of a valuation

Market value of bonds—Statutory accounting requires that bonds in good standing be recorded at amortized cost for P&C insurers For the purposes of determining the adjusted net worth, bonds should be valued at their market value

Schedule F penalties for reinsurance—Statutory accounting imposes a Schedule F penalty for P&C insurers that have ceded balances with unauthorized reinsurance companies and other reinsurers that present a collectibility risk A liability is established on the balance sheet for cessions that are not secured with a letter of credit or other collateral. Many times the collectibility of the ceded balances is not impaired Therefore, adjustments should be made to reflect the probable recoveries

Unearned premiums reserve adjustments—Certain P&C insurance policies may require additional reserve provisions Two common types of policies are retrospectively rated policies and long-duration contracts (see section 4 9 6 2) Differences in the best estimate for the reserve relating to these policies should also be included as a book value adjustment

4 9 3 LOSS AND LOSS ADJUSTMENT EXPENSE RESERVES

The estimates of the amount and timing of the unpaid loss and LAEs is the most critical aspect of the P&C insurance company valuation The CAS has published a vast amount of research regarding the models, methods, and techniques used to estimate loss and LAE reserves Certain loss reserving methods and techniques are applicable to most P&C lines of business, while other methods have been developed for specific types of exposure In addition, a number of tests have been developed to detect unusual conditions or circumstances that may require the actuary to perform special procedures

A comprehensive discussion of the various tests used to evaluate P&C loss reserves is beyond the scope of this book In this section, a brief description of the most common P&C loss and LAE reserving methods is presented The data considerations, techniques used to estimate key parameters, and the strengths and weakness of the common reserving methods are addressed The purpose of this section is to allow the reader to develop a better understanding of how changes in claim handling procedures, underwriting decisions, legislative action, judicial interpretation, inflation, and other economic factors impact the estimates of ultimate losses and resulting reserve estimates suggested by the common reserving methods This is particularly important when performing reserve estimates for an acquisition since these changes are more prevalent for companies being sold The methods discussed in this section apply to insurance companies as well as to corporations with self-insured P&C exposure

Valuation models for P&C insurance companies use the best estimate of loss and LAE reserve on a statutory basis The estimate of the P&C self-insured liabilities for a corporate acquisition and the estimate for purchase price accounting may be made on a 'fair value' basis The CAS Fair Value task force has published a White Paper[7] on Fair Valuing Property/Casualty Insurance Liabilities This document also serves as a reference on issues relating to purchase price accounting under GAAP In addition to addressing FASB developments, the paper also addresses fair value of property casualty liabilities under International Accounting Standards #39 (ISA 39) While the valuation techniques for estimating the fair value of property casualty liabilities will be addressed in section 4 9 3 6, the accounting issues are covered in Chapter 8

4 9 3 1 *Data Considerations for Estimating Loss and LAE Reserves*

There are several elements of the process by which loss and LAE liabilities are estimated: type of exposure, data, methods, and parameters Based on the type of exposure, the actuary may choose to apply a method to various types of data, including paid losses, reported losses (paid plus case basis claim reserves also referred to as incurred losses), claim counts, frequency, severity or other loss, and LAE ratios Similarly, the actuary will consider more than one method for application to a particular data set

The various methods applied to alternate data sets will likely give rise to a wide range of preliminary reserve estimates Based on the strengths and weakness of the particular method, for the particular exposure and accident year being estimated, the actuary will select the best estimate The actuarial judgments inherent in the loss reserving process will naturally lead to differences in opinion of the value of the unpaid losses The casualty actuarial profession, in its Statement of Principles Regarding Property and Casualty Loss and Loss Adjustment Expense Reserves,[8] has acknowledged that a range of estimates of the liabilities can be considered reasonable

[7] CAS Task Force on Fair Value Liabilities (2001) Casualty Actuarial Society Forum: Vol: Winter: White Paper on Fair Valuing Property/Casualty Insurance Liabilities Pages 439-570; Arlington VA

[8] CAS Yearbook—Statement of Principles Regarding Property Casualty Loss and Loss Adjustment Expense Reserves adopted May 1998

Due to the provision for risk, these principles recognize that the estimate of the unpaid losses may differ based on the purpose for which the estimate is being performed. For the purpose of estimating the unpaid losses and cash flows used in a valuation model, the best estimate should be used, without a margin for risk. The margin for risk is intrinsic in the discount for the cost of capital used in the valuation model. The fair value estimate of the self-insured loss and LAE reserves may be the more appropriate estimate for a corporate acquisition when the liabilities are valued on a GAAP basis and the cash flows are not being used in a cash flow valuation model.

Due to the diverse nature of the risk, exposure, and loss development patterns, the loss and LAE reserves are reviewed by line of business. Property and casualty lines of business include fire, earthquake, homeowners, farmowners, commercial multiple peril, mortgage guaranty, ocean and inland marine, medical malpractice, workers' compensation, general liability, product liability, financial guaranty, private passenger auto, commercial auto liability, aircraft, fidelity and surety, burglary and theft, boiler and machinery, and credit.

The segregation of the data used in the analysis of loss and LAE reserves differs for each company based on the amount of business written in each line of business. The two basic principles in evaluating the proper segmentation are homogeneity and credibility. Conforming to the homogeneity principle entails analyzing types of losses that are expected to have similar development patterns. The credibility principle requires a sufficient volume of data to establish stable development patterns. These two principles oppose each other because the former suggests separating the data into refined groups while the latter suggests grouping data for stability.

The 21 lines of business reported in Schedule P of the P&C insurance company statutory annual statement typically form the basis for the data segmentation. However, the claim data is typically segmented into additional detail, such as type of loss, type of product within a line, or geographical regions. For example, personal automobile liability loss reserves may be calculated separately for bodily injury and property damage claims because the former type of claims take significantly longer to settle.

The data used in the loss reserve analysis is typically arranged in a triangular format. The inception to date paid losses, reported losses, reported claim count, and closed claim count data are shown for each accident period, at uniform intervals of valuation. Annual (12-month intervals) and quarterly valuation intervals are most common. The claim data may also be segregated by policy year, report year, or other fiscal year ending period. Accident-year data is the basis for the statutory reporting in Schedule P. Policy-year data is commonly used for corporations with self-insured exposure. Report-year data is commonly used to estimate the reserves for claims-made insurance policies.

In general, the objective for most loss-reserving techniques is to project an estimate of the ultimate losses for each period under review. The total indicated reserve is then determined by subtracting the loss payments made inception to date. When calculating the outstanding liabilities for corporate self-insureds, it is important to distinguish between the claims paid by the third-party claims administrators and the loss payments made by the company being evaluated. Sometimes corporate self-insureds establish prepaid loss fund deposits and other times they are billed subsequent to the administrator paying the claim. The difference in the indicated liability for these two processes may be material.

The total required reserve is made up of two components: the case basis reserves and the incurred but not reported (IBNR) reserves. Case basis reserves are established on an individual claim case basis by the claims adjusters settling the claim. IBNR reserves typically include a provision for claims that have not been reported, pipeline claims (those that have been reported but are not recorded in the insurer's claim system), development on known claims, and the

additional cost for claims that have closed but may reopen at a later date The provision for loss reserves should only include amounts for claims that have been incurred to date As noted in section 4.9.6.4, the equalization and catastrophe reserves allowed in many European countries are provisions for claims that have not been incurred These are not considered loss reserves for statutory accounting and should therefore be included as an adjustment to book value

4.9.3.2 *Common Actuarial Techniques for Estimating P&C Loss Reserves*

There are numerous actuarial loss reserving techniques for P&C exposure, some specifically designed for unique exposure, and others that are common to most types of insurance When estimating P&C liabilities, multiple techniques should be applied to the claim data Most methods begin by projecting the ultimate losses and determine the required reserve by subtracting the payments made to date The weights assigned to each technique are usually based on actuarial judgment, considering the strengths and weakness of the method and data to which it is being applied The methods and techniques described below are staples in most actuarial reserve studies for the common lines of business However, even these methods are considered but disregarded by the reserving actuary under certain circumstances

4.9.3.2.1 Loss Development Method

The loss development method (LDM) is the most common method used to estimate loss reserves and is a staple in most actuarial reserve studies for P&C lines of business This method may be applied to the paid or reported losses to project the ultimate losses and is also applied to claim counts to estimate the ultimate number of claims that will be reported for each accident period This method projects the preliminary estimate of ultimate losses by applying loss development factors (LDFs) to the recent valuation of losses for that accident period (Table 4.10)

PC SAMPLE COMPANY
Workers' Compensation
Summary of Selected Ultimate Losses
as of December 31, 2004

	Estimate of Ultimate Losses ($000)					
Accident Year	(1) LDM Paid Analysis	(2) LDM Reported Analysis	(3) BF Paid Analysis	(4) BF Reported Analysis	(5) Selected Estimate of Ultimates	(6) Weights Used
1991	9 609	9 462	9 597	9 460	9 536	(5 5 0 0)
1992	13 183	13 155	13 149	13 139	13 169	(5 5 0 0)
1993	15 851	15 350	15 875	15 378	15 601	(5 5 0 0)
1994	17 935	18 192	17 935	18 182	18 063	(5 5 0 0)
1995	20 533	19 939	20 351	19 883	20 236	(5 5 0 0)
1996	19 930	20 042	19 867	20 008	19 986	(5 5 0 0)
1997	21 512	20 619	21 206	20 535	20 913	(0 5 5 0) a
1998	17 917	17 706	17 923	17 721	17 812	(5 5 0 0)
1999	15 377	14 712	15 701	14 888	15 244	(8 2 0 0) b
2000	19 852	19 664	19 748	19 637	19 814	(8 2 0 0) b
2001	18 393	17 322	18 477	17 449	18 179	(8 2 0 0) b
2002	16 894	14 709	17 181	15 029	16 457	(8 2 0 0) b
2003	16 347	14 845	16 556	15 118	16 185	(4 0 4 2) c
2004	17 417	15 120	17 582	16 006	17 267	(0 0 8 2) d
Total	240 750	230 838	241 149	232 432	238 461	

a - Paid LDM distorted due to large claim settlement
b - Reported loss development given less weight because of case reserve weakening (see Table 4 17)
c - BFM given more weight to adjust for late emerging large losses that may not be reflected in claim data
d - BFM given more weight due to immaturity of accident year

	Estimate of Ultimate Losses ($000)					
Accident Year	(7) Paid Loss	(8) Reported Loss	(9) Case Reserves	(10) IBNR	(11) Estimate of Total Reserve	(12) Estimate of Ultimate
1991	9 157	9 237	81	298	379	9 536
1992	12 426	12 779	353	390	743	13 169
1993	14 750	14 836	87	764	851	15 601
1994	16 474	17 495	1 021	568	1 589	18 063
1995	18 581	19 080	499	1 155	1 654	20 236
1996	17 788	19 083	1 295	903	2 198	19 986
1997	18 888	19 535	648	1 377	2 025	20 913
1998	15 484	16 692	1 209	1 119	2 328	17 812
1999	12 996	13 773	777	1 471	2 248	15 244
2000	16 131	18 226	2 096	1 588	3 683	19 814
2001	14 230	15 801	1 571	2 378	3 949	18 179
2002	11 784	13 208	1 425	3 249	4 673	16 457
2003	8 899	12 784	3 885	3 401	7 286	16 185
2004	4 728	9 813	5 085	7 454	12 539	17 267
Total	192 315	212 345	20 030	26 116	46 146	238 461

Notes:
(1) (2) From Table 4 10
(3) (4) From Table 4 13
(5) - Actuarial Judgment: Weighted average of (1) - (4) using (6) as weights
(7) (8) Company Data
(9) = (8) - (7)
(10) = (5) - (8)
(11) = (9) + (10)
(12) = (5)

TABLE 4 9

PC SAMPLE COMPANY
Workers' Compensation
Loss Development Methods
As of December 31, 2004

	Paid Loss Development			Reported Loss Development		
	(1)	(2)	(3)	(4)	(5)	(6)
Accident Year	Paid Loss Amount ($000)	Paid LDF	Indicated Ultimate Loss	Reported Loss Amounts ($000)	Reported LDF	Indicated Ultimate Loss
1991	9 157	1 0494	9 609	9 237	1 0244	9 462
1992	12 426	1 0609	13 183	12 779	1 0295	13 155
1993	14 750	1 0747	15 851	14 836	1 0346	15 350
1994	16 474	1 0887	17 935	17 495	1 0398	18 192
1995	18 581	1 1050	20,533	19 080	1 0450	19 939
1996	17 788	1 1204	19 930	19 083	1 0502	20 042
1997	18 888	1 1389	21 512	19 535	1 0555	20 619
1998	15 484	1 1571	17 917	16 692	1 0608	17 706
1999	12 996	1 1832	15 377	13 773	1 0682	14 712
2000	16 131	1 2307	19 852	18 226	1 0789	19 664
2001	14 230	1 2925	18 393	15 801	1 0963	17 322
2002	11 784	1 4337	16 894	13 208	1 1136	14 709
2003	8 899	1 8369	16 347	12 784	1 1612	14 845
2004	4 728	3 6840	17 417	9,813	1 5408	15 120
Total	192 315		240,750	212 345		230 838

(1) (4) Company Claim Data
(2) From Paid Loss Development Factor Analysis (see Table 4 11)
(3) = (1) x (2)
(5) From reported loss development factor analysis - not shown
(6) = (4) x (5)

TABLE 4 10

The paid loss development method assumes that the future pattern of loss payments will be consistent with historical payment patterns Paid loss development factors are estimated by analyzing the percentage change in paid losses between successive valuation periods (Table 4-11) These ratios are commonly referred to as link ratios For example, if, on average, paid losses at 24 months after the start of the accident year were 150% of losses paid at 12 months, the link ratio from 12 to 24 months is 1 50 The process to estimate the link ratio from 24 to 36 months, 36 to 48 months, etc , is continued until a level of maturity is reached, at which point no change is expected To estimate the development beyond the experience period, curves are sometimes fit to the development patterns to determine an appropriate tail factor The tail factor and link ratios are then cumulated backwards from the oldest age of development to determine the LDF needed to project the losses from each age of valuation to its ultimate settlement value. The same process is used for reported losses

The LDFs are the key parameters in the LDM Ideally, the LDFs are calculated using historical claim data from the specific segment of business being valued. When sufficient historical claim data is not available or fully credible, industry benchmarks are sometimes used in lieu of, or to supplement, the LDFs derived from actual company data. The benchmark LDFs should be obtained from a peer group of companies that have a similar mix of business and claim handling philosophy Various tests may be performed to ensure that the benchmark LDFs represent a reasonable estimate of the expected claim development patterns Otherwise, errors in the reserve estimates may result

PC SAMPLE COMPANY
Workers' Compensation
Loss Development Methods
As of December 31, 2004

Paid Loss Amounts ($000)

Accident Year	12	24	36	48	60	72	84	96	108	120
1991	2 578	4 972	6 448	7 195	7,876	8,083	8 416	8 500	8 770	8 890
1992	3 130	6 369	8 136	9,580	10 491	10 969	11 217	11 480	11 662	11 948
1993	3 781	7 988	10 785	12 459	13 079	13 516	13 780	13 932	14 139	14 320
1994	4 581	9 414	12 423	13 947	14 889	15 266	15 609	15 787	15 988	16 230
1995	5 122	10,374	14 164	15 972	16 990	17 747	17 865	18 060	18 513	18 581
1996	4 495	9 970	13 603	15 365	16 101	16 876	17 301	17 544	17 788	
1997	5 240	11 323	14 800	16 773	17 567	18 008	18 586	18 888		
1998	5 242	10 440	12 781	14 210	14 672	15 181	15 484			
1999	4 347	8 583	10 939	11 824	12 484	12 996				
2000	5 040	10,778	13 846	15 281	16 131					
2001	4 886	9 960	12 796	14 230						
2002	4 462	8 713	11 784							
2003	4 442	8 899								
2004	4 728									

Age-to-Age Factors

Accident Year	12-24	24-36	36-48	48-60	60-72	72-84	84-96	96-108	108-120	To Ult
1991	1 929	1 297	1 116	1 095	1 026	1 041	1 010	1 032	1 014	
1992	2 035	1 277	1 177	1 095	1 046	1 023	1 023	1 016	1 025	
1993	2 113	1 350	1 155	1 050	1 033	1 020	1 011	1 015	1 013	
1994	2 055	1 320	1 123	1 068	1 025	1 022	1 011	1 013	1 015	
1995	2 025	1 365	1 128	1 064	1 045	1 007	1 011	1 025	1 004	
1996	2 218	1 364	1 130	1 048	1 048	1 025	1 014	1 014		
1997	2 161	1 307	1 133	1 047	1 025	1 032	1 016			
1998	1 992	1 224	1 112	1 033	1 035	1 020				
1999	1 974	1 274	1 081	1 056	1 041					
2000	2 138	1 285	1 104	1 056						
2001	2 038	1 285	1 112							
2002	1 953	1 352								
2003	2 004									
2004										

Averages

	12-24	24-36	36-48	48-60	60-72	72-84	84-96	96-108	108-120	To Ult
Simple Avg										
All Yrs	2 049	1 308	1 125	1 061	1 036	1 024	1 014	1 019	1 014	
Latest 5	2 022	1 284	1 108	1 048	1 039	1 021	1 013	1 016	1 014	
Latest 3	1 998	1 307	1 099	1 048	1 034	1 026	1 014	1 017	1 011	
Medial Avg.										
Latest 5x1	2 005	1 281	1 109	1 050	1 040	1 023	1 012	1 015	1 014	

Paid Loss Development Factor Selection

	12-24	24-36	36-48	48-60	60-72	72-84	84-96	96-108	108-120	Tail Factor*
(1) Industry	2 186	1 259	1 110	1 058	1 034	1 025	1 018	1 017	1 015	1 168
(2) Prior	2 019	1 275	1 112	1 049	1 036	1 021	1 015	1 015	1 015	1 105
(3) Selected	2 005	1 281	1 109	1 050	1 040	1 023	1 016	1 016	1 014	1 105
(4) Paid LDF	3 684	1 837	1 434	1 293	1 231	1 183	1 157	1 139	1 120	1 105
(5) Percent of Ult	0 271	0 544	0 698	0 774	0 813	0 845	0 864	0 878	0 893	0 905

TABLE 4 11

Notes:
Age-to-Age Factors determined by dividing successive valuations:
For AY 2003, 2 004 = 8 899 / 4 442

(1) Industry from NCCI 5-year averages
(2) From the prior loss reserve analysis
(3) Based on actuarial judgment
(4) Cumulating selected factors from oldest period
(5) = 1 00 / (4)

* Tail Factor - based on special study of payments beyond 120 months

A comparison of the net paid and reported LDFs based on information published in the 2003 annual statements of a sample of insurance companies is shown in the table below

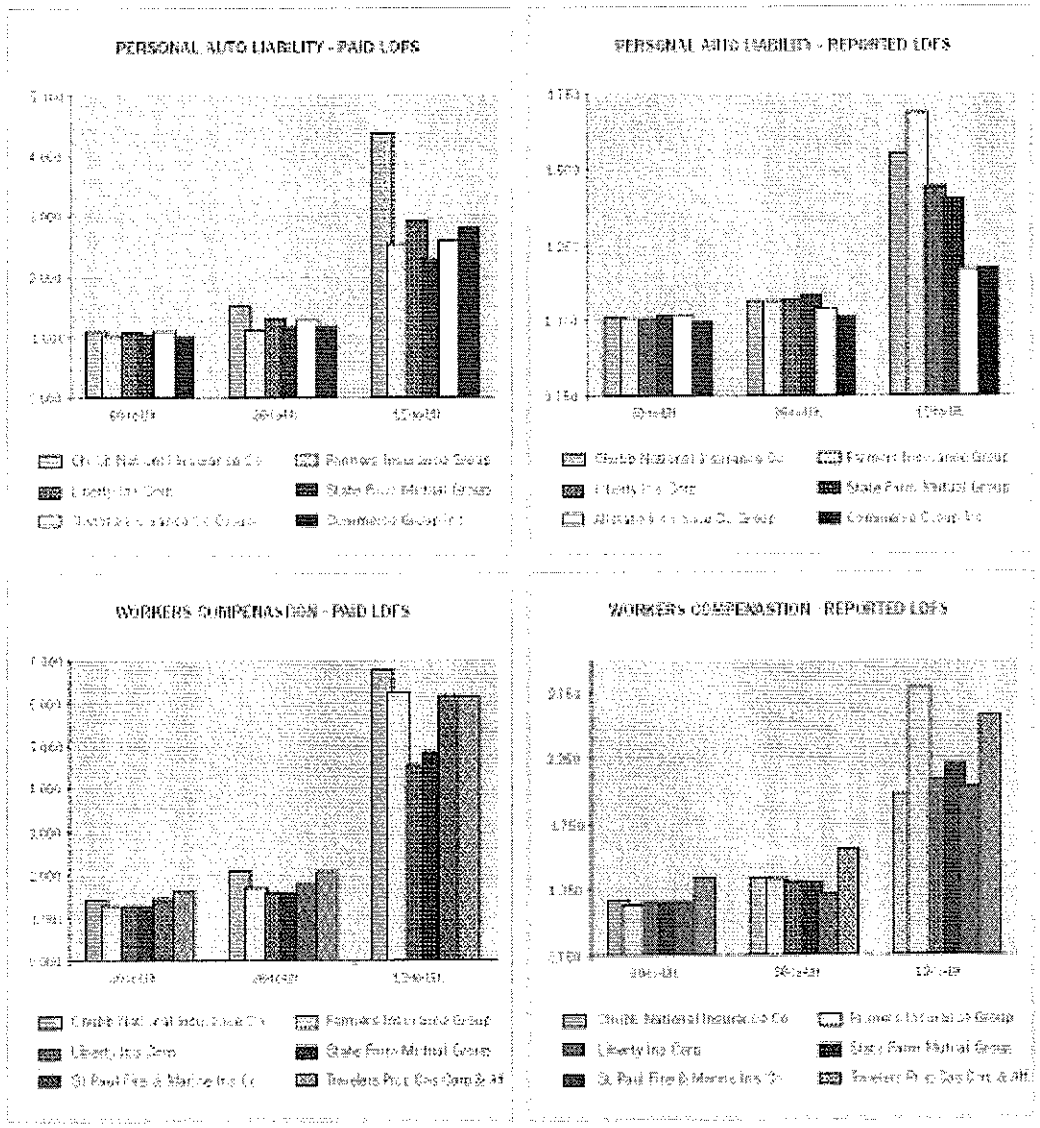

EXHIBIT 4 1

The various claim processes established by these companies result in significantly different development patterns. It is evident that the use of benchmark LDFs from an inappropriate peer group of companies will result in materially different indicated loss reserves. For example, the data above suggest that if one were to use the Travelers loss development factors as a benchmark patterns for workers' compensation, the reported loss development method would indicate 71% more IBNR than the indications produced using the St. Paul factors. Similarly, the Travelers paid development factors would produce 29% more total indicated reserves than the St. Paul factors.

Loss development patterns will also differ by retention level The lower the retention, the quicker the losses will reach their final settlement value or retained limit

There are three weaknesses of the LDM First, for immature accident years, the LDFs may become very large, especially for long-tailed lines of business As a result, variations in claim experience during the early valuation periods, such as the absence or presence of a large loss, may materially distort the indicated reserve Second, for long-tailed lines of business, the tail factor selection (the factor for development beyond the review period) has a leveraged effect on the indicated reserve The additional development assumed by the tail factor applies to all years in the reserve analysis Third, a change in a company s claim reporting patterns and loss payment patterns may produce an indicated change in IBNR reserve that moves in the wrong direction For example, if a company begins to pay off claims quicker and/or strengthens its case reserves, the indicated LDFs will increase and then be applied to higher claim values The LDM will therefore suggest that additional reserves are needed, when the opposite may be true

4 9 3 2 2 Expected Loss Method

The expected loss method is used for incomplete policy years, for new exposures, or where the limited historical experience does not provide credible information for projection purposes

The expected ultimate loss for the accident period is estimated by multiplying the forecast exposure by the a priori estimate of the expected ultimate loss rate The unit of exposure for P&C insurance is the basis from which insurance premiums are developed and represents a relative measure of loss expectation For P&C insurance, the exposure unit varies by line of insurance The a priori expected ultimate loss rate is developed from industry loss costs or derived as an average of the company s historical adjusted loss rates, as shown in Table 4 12

PC SAMPLE COMPANY
Workers Compensation
Initial Expected Ultimate Loss Analysis

Policy Year Ending	(1) Payroll ($10 000)	(2) Prior Estimated Ultimate Loss ($000)	(3) Large Loss	(4) Limited Loss (2) - (3)	(5) Net Trend & Benefit Adjustment	(6) Trended Limited Loss (4) x (5)	(7) Limited Loss Rate (6) / (1)	(8) Expected Loss ($000)
1991	9 093	9 192	-	9 192	1 078	9,912	1 090	9,353
1992	12 182	12 725	766	11 959	1 073	12 831	1 053	12 593
1993	15 458	15 184	-	15 184	1 059	16 083	1 040	16 188
1994	16 911	17 799	680	17 119	1 046	17 899	1 058	17 940
1995	17 334	20 140	2 235	17 905	1 032	18 481	1 066	18 627
1996	17 907	19 890	1 435	18 455	1 027	18 954	1 058	19 339
1997	17 513	20 967	2,756	18 211	1 022	18 610	1 063	19 008
1998	16 308	17 727	663	17 064	1 007	17 180	1 053	17 966
1999	16 097	14 974		14 974	1 022	15 306	0 951	17 467
2000	17 699	19 664	1 203	18 461	1 017	18 775	1 061	19 302
2001	17 118	17 775	-	17 775	1 012	17 988	1 051	18 761
2002	16 085	16 894	-	16 894	1 000	16 894	1 050	17 841
2003	15 229				0 995			
2004	15 750				1 010			
Total 91-02	189 705	202 931	9 738	193 193		198 913	1 049	
latest 7							1 041	
91-02 ex hi/lo							1.055	
(9) Selected Average Loss Rate as of 2002							1 055	
(10) Average Large Loss Load			0 051					
(11) 2003 Expected Loss ($000)								16 807
(12) 2004 Expected Loss ($000)								17 644

TABLE 4 12

Notes:
(2) From prior loss reserve analysis
(3) Company data - claims over $500 000
(5) Excess loss over premium trend plus cumulative benefit level changes based on NCCI 2003 statistical report
(8) = (1) x [1+(10)] x (9) / (5)
(9) Based on averages of (7)
(10) Based on total (3) / Total (1)
(11) (12) = (1) x ([1+(10)] x (9) x (5)

When determining the adjusted loss rate using historical loss data, the historical losses are usually adjusted for future development, inflation, trend, unusual large loss experience, and changes in policy provisions Similarly the historical exposure is adjusted for inflation and company growth The purpose of the adjustments is to bring the historical experience on-level with the current conditions The adjusted historical adjusted losses are divided by the adjusted exposure to determine the adjusted historical adjusted loss rates from which the a priori expected ultimate loss rate is selected

Alternatively, the expected ultimate loss is determined by multiplying the company s estimated earned premium by an expected loss ratio The expected loss ratio may be derived from a pricing study or be selected based on an average of the company's historical adjusted loss ratios The process to adjust the historical losses when calculating the adjusted historical loss ratios is similar to the process used to develop the historical loss rate Historical premiums must be adjusted for prior rate changes to bring premiums on-level with the current average rates

The primary weakness of the expected loss method is that the indicated ultimate loss produced by this method is not responsive to changes in actual loss activity during the year As a result, the indicated reserves will decrease proportionally to an increase in paid losses and the indicated IBNR decreases when reported losses increase Using the expected loss method, the resulting change in IBNR reserves may move in a direction that is intuitively opposite from what the actual loss experience might suggest As a result, the expected loss ratio method should only be used in circumstances where the actual experience provides little or no additional predictive value in estimating the ultimate losses

4.9.3.2.3 Bornheutter-Ferguson Method

The actuarial technique described by Bornheutter and Ferguson (Table 4.13) is a combination of the LDM and the expected loss method In this method, the actual loss experience will affect the indicated ultimate losses, but it does not alter the expectation of the remaining unpaid (or unreported) losses This technique determines the unpaid losses based on an initial estimate of expected ultimate loss and an assumed development pattern The initial expected losses for each accident period are derived from the expected loss method The remaining development for each year is determined using loss development factors from the LDM. The indicated reserve is derived as the unpaid (or unreported) portion of the expected loss

PC SAMPLE COMPANY
Workers' Compensation
Bornhuetter-Ferguson Methods
As of December 31, 2004

Paid Bornheutter - Ferguson Method ($000)

Accident Year	(1) Initial Expected Ultimate Loss	(2) Expected Percentage Paid	(3) Expected Total Reserve Factor 1.00 - (2)	(4) Actual Paid Loss	(5) Expected Paid (1) x (3)	(6) Indicated Ultimate Loss (4) + (5)
1991	9 353	0 953	0 047	9 157	440	9 597
1992	12 593	0 943	0 057	12 426	723	13 149
1993	16 188	0 930	0 070	14 750	1 125	15 875
1994	17 940	0 919	0 081	16 474	1 461	17 935
1995	18 627	0 905	0 095	18 581	1 770	20 351
1996	19 339	0 893	0 107	17 788	2 079	19 867
1997	19 008	0 878	0 122	18 888	2 318	21 206
1998	17 966	0 864	0 136	15 484	2 440	17 923
1999	17 467	0 845	0 155	12 996	2 705	15 701
2000	19 302	0 813	0 187	16 131	3 618	19 748
2001	18 761	0 774	0 226	14 230	4 246	18 477
2002	17 841	0 698	0 302	11 784	5 397	17 181
2003	16 807	0 544	0 456	8 899	7 658	16 556
2004	17 644	0 271	0 729	4 728	12 855	17 582
Total	238 835			192 315	48 834	241 149

Reported Bornheutter - Ferguson Method ($000)

Accident Year	(1) Initial Expected Ultimate Loss	(7) Expected Percentage Reported	(8) Expected IBNR Factor 1.00 - (7)	(9) Actual Reported Loss	(10) Expected Unreported (1) x (8)	(11) Indicated Ultimate Loss (9) + (10)
1991	9 353	0 976	0 024	9 237	222	9 460
1992	12 593	0 971	0 029	12 779	361	13 139
1993	16 188	0 967	0 033	14 836	542	15 378
1994	17 940	0 962	0 038	17 495	687	18 182
1995	18 627	0 957	0 043	19 080	802	19 883
1996	19 339	0 952	0 048	19 083	925	20 008
1997	19 008	0 947	0 053	19 535	999	20 535
1998	17 966	0 943	0 057	16 692	1 029	17 721
1999	17 467	0 936	0 064	13 773	1 115	14 888
2000	19 302	0 927	0 073	18 226	1 411	19 637
2001	18 761	0 912	0 088	15 801	1 647	17 449
2002	17 841	0 898	0 102	13 208	1 820	15 029
2003	16 807	0 861	0 139	12 784	2 334	15 118
2004	17 644	0 649	0 351	9 813	6 193	16 006
Total	238 835			212 345	20 086	232 432

Notes:
(1) From Expected Loss Method Table 4 12
(2) = 1.00 / Paid LDF, see Table 4 11 Paid Loss Development Factors
(4) (9) Company data
(9) = 1 00 / Reported LDF

TABLE 4.13

This method estimates the unpaid losses by applying the following formula to the paid loss data:

FORMULA 4 3

$$Total\ Reserve = \{1\text{-}1/PLDF\} \times Expected\ Loss$$

where PLDF represents the paid loss development factor

Alternatively, the IBNR reserve may be estimated by applying the Bornhuetter-Ferguson Method (BFM) method to the reported loss data using the formula:

FORMULA 4 4

$$IBNR\ Reserve = \{1\text{-}1/RLDF\} \times Expected\ Loss$$

where RLDF represents the reported loss development factor

The Bornhuetter-Ferguson technique is particularly useful for the most recent accident years that have huge loss development factors and for low frequency, high severity lines of business that exhibit significant variability Paid loss development factors, in particular, may be huge for immature accident years; a relatively small change in the paid losses may have a significant impact on the indicated loss reserve This method adds stability to the projected loss reserves since only the expected development is added to the actual loss experience to date to estimate the ultimate losses

The weakness of this method is that it is slower to respond to changes in claim activity than the LDM

4.9.3.3 *Common Actuarial Techniques for Estimating P&C LAE Reserves*

The CAS literature also has a plethora of methods and techniques for estimating LAE reserves and resulting cash flows for the various P&C insurance exposures For P&C insurers, there are two types of loss adjustment expenses included in Schedule P of the financial statements: defense and cost containment (DCC) expense and adjustment and other payment (AOP) expense

4.9.3.3.1 Defense and Cost Containment Reserves

DCC expenses are sometimes referred to as allocated loss adjustment expenses[9] (ALAE) because they are typically recorded on a claim-by-claim basis DCC expenses share many of the same development characteristics as the losses. The duty to defend an insured may in fact have a longer duration than the actual loss payments and for some lines of insurance the cost to defend is a significant portion of the total claim cost Therefore, special actuarial techniques have been developed to contemplate both the long-term nature of these costs and the variability inherent in the experience.

Due to the similar nature of the DCC expenses, many of the methods used to estimate loss reserves may also be used to estimate DCC expense reserves For some lines of business, the loss and DCC experience is analyzed on a combined basis and a DCC expense analysis is used to allocate the total reserves The LDM and BFM methods are also used to project the ultimate DCC expenses using DCC data. Some DCC actuarial reserving methods attempt to estimate the ultimate paid DCC-to-paid loss ratio. The ultimate paid-to-paid ratio is then applied to the best estimate of the ultimate loss to determine the ultimate DCC cost The LDM method may also be applied to the paid-to-paid ratios at each age of development (Tables 4 14 and 4 15)

[9] ALAE was also the term used prior to 1998 when the NAIC modified the classification of LAE reserves for property and casualty insurance companies

PC SAMPLE COMPANY
Workers' Compensation
Selected Ultimate Defense and Cost Containment Expense
as of December 31, 2004

	Ultimate DCC Expense and Indicated DCC Reserve ($000)									
	Paid-to-Paid Method					LDM Method			Indicated reserve	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Accident Year	Paid DCC to Paid Loss Ratio	Paid-to-Paid Development Factor to Ultimate	Indicated Ultimate Pd-to Pd Ratio	Estimated Ultimate Loss	Indicated Ultimate DCC Expense	Paid DCC	Paid DCC Development Factor to Ultimate	Indicated Ultimate DCC Expense	Selected Estimated Ultimate DCC	Estimated DCC Reserve
1991	0.0514	1.024	0.053	9,536	502	471	1.072	505	504	33
1992	0.0515	1.029	0.053	13,169	698	640	1.089	697	697	57
1993	0.0508	1.035	0.053	15,601	820	749	1.105	828	824	75
1994	0.0578	1.040	0.060	18,063	1,085	952	1.124	1,070	1,078	126
1995	0.0567	1.045	0.059	20,236	1,198	1,053	1.145	1,206	1,202	149
1996	0.0658	1.051	0.069	19,986	1,382	1,170	1.170	1,368	1,375	205
1997	0.0624	1.058	0.066	20,913	1,381	1,179	1.196	1,411	1,396	216
1998	0.0648	1.068	0.069	17,812	1,233	1,003	1.225	1,228	1,231	227
1999	0.0632	1.122	0.071	15,244	1,082	822	1.318	1,084	1,083	261
2000	0.0573	1.143	0.066	19,814	1,299	925	1.401	1,295	1,297	372
2001	0.0577	1.240	0.072	18,179	1,301	821	1.593	1,308	1,304	483
2002	0.0611	1.445	0.088	16,457	1,452	719	2.091	1,504	1,478	759
2003	0.0448	1.971	0.088	16,185	1,429	399	3.766	1,502	1,465	1,067
2004	0.0256	3.469	0.089	17,267	1,533	121	13.282	1,607	1,570	1,449
Total				238,461	16,395	11,024		16,612	16,504	5,479

Notes:
(1), (2) From Table 4.15
(3) = (1) x (2)
(4) From Table 4.9, Column 5
(5) = (3) x (4)
(6) = Company Data
(7) From DCC development factor analysis - not shown.
(8) = (6) x (7)
(9) Actuarial judgment - average of (5) and (8)
(10) = (9) - (6)

TABLE 4.14

PC SAMPLE COMPANY
Workers' Compensation
Paid DCC to Paid Loss Ratio Development
as of December 31, 2004

Paid DCC to Paid Loss Ratio

Accident Year	12	24	36	48	60	72	84	96	108	120
1991	0 0109	0 0250	0 0322	0 0380	0 0421	0 0457	0 0480	0 0488	0 0494	0 0495
1992	0 0119	0 0289	0 0368	0 0432	0 0461	0 0488	0 0491	0 0498	0 0505	0 0507
1993	0 0131	0 0282	0 0402	0 0454	0 0490	0 0491	0 0496	0 0496	0 0495	0 0503
1994	0 0128	0 0320	0 0460	0 0546	0 0554	0 0548	0 0556	0 0570	0 0573	0 0578
1995	0 0145	0 0326	0 0452	0 0494	0 0503	0 0494	0 0551	0 0556	0 0562	0 0567
1996	0 0181	0 0350	0 0406	0 0473	0 0544	0 0585	0 0652	0 0657	0 0658	
1997	0 0223	0 0318	0 0447	0 0529	0 0600	0 0613	0 0617	0 0624		
1998	0 0155	0 0347	0 0463	0 0598	0 0623	0 0634	0 0648			
1999	0 0151	0 0297	0 0528	0 0609	0 0623	0 0632				
2000	0 0206	0 0318	0 0470	0 0531	0 0573					
2001	0 0223	0 0433	0 0497	0 0577						
2002	0 0266	0 0477	0 0611							
2003	0 0299	0 0448								
2004	0 0256									

Age-to-Age Factors

Accident Year	12-24	24-36	36-48	48-60	60-72	72-84	84-96	96-108	108-120	To Ult
1991	2 289	1 287	1 181	1 106	1 088	1 049	1 016	1 013	1 002	
1992	2 441	1 273	1 173	1 066	1 058	1 006	1 015	1 015	1 004	
1993	2 161	1 424	1 131	1 077	1 003	1 010	0 999	0 998	1 016	
1994	2 504	1 439	1 186	1 015	0 988	1 016	1 025	1 005	1 008	
1995	2 252	1 384	1 095	1 017	0 982	1 115	1 010	1 011	1 008	
1996	1 931	1 162	1 164	1 150	1 075	1 115	1 007	1 002		
1997	1 424	1 407	1 184	1 133	1 022	1 006	1 012			
1998	2 243	1 332	1 293	1 041	1 018	1 021				
1999	1 961	1 781	1 153	1 022	1 015					
2000	1 541	1 479	1 129	1 081						
2001	1 942	1 149	1 160							
2002	1 797	1 279								
2003	1 496									
2004										

Averages

	12-24	24-36	36-48	48-60	60-72	72-84	84-96	96-108	108-120	To Ult
Simple Avg										
All Yrs	1 999	1 366	1 168	1 071	1 028	1 042	1 012	1 007	1 008	
Latest 5	1 747	1 404	1 184	1 085	1 023	1 055	1 011	1 006	1 008	
Latest 3	1 745	1 302	1 148	1 048	1 019	1 047	1 010	1 006	1 010	
Medial Avg.										
Latest 5x1	1 760	1 364	1 166	1 085	1 019	1 051	1 010	1 006	1 006	

Paid Loss Development Factor Selection

	12-24	24-36	36-48	48-60	60-72	72-84	84-96	96-108	108-120	Tail Factor*
(1) Benchmark										
(2) Prior	1 811	1 385	1 184	1 073	1 017	1 052	1 010	1 008	1 007	1 043
(3) Selected	1 760	1 364	1 166	1 085	1 019	1 051	1 010	1 006	1 006	1 045
(4) Paid DCC LDF	3 470	1 971	1 446	1 240	1 143	1 122	1 068	1 058	1 052	1 045
(5) Percent of Ult	0 288	0 507	0 692	0 806	0 875	0 891	0 936	0 945	0 951	0 957

TABLE 4 15

Notes:
Paid to paid DCC ratios developed by dividing paid DCC development triangle (not shown) by paid loss triangle (Table 4 11)
Age-to-Age factors determined by dividing successive valuations: For AY 2003, 1.496 = .0448 / .0299
(2) From prior loss reserve analysis
(3) Based on judgment
(4) Cumulating selected factors from oldest period
(5) = 1 00 / (4)
* Tail Factor based on special study of payments beyond 120 months

4.9.3.3.2 All Other Payments

All other payments (AOP) expenses are also referred to as unallocated loss adjustment expenses (ULAE). This category of LAE includes the claim department costs and other adjustment expenses incurred in the process of settling claims that are not recorded on an individual claim basis. The claim administration expenses typically represent between 5 and 10 percent of the total loss and LAE costs.

The most common approach for estimating the AOP reserves is the calendar year paid-to-paid ratio method. For this method, the historical ratio of paid AOP to paid losses is calculated for prior calendar periods. To determine the unpaid cost to settle the remaining claims, it is usually assumed that one-half of the expense to handle a claim is incurred when the claim is established and the remaining half is incurred over the life of the claim. Therefore, the selected paid-to-paid ratio is applied to the IBNR reserve, and one-half of the selected paid-to-paid ratio is applied to the case reserves. As noted above, the IBNR reserves reported in statutory financial statements also include development on known claims. To adjust for this, the IBNR reserve is sometimes separated into its components for this calculation. Alternatively, an adjustment may be made to the 50/50 rule to reflect the potential conservatism resulting from applying the paid-to-paid ratio to the total reported IBNR.

The calendar year paid-to-paid method is one of the more common methods used to estimate AOP reserves because it is the most efficient method to apply. Other methods using time studies, claim counts and the average settlement cost per claim may produce more accurate results.

For corporate self-insureds, the AOP reserves are calculated using the contract provisions from third-party claim administrators. Some third-party claim administrators collect all fees up front to cover the cost to settle claims from the time they are reported until they close, commonly referred to as "cradle to grave." Some claim administrators charge on a per claim basis when the claim is reported and others charge as a percentage of paid loss as payments are made.

4.9.3.4 *Loss Reserving Diagnostics*

The underpinning of most actuarial loss reserving techniques is the assumption that the historical claim emergence and claim settlement patterns will be a valid predictor of future loss development patterns. Most actuarial projection techniques perform well in a stable claims environment. However, changes in company underwriting and claim handling philosophies, as well as changes in the legal system and regulatory environments, may significantly impact claim activity. Companies being sold are also more likely to have undergone recent operational changes. Therefore, the loss reserve analysis performed in conjunction with an actuarial appraisal should also include reserving diagnostics to determine whether there has been a change in claim development patterns that may distort the indicated reserves. Generally there are three diagnostic tools actuaries use:

1. assessing the convergence of the various loss reserving techniques
2. analyzing various reserving statistics, and
3. testing the runoff of prior reserve estimates

4.9.3.4.1 Convergence of Reserving Methods

The actuarial loss reserve analysis for property casualty exposure should include multiple actuarial loss reserving techniques to project the preliminary estimates of the ultimate losses. The various actuarial reserving techniques use diverse data sets and assumptions. When the indications produced by the various methods diverge, it may be a sign that there has been a change in claim development.

A reconciliation of the various indications may allow the actuary to associate the divergence with certain business or environmental changes that are not contemplated by the various actuarial projection techniques. The reconciliation process allows the actuary to determine which method or technique will produce the best indication for the particular line of business and accident year being forecasted. Based on this assessment, the actuary will either explicitly or implicitly assign weights to the various indications when selecting the best estimate.

4.9.3.4.2 Analysis of Reserving Statistics

There are various reserving statistics that are developed to test the underlying assumptions or key parameters used in each loss reserving method. To assess the reasonableness of the loss development factors derived in the LDM, development triangles displaying historical settlement rates and the average case reserve per outstanding claim are analyzed (Tables 4.16 and 4.17). The settlement rate represents the percentage of the ultimate number of claims that have been closed at each age of development. This statistic is used to evaluate changes in payment patterns. The average case reserve per outstanding claim is used to identify changes in case basis claim reserving practices that affect the reported loss development patterns. When a measurable change in the claim data has occurred, loss development methods may produce erroneous results. Under these circumstances actuaries may need to rely on other techniques or use methods such as those described by Berquest & Sherman to adjust the historical data so that a valid estimate of future development patterns may be determined. Other important diagnostic statistics of the historical data include:

1. development patterns of average claim size, paid loss ratios, and reported loss ratios,
2. indicated ultimate frequency, severity, and pure premium (Table 4.18),
3. open claim duration, or the average number of days claims remained open, and
4. reporting lags, or the number of days between accident date and the date the claim was entered into the claim system.

PC SAMPLE COMPANY
Workers' Compensation
Settlement Rate
as of December 31, 2004

Closed Claim Count

Accident Year	12	24	36	48	60	72	84	96	108	120
1991	3 662	5 240	5 393	5 476	5 530	5 553	5 564	5 582	5 594	5 597
1992	4 620	6 158	6 397	6 461	6 520	6 532	6 545	6 567	6 573	6 576
1993	4 675	6 767	7 030	7 095	7 143	7 182	7 201	7 214	7 231	7 231
1994	5 194	6 954	7 210	7 295	7 354	7 405	7 430	7 437	7 442	7 445
1995	5 231	6 942	7 227	7 311	7 360	7 384	7 411	7 417	7 422	7 419
1996	5 012	6 944	7 185	7 313	7 350	7 370	7 387	7 401	7 397	
1997	5 526	7 108	7 322	7 422	7 491	7 508	7 533	7 532		
1998	4 897	6 406	6 583	6 692	6 743	6 760	6 758			
1999	4 973	6 428	6 643	6 721	6 758	6 762				
2000	5 729	7 226	7 432	7 537	7 560					
2001	5 130	6 281	6 494	6 545						
2002	4 491	5 585	5 714							
2003	4 402	5 162								
2004	4 666									

Settlement Rate - Closed Count / Ultimate Count

Accident Year	12-24	24-36	36-48	48-60	60-72	72-84	84-96	96-108	108-120	To Ult
1991	0 653	0 935	0 962	0 977	0 986	0 990	0 992	0 996	0 998	0 998
1992	0 702	0 935	0 972	0 981	0 990	0 992	0 994	0 997	0 998	0 999
1993	0 646	0 934	0 971	0 980	0 986	0 992	0 994	0 996	0 998	0 998
1994	0 696	0 932	0 966	0 977	0 985	0 992	0 996	0 997	0 997	0 998
1995	0 703	0 932	0 971	0 982	0 988	0 992	0 995	0 996	0 997	0 996
1996	0 675	0 936	0 968	0 985	0 990	0 993	0 995	0 997	0 997	
1997	0 730	0 938	0 967	0 980	0 989	0 991	0 995	0 994		
1998	0 720	0 942	0 968	0 984	0 991	0 994	0 994			
1999	0 730	0 944	0 975	0 987	0 992	0 993				
2000	0 749	0 944	0 971	0 985	0 988					
2001	0 766	0 937	0 969	0 977						
2002	0 754	0 938	0 960							
2003	0 776	0 910								
2004	0 770									

TABLE 4 16

Notes:
Settlement rates developed by dividing the closed claim count triangle above by the ultimate claim counts in Table 4 18 Column 4 Settlement rates have been relatively consistent potential drop off during latest year

PC SAMPLE COMPANY
Workers Compensation
Average Case Reserve
as of December 31, 2004

Case Basis Reserves ($000)

Accident Year	12	24	36	48	60	72	84	96	108	120
1991	4 971	4 343	3 513	2 486	1 427	597	633	513	333	35
1992	7 162	7 071	4 757	2 793	2 366	1 640	1 392	886	653	580
1993	7 466	6 559	3 756	2 350	1 467	1 008	739	536	371	297
1994	8 087	7 033	4 127	2 967	1 783	949	1 499	1 495	1 323	1 178
1995	8 754	7 810	4 082	2 655	1 653	1 081	601	1 033	692	499
1996	7 566	5 989	3 615	2 323	2 449	1 052	832	613	1 295	
1997	8 185	6 679	4 173	2 438	1 223	1 063	647	648		
1998	6 621	5 924	3 787	2 381	1 739	1 310	1 209			
1999	5 438	4 289	2 271	1 436	1 162	777				
2000	8 371	5 997	3 661	2 319	2 096					
2001	6 398	4 861	2 166	1 571						
2002	4 248	3 060	1 425							
2003	4 032	3 885								
2004	5 085									

Open Claim Count

Accident Year	12-24	24-36	36-48	48-60	60-72	72-84	84-96	96-108	108-120	To Ult
1991	1 574	354	208	125	74	52	41	25	13	10
1992	1 584	405	178	118	60	49	36	16	11	8
1993	2 013	457	205	141	95	58	40	28	11	11
1994	1 854	497	248	164	106	56	31	25	21	18
1995	1 736	488	211	130	82	59	34	29	25	27
1996	1 962	456	230	103	69	49	32	20	25	
1997	1 527	437	246	151	82	65	41	41		
1998	1 435	375	214	108	58	42	41			
1999	1 449	366	160	85	50	46				
2000	1 597	414	214	113	90					
2001	1 316	400	200	153						
2002	1 273	351	235							
2003	1 026	494								
2004	1,143									

Average Case Reserve per Open Claim

Accident Year	12-24	24-36	36-48	48-60	60-72	72-84	84-96	96-108	108-120	To Ult
1991	3 158	12 268	16 889	19 888	19 284	11 481	15 439	20 520	25 615	3 500
1992	4 521	17 459	26 725	23 669	39 433	33 469	38 667	55 375	59 364	72 500
1993	3 709	14 352	18 322	16 667	15 442	17 379	18 475	19 143	33 727	27 000
1994	4 362	14 151	16 641	18 091	16 821	16 946	48 355	59 800	63 000	65 439
1995	5 043	16 004	19 346	20 423	20 159	18 322	17 676	35 621	27 680	18 482
1996	3 856	13 134	15 717	22 553	35 493	21 469	26 000	30 665	51 808	
1997	5 360	15 284	16 963	16 146	14 915	16,354	15,773	15 793		
1998	4 614	15 797	17 696	22 046	29,983	31,179	29,482			
1999	3 753	11 719	14 194	16 894	23,242	16,881				
2000	5 242	14 486	17,107	20,525	23 284					
2001	4 862	12,153	10,828	10,267						
2002	3 337	8 718	6,062							
2003	3 930	7,865								
2004	4 449									

Notes:

Observation: Average case reserve has been reduced during the past 18 months, discuss with claim managers

Reported loss development methods will understate true ultimate losses in 1998-99 and 2001-2004

TABLE 4.17

PC SAMPLE COMPANY
Workers' Compensation
Ultimate Claim Count Analysis
as of December 31, 2004

				Estimated Ultimate Claim Count					
Accident Year	(1) Open Claims	(2) Reported Count	(3) Claim Count LDF	(4) Estimated Ultimate Count	(5) Estimated Ultimate Loss	(6) Estimated Severity	(7) Payroll ($10,000)	(8) Adjusted Payroll	(9) Adjusted Frequency
1991	10	5,607	1.000	5,607	9,536	1,701	9,093	12,535	0.45
1992	8	6,584	1.000	6,584	13,169	2,000	12,182	16,383	0.40
1993	11	7,242	1.000	7,242	15,601	2,154	15,458	20,282	0.36
1994	18	7,463	1.000	7,463	18,063	2,420	16,911	21,648	0.34
1995	27	7,446	1.000	7,446	20,236	2,718	17,334	21,648	0.34
1996	25	7,422	1.000	7,422	19,986	2,693	17,907	21,818	0.34
1997	41	7,573	1.000	7,574	20,913	2,761	17,513	20,817	0.36
1998	41	6,799	1.000	6,801	17,812	2,619	16,308	18,912	0.36
1999	46	6,808	1.000	6,810	15,244	2,238	16,097	18,212	0.37
2000	90	7,650	1.000	7,653	19,814	2,589	17,699	19,536	0.39
2001	153	6,698	1.001	6,701	18,179	2,713	17,118	18,434	0.36
2002	235	5,949	1.001	5,955	16,457	2,764	16,085	16,899	0.35
2003	494	5,656	1.003	5,672	16,185	2,853	15,229	15,610	0.36
2004	1,143	5,809	1.043	6,061	17,267	2,849	15,750	15,750	0.38
Total	2,342	94,706		94,991	238,461		220,684		

Notes:
(1), (2), (7) – Company Data
(3) – From claim count development factor analysis (not shown)
(4) = (2) x (3)
(5) From Table 4.9
(6) = (5) / (4) x 1000 *Observation:* Ultimate severity changes relatively consistent with historical inflation
(8) – Column (7) adjusted for 2.5% annual payroll trend
(9) = (4) / (9) *Observation:* Frequency of claims is consistent after adjusting for inflationary effect on payroll

TABLE 4.18

4.9.3.4.3 Runoff Analysis

A runoff analysis is a comparison of the selected ultimate losses from the most recent valuation to those selected in prior reviews. Schedule P, Part 2 of the P&C statutory annual statement displays the results from a one-year and two-year runoff of the company's selected ultimate losses. The one-year runoff represents the difference in the estimated ultimate losses from the current period to those selected in the prior year. The two-year runoff compares the current ultimate loss selections to those in the penultimate year.

The runoff analysis provides two important pieces of information during the valuation process. First, when the current best estimate of the ultimate losses is compared to those underlying the recorded reserves from the prior accounting period, the resulting runoff represents the impact to the current year's earnings due to changes in reserves relating to prior accident years. This is one of the more significant quality of earnings adjustments required when performing a valuation using comparable multiples.

A runoff analysis may also be used by the actuary to determine whether the reserving model, method, or assumptions are biased optimistically or conservatively. If a similar reserving process has been used in prior loss reserve reviews, and there has consistently been unfavorable runoff in the ultimate losses, it might indicate that one of the key assumptions in the model is optimistic. The actuary performing the reserve analysis should be able to reconcile material runoff amounts by identifying assumptions in prior loss projections that did not materialize as expected and quantifying the impact of the differences.

While this test is a valuable tool for an actuary to assess the appropriateness of the reserve model and the assumptions used in prior reviews, this test should not be used to assess the adequacy of the current reserves. The actuary's best estimate of the ultimate losses must be selected for the current period for this test to provide meaningful results. Otherwise, it will be impossible to discern whether the unfavorable change in ultimate losses was due to an optimistic bias in the prior reserving assumptions or conservative assumptions selected in the current review.

4.9.3.5 *Loss Reserve Cash Flows*

The loss development factors derived from the paid LDM are used to determine the paid loss cash flows. The inverse of the paid LDF (1/PLDF) represents the expected portion of losses paid at each valuation period. It is generally assumed that the loss reserves will run off proportionally to the paid development pattern (Table 4.19). A more detailed discussion of loss and LAE cash flows is included in section 4.9.4.2.

PC SAMPLE COMPANY
Workers' Compensation
Cash Flow Analysis
as of December 31, 2004

Paid Loss Development Patterns

	12-24	24-36	36-48	48-60	60-72	72-84	84-96	96-108	108-120	120-132**
(1) Percent of Ultimate	0 271	0 544	0 698	0 774	0 813	0 845	0 864	0 878	0 893	0 905
(2) Percent Unpaid	0 729	0 456	0 302	0 226	0 187	0 155	0 136	0 122	0 107	0 095
(3) Incremental Paid	0 271	0 273	0 153	0 076	0 039	0 033	0 019	0 014	0 014	0 012

Future Loss Payments

Accident Year	(4) Total Reserve	(5) Precent Paid	24-36	36-48	48-60	60-72	72-84	84-96	96-108	108-120	120-132**
1991	379	0 047									
1992	743	0 057									
1993	851	0 070									
1994	1 589	0 081									
1995	1 654	0 095									
1996	2 198	0 107									255
1997	2 025	0 122								240	207
1998	2 328	0 136							237	248	214
1999	2 248	0 155						276	201	210	181
2000	3 683	0 187					640	374	272	285	245
2001	3 949	0 226				679	569	332	241	253	218
2002	4 673	0 302			1 177	601	504	294	214	224	193
2003	7 286	0 456		2 449	1 218	622	521	304	221	232	199
2004	12 539	0 729	4 698	2 635	1 311	670	561	328	238	249	215
Total	46 146										

Future loss payments distributed proportional to incremental payment pattern = (4) x (3) / (5)
Each diagonal represents a future calendar year as shown below
** Table extends beyond 132 months

Future Cash Flow - Expected Calendar Year Payments

Accident Year	(4) Total Reserve	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
1991	379	97	97	97	89						
1992	743	130	156	156	156	143					
1993	851	148	123	148	148	148	136				
1994	1 589	235	235	196	235	235	235	216			
1995	1 654	244	209	209	174	209	209	209	192		
1996	2 198	255	286	245	245	204	245	245	245	225	
1997	2 025	240	207	232	199	199	166	199	199	199	183
1998	2 328	237	248	214	240	206	206	171	206	206	206
1999	2 248	276	201	210	181	203	174	174	145	174	174
2000	3 683	640	374	272	285	245	275	236	236	197	236
2001	3 949	679	569	332	241	253	218	244	209	209	174
2002	4 673	1 177	601	504	294	214	224	193	216	185	185
2003	7 286	2 449	1 218	622	521	304	221	232	199	224	192
2004	12 539	4 698	2 635	1 311	670	561	328	238	249	215	241
(6) Total	46 146	11 505	7 160	4 748	3 679	3 125	2 637	2 357	2 097	1 834	1 591

Notes: (1) From Table 4 14
(2) = 1 - (1)
(3) Developed from subtracting two successive factors in Row (2) Incremental Factors not shown:

132-144	144-156	156-168	168-180	180-192	192-204	204-216	204-216
0 014	0 012	0 012	0 010	0 012	0 012	0 012	0 011

(4) Table 4 9
(5) From (2) also Table 4 12 Column 3
(6) Calendar year total payments

TABLE 4 19

4.9.3.6 *Discounted Loss Reserves and Fair Value Liabilities*

Section 4.9.2 described a number of adjustments that are made to the capital and surplus to determine a company's adjusted book value. The purpose of most adjustments is to restate the value of assets at their current market value. Under statutory accounting principles, P&C liabilities must be recorded at the nominal value, without discounting these liabilities to reflect the time value of money. Because statutory accounting is the basis used to determine distributable earnings, the nominal value of loss reserves is used in the valuation models. However, fair value liabilities are used for purchase price accounting under GAAP and may be required for valuing self-insured liabilities for corporate acquisitions.

The embedded value in the loss and LAE reserves must be determined for purchase price accounting under GAAP. The fair value reserves for GAAP purposes represent the expected value of the reserves, reduced by a discount for the time value of money plus the market value margin for risk associated with an uncertainty of the loss payment stream.

There are various approaches to estimating the fair value reserves for P&C loss reserves. The CAS White Paper discusses 10 approaches, including the strengths and weaknesses of each method. Some methods determine the fair value reserves directly using a risk-adjusted discount rate. For these methods, the challenge is to determine the appropriate risk-adjusted discount rate to use for the various property casualty cash flows. Capital asset pricing model methods, internal rate of return models, and single period risk-adjusted discount methods fall in this category.

Other methods to calculate the fair value reserves determine the discount and market value margin separately. For methods that determine the fair value as the sum of two components, the discount is determined using duration-matched yield curves. Once the cash flows relating to the loss and LAE payments are determined using the techniques discussed in section 4.9.3.3, the present value is determined using standard discounting techniques (Table 4.20). Various methods are then used to determine the market value margin. These include stochastic simulation, loss development modeling, aggregate probability distribution methods, and market values determined from reinsurance transactions.

PC SAMPLE COMPANY
Workers Compensation
Loss Reserve Discount Analysis
as of December 31, 2004

		Reserve Discount									
	(1)	(2) Calendar Year Payments									
	Total Reserve	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
(2) Cash Flow	46 146	11 505	7 160	4 748	3 679	3 125	2 637	2 357	2 097	1 834	1 591
(3) Years Before Payment		0 5	1 5	2 5	3 5	4 5	5 5	6 5	7 5	8 5	9 5
(4) Discount Factor (5.0%)		0 9759	0 9294	0 8852	0 8430	0 8029	0 7646	0 7282	0 6936	0 6605	0 6291
(5) Discounted Reserve	38 047	11 228	6 655	4 203	3 101	2 509	2 016	1 717	1 454	1 211	1 001

Notes:
(1) (2) From Table 4.19 (Note: Not all calendar years shown)
(3) Assumes payments made uniformly during the calendar year
(4) [1/1.05]*(3)
(5) = (2) x (4) (Note: Present value of expected payments made during 2015-2021 included in total.)

TABLE 4.20

The method selected by the actuary is based on the strengths and weaknesses of the method, the lines of business written by the company, the data available for the calculation, and ease of explanation

4.9.4 P&C CASH FLOW ASSUMPTIONS

For P&C insurance valuations, significant attention is given to the adequacy of the loss reserves and the loss ratio assumptions used in the valuation model However, as Witcraft documented in her 1989 paper, the assumptions relating to the timing of the cash flows also present significant risk to the valuation The claims processes used by P&C companies create significantly different claim payment patterns as noted in the discussion on loss development methods in section 4 9 3 2 1 Therefore, an analysis of the direct payment patterns and reinsurance recoveries is needed to assess the timing of cash flows for the target company

4.9.4.1 *Investment Returns*

The issues relating to investment returns are similar to those for life and health insurers discussed in section 4 4 4 Due to the variability in payment patterns for property casualty losses, property casualty insurance companies do not always develop investment strategies to match cash flows While developing the valuation model, specific attention should be given to the mix and duration of the assets supporting the liabilities If the assets supporting the loss reserves are not properly matched to the expected loss payment stream, the insurer may be forced to liquidate high yielding bonds or sell equities during inopportune times

4.9.4.2 *Loss and LAE Cash Flow*

The LDFs from the loss development method define the payment patterns and percentage of unpaid loss at each age of development It is generally assumed that the selected outstanding losses for each accident year will be paid in subsequent periods proportional to the reduction in unpaid losses implied by these development patterns

The selected reserves may not be based on the paid LDM when other methods produce more reliable results When the selected reserves are similar to that indicated by the paid LDM, or when the differences are due to random variation, it is reasonable to assume cash flows will follow the paid LDM patterns When the paid LDM produces indicated reserves that are materially different from the selected reserves, adjustments to the cash flows derived by the paid LDFs may be necessary Berquest & Sherman techniques to adjust the historical paid loss data for changes in settlement rates may be used to develop revised payment patterns Alternatively, a payment pattern may be derived by fitting a curve through the percentage of unpaid losses selected for each accident year

The number of lines of business or segments used to determine the loss and LAE cash flows is usually consistent with the analysis performed to assess the adequacy of the reserves However, lines of business are sometimes combined to simplify the cash flow assumptions

When non-homogeneous lines are combined, the historical composition of the consolidated lines should be evaluated to ensure that there has not been a significant change in the mix of business that would alter the expectations for future payment patterns

Many of the comments relating to P&C losses apply to the LAE cash flows The amount and duration of the defense and medical cost containment expense cash flows will depend, in part, on the company s claim settling philosophy However, since many P&C insurance policies require the insurer to defend the insured, the tail for these costs is usually larger than the tail for losses

For other adjusting costs, statutory reporting requirements require insurance companies to assume that 50% of the AOP expense is allocated proportional to claim payments, 45% is allocated to the current accident year, and 5% is allocated to the prior year Models based on reported and closed claim counts will generally produce a better estimate of actual cash flows

4.9.4.3 Reinsurance Cash Flow

Property and casualty insurance companies use various forms of reinsurance to reduce risk and provide surplus relief. To properly account for the cash flows, the valuation model should include direct and ceded assumptions for premiums and losses. For proportional reinsurance contracts, such as quota share and surplus share agreements, the reinsurer assumes a predefined percentage of the premium and loss. Ceded cash flows for proportional reinsurance follow the insurance company's assumptions.

For excess reinsurance contracts the insurer remits the ceded premium during the contract year but only receives reimbursement when the insurer's loss payments exceed a certain limit. Excess reinsurance may be written on a per occurrence basis, a per event basis (for catastrophes), or an annual aggregate basis. The terms and conditions of reinsurance policies are custom designed to meet the needs of each insurer. Therefore, these contracts must be reviewed carefully to understand the coverage that has been extended and the resulting cash flows for the ceded premium and losses.

4.9.4.4 Premium Cash Flow

The length of the policies issued by the insurer, the type of billing plans used, and the collection process will affect the premium cash flows and the accrual of unearned premium reserves. Most P&C insurers write annual policies, but it is not uncommon for personal automobile policies to be written on a six-month basis. Property and casualty premiums may be paid annually, or billed monthly, quarterly, or semiannually. Some companies that use the independent agent distribution system offer agency-billing options, whereby the insurance agent or broker collects the premium and remits balances to the insurance company. Other P&C insurance companies use direct billing, electronic fund transfers, and credit card billing options.

Special attention should be given to the premium cash flows on retrospectively rated policies and other commercial policies with loss-sensitive adjustment provisions. Under these plans, an initial premium deposit is collected and annual premium adjustments are made based on the insured's loss experience until all losses have been settled.

4.9.5 MANAGEMENT PLAN ASSUMPTIONS

When the actuarial appraisal is being performed by the selling company, the management assumptions used in the valuation model should be consistent with those used in the pro forma financial statements. For P&C insurance valuations, detailed forecasts are usually only made for short periods of time (5-7 years) and simplifying assumptions are made for longer forecasts. Appraisals prepared for the investor may include alternative assumptions to determine the economic value of assumed synergies, embedded options, and transaction costs. This section contains issues relating to the management assumptions that should be considered for P&C insurers.

4.9.5.1 Premium Projection

The premium projections for P&C insurance companies have greater uncertainty than those in the life and health insurance industry. Property and casualty insurance products are usually sold as annual contracts without guaranteed renewal provisions.[10] Insurance companies often re-underwrite their policyholder upon renewal and have the option to cancel coverage or charge a significantly higher premium when there has been an increase in risk of loss. The P&C insurance market is highly competitive, and policyholders often change insurance carriers. In the personal insurance market, policyholders or their insurance agents often shop the market for competitive prices. In the commercial lines market, company risk managers keep constant pressure on their brokers.

[10] It should be noted that for personal lines insurance, some state insurance regulations place nonrenewal restrictions on insurance carriers.

to place insurance coverage at the most competitive rates As a result, the persistency for P&C insurance companies is significantly lower than those for life and health insurance companies

Premium projections are usually made on a written premium basis, and the premium is earned proportionally during policy term Written premium for the prospective period should consider:

Written premium during previous periods
- \- Less a reduction for nonrenewed policies
- \+ Plus new business exposure
- \+ Plus increases from inflation sensitive exposure base (i e , payroll and revenues)
- +/- Plus impact of planned rate changes
- +/- Plus flexible pricing modifications (experience modifications, schedule modifications, pricing tiers, and other subjective discounts)

Many times the new and renewal components are combined in a P&C valuation model However, it may be necessary to develop separate projections of these components to determine the value of intangible assets for SFAS 141 (see Chapter 8) The intangible value of renewals for short-term contracts and the intangible value of distribution relationships are sometimes estimated separately using historical renewal rates and new business assumptions

A common investor complaint regarding P&C valuation models is the amount of subjectivity underlying the key parameter used in the model Models that incorporate a constant change in forecasted premiums, without contemplating changing market conditions, are subject to investor skepticism By forecasting the premium impact from each of the components above, the actuary is able to validate the reasonableness of the assumptions using the company s historical results, the company s marketing plans, and anticipated changes in the underwriting cycle Furthermore, many of the components used to project premium are also used to forecast future losses

4.9.5.2 *Loss and Loss Ratio Assumptions*

Losses for the prospective accident periods may be forecasted directly or by estimating future loss ratios that will be applied to managements forecasted premiums Regardless of which method is used, an analysis of the components underlying the forecast should be performed to validate the assumptions The expected losses or loss ratio derived for the loss reserve analysis described in section 4 9 3 2 2 is typically the base from which the forecast is made

Forecasted losses are then projected by adjusting the base year expected loss (or loss ratio) for:
- \- Reduction in exposure for nonrenewed policies
- \+ Increase for new business exposure
- \+ Increase for loss inflation
- +/- Adjustments for frequency and severity trends
- +/- Impacts from underwriting changes

When using the loss ratio approach to forecast losses, changes in exposure are not needed because they are implicit in the forecasted premium In addition, only inflation net of premium inflation is used to modify the expected loss ratio

Forecasted changes in losses from underwriting come from two sources: modifications to policy provisions that expand or reduce insurance coverage and changes in the company's mix of business When the loss ratio approach is used to forecast losses, revisions to policy provisions may have no impact on forecasted loss ratios if they are introduced with a corresponding change in rate levels

Material modifications in the expected loss ratio from changes in the mix of business should be justified with a reasonable business plan Underwriting changes in the company s mix of business occurs when the quality of the new business differs from the business lost at policy renewal Premium growth assumptions should be consistent with the other underwriting assumptions For example, loss ratio improvements resulting from the elimination of an unprofitable segment of business should be accompanied by a corresponding reduction in exposure Conversely, significant growth assumptions are typically coupled with loss ratio deterioration since new business loss ratios are generally assumed to be higher than those from a stable book of renewal business, and premium reductions are usually required to attract new business The P&C underwriting cycle should be considered when developing the loss ratio assumptions

4.9.5.3 *Expenses and Expense Ratios*

The issues for developing management plan assumptions for expenses are similar to those for life and health insurers Agent commissions, taxes, and a portion of the general and other acquisition expenses are considered variable expenses and are forecasted as a percent of written premium The remainder of the general and other acquisition expenses are forecasted using CPI inflation or other reasonable business plan assumptions

4.9.5.4 *Reinsurance*

In the sell-side appraisal, the reinsurance assumptions for the forecasted period are typically consistent with the current program However, the investor should also consider the reinsurance underwriting cycle and the profitability of the reinsurance program (from the reinsurer's perspective) when assessing the reinsurance assumptions selected for the forecast If the ceded experience has historically been unprofitable for the reinsurer, the forecast should include anticipated increases in the cost for reinsurance and increases in anticipated retention levels When the buy-side appraisal is being performed for an investor that will consolidate the target into its existing operations, the appraisal may also be performed using the assumptions consistent with the investor s reinsurance program The difference in the two estimates represents the value of the embedded reinsurance option or an additional integration cost for the acquisition

4.9.6 OTHER UNIQUE PROPERTY CASUALTY VALUATION ISSUES

There many other issues associated with P&C insurers that go beyond the methods and assumptions used in the valuation model for an actuarial appraisal Some of the more important issues are summarized in this section

4.9.6.1 *Adjustments for Market-Multiple Valuations*

As noted above, actuarial appraisal values using discounted cash flow techniques are not always available for P&C insurance companies Under these circumstances, investors may rely on market multiples of comparable companies to determine a reasonable bid price pending a more thorough analysis of the economic value This method attempts to determine a company's market price (as opposed to its economic value) by applying a factor to key financial statistics, such as:

1 earnings before income tax (EBIT),
2 earnings before income tax, depreciation, and amortization (EBITDA),
3 revenues,
4 cash flows,
5 assets, and
6 book value.

The ratios of price (or total invested capital) to each of the financial statistics above are calculated for all recent acquisitions and evaluated to select the appropriate multiple to apply to the financial statistics for the target company

When using the market-multiple approach for P&C insurance companies, there are two important issues that should be considered First, market multiples will be most appropriate for peer group companies, companies that are most similar to the target company Second, certain adjustments to the financial statistics may be needed before calculating the market-multiples or before applying the benchmark multiples to the target company's data

Property and casualty insurance companies are not homogeneous The mix of business written, the type of insurance product sold, the size of the company, the distribution channel, and the geographical location of the markets create significant differences in the risk of the business Theoretically, the companies with less risk will command higher market multiples Therefore, when using a market-multiple approach, the market-multiples from companies that are reasonably similar to the target company represent the best benchmarks However, the number of P&C acquisitions is limited, and the diverse nature of property casualty operations makes it difficult to find multiple peer group acquisitions Under these circumstances, one may adjust the multiples of relatively similar companies for any perceived differences in risk

Certain financial statistics are subject to significant variability due to the risk inherent in the P&C exposure Others are subject to distortions from the loss reserving process When applying the market-multiple approach, it is sometimes necessary to make adjustments to both the benchmark multiples and the target's earnings (or other base) to which they are being applied The two most common adjustments are distortions caused by catastrophes and changes in reserve adequacy The absence or presence of catastrophe losses may significantly alter the earnings multiples Similarly, changes in the reserve adequacy or distortions in the calendar year earnings from prior accident year activity may distort market-multiples based on book value or earnings Therefore, adjustments to the financial statistics to normalize for these and other variations may produce a better set of market-multiples for the peer group companies and reduce errors when they are applied to the target's statistics

4.9.6.2 *Unearned Premium Reserves for Multi-Year Policies*

Many P&C insurers offer commercial insurance products that have retrospective premium provisions These policies allow for the collection of additional premium and return of excess premium based on an insured's actual losses Retrospectively rated policies may be written on a paid loss basis, reported loss basis, or a developed loss basis Policies written on a paid loss basis provide the insured with the most favorable cash flow terms To eliminate the credit risk, these policies usually require the insured to post security for the unpaid premiums in the form of an irrevocable letter of credit Retrospective premium adjustments are earned as written Therefore, an actuarial reserve must be calculated to properly accrue for expected additional or returnable premium

Some P&C insurance products cover an exposure over a multiple-year period, sometimes referred to as long-duration contracts Coverages such as residual value insurance, title insurance, and warranty insurance are examples of this type of product Under most long-duration contracts, the premium is paid at policy inception and earned during the exposure period Losses may be incurred at any point during the coverage period with no specific accident date Therefore, the accounting principle of matching may be applied to allocate these losses over the years during which the premium is earned

When a book of business is significantly underpriced, the unearned premium may not be sufficient to cover all of the losses that may emerge during the remaining coverage period Therefore, for long-duration contracts, it is also necessary to test the adequacy in the unearned premium reserve and establish a reserve for any deficiencies that may emerge

4.9.6.3 *Environmental Liability/Asbestos/Mass Tort*

For some actuarial appraisals, the unpaid losses relating to environmental liabilities, asbestos exposure, or other mass tort claims are recorded on a best estimate basis, and the risk associated with this exposure is included in the selection of the investor's required cost of capital. However, due to the significant risk inherent in this exposure, the economic value of these liabilities is often treated separately. Actuaries that specialize in this product are retained to evaluate the remaining exposure, estimate the indicated reserves, and develop assumed cash flows. Many times the indicated range of reserves resulting from these exposures is extremely large. Therefore, a separate risk-adjusted discount rate may be selected to estimate the economic value of these special exposures, and special purchase and sale provisions are developed to mitigate the risk.

4.9.6.4 *Catastrophes and Concentration of Risk*

The catastrophic risk associated with property insurance should be considered in the selection of prospective loss ratios and the required cost of capital. Property and casualty insurance companies commonly use catastrophe models to determine their risk and exposure from windstorms, earthquakes, and other events. The results of these models are usually reported to insurance company rating agencies. A common catastrophe model will develop the expected loss for a 100-year event. These statistics may also be useful for an investor in assessing the relative risk for the target company compared to others in the peer group when using the market multiple approach.

In the United States, insurance companies are not permitted to establish loss reserves for catastrophe losses that have not occurred. The NAIC has made proposals for establishing tax-deferred reserves to protect the solvency of property insurers. In essence this reserve would be considered a segregation of surplus in an actuarial appraisal.

In other countries, insurers may be allowed to (or may be required to) establish equalization reserves for this exposure. For the purposes of determining the appraisal value of P&C insurance companies in the United States, elimination of the equalization reserve is included as a book value adjustment.

4.9.7 SCENARIO VS. STOCHASTIC RISK EVALUATION

The limited time frame to perform the valuation may prohibit a detailed analysis of the key variables required for stochastic modeling. Most nontechnical executives and investment bankers prefer scenario testing to assess the risk of the various assumptions. Using this approach, different valuations are produced under a range of scenarios, varying key assumptions such as loss ratios, discount rates, and premium growth rates. Key parameters are sometimes varied, holding other variables constant to test the sensitivity of particular parameters on the appraisal value. While technical shortcomings may exist, this approach allows the actuary to focus the decisionmaker's attention on the key assumptions, providing a measure of how a change in those assumptions will impact the appraisal value.

When discussing the valuation risk, it is important to distinguish the different types of risk that exist. Certain risks may already be considered in the valuation through the selected cost of capital or risk-adjusted discount rate. As discussed in section 4.4.7, the cost of capital used in many sell-side valuations is derived using a capital asset pricing model (CAPM) approach and an insurance industry beta. The insurance industry beta reflects the relative risk for the insurance industry. An appraisal using a hurdle rate derived in this manner would only incorporate the market risk (systematic risk that cannot be eliminated through diversification) with no additional provisions for the specific risk of the target company. Many financial experts argue that this is the appropriate hurdle rate to use in the valuation model. However, from the investor's point of view, the specific risk of the target company should also be considered.

The cost of capital should be increased if the target company has unusually high underwriting risk, asset risk, or parameter risk. Underwriting risk is generally related to long-tailed liabilities or a material exposure to catastrophe losses. In pricing P&C products, the underwrit-

ing risk is typically reflected through higher profit loads and through the cost to transfer the risk to the reinsurance markets A company that retains the underwriting risk is expected to receive higher profits as compensation for assuming this risk Similarly, adjustments to the required cost of capital may be needed if the target company has a relatively risky investment portfolio supporting its liabilities Finally, if there is significant uncertainty in estimating key parameters for the valuation model, the investor may reduce the appraisal value by increasing the required cost of capital to reflect this risk

4.10 SUMMARY

With the range of values derived using the various techniques described in this chapter, deciding the ultimate value of the target company is in the hands of the management of both the seller and the buyer Due to the complexity of insurance entities, there are many factors that could be weighted differently in the eyes of the parties involved The financial advisors job is to provide management of both sides with a range of reasonable values Once this range has been identified, the price ultimately paid by the buyer will be decided in the negotiation process

The tables on the following pages identify the major public life and P&C insurance transactions that have occurred over the past 25 years with a purchase price in excess of $500 million, and that include a North American buyer or seller Along with the purchase price, the tables display the resulting GAAP P/E and P/B ratios Table 4 21 lists life company transactions while Table 4 22 shows P&C company deals

INSURANCE M&A ACTIVITY
Selected 1987-2003 Announced Life Transactions
Deals $500 Million or More

Buyer	Unit To Be Bought	Price (in $millions)	GAAP P/E	GAAP P/B
1987				
1988				
1989				
GE Capital	FGIC	642 0	9 9	1 2
Zurich Insurance	Maryland Casualty	740 0	9 9	0 8
1990				
1991				
AMEV (Fortis)	Mutual Benefit Group	500 0	10 0	NA
1992				
UNUM	Colonial Companies	570 0	15.0	1 9
Conseco	Bankers L&C	600 0	NA	2 8
1993				
GE Capital Corp	Great Northern Ins Annuity	525 0	18 0	1 4
GE Capital Corp	United Pacific Life	550 0	10 0	0 8
UNUM	Colonial Companies	656 0	15 0	1 9
1994				
Torchmark Corp	American Income Holding Inc	563 5	14 4	2 8
American General Corp	Western National (40%)	724 0	8 3	1 1
American General Corp	Franklin Life	1 170 0	14 6	0 9
American General Corp	Unitrin	2 611 0	27 5	1 3

TABLE 4 21

INSURANCE M&A ACTIVITY (Continued)

Buyer	Unit To Be Bought	Price (in $millions)	GAAP P/E	GAAP P/B
1987				
1988				
1989				
GE Capital	FGIC	642 0	9 9	1 2
Zurich Insurance	Maryland Casualty	740 0	9 9	0 8
1990				
1991				
AMEV (Fortis)	Mutual Benefit Group	500 0	10 0	NA
1992				
UNUM	Colonial Companies	570 0	15 0	1 9
Conseco	Bankers L&C	600 0	NA	2 8
1993				
GE Capital Corp	Great Northern Ins Annuity	525 0	18 0	1 4
GE Capital Corp	United Pacific Life	550 0	10 0	0 8
UNUM	Colonial Companies	656 0	15 0	1 9
1994				
Torchmark Corp.	American Income Holding Inc	563 5	14 4	2 8
American General Corp	Western National (40%)	724 0	8 3	1 1
American General Corp	Franklin Life	1 170 0	14 6	0 9
American General Corp	Unitrin	2 611 0	27 5	1 3
1995				
Jefferson-Pilot Corp	Alexander Hamilton Life	575 0	11 3	
Humana Inc	Emphesys Financial Group	650 0	10 4	2 3
GE Capital	Life of Virginia sub of AON	960 0		1 2
Zurich & Insurance Partners	Kemper Corp	1 744 0	15 0	1 9
1996				
Conseco Inc	Life Partners Group	600 6	21 2	1 4
Conseco Inc	Capital American Financial Corp	650 0	12 7	2 2
American General	Home Beneficial Corp	665 0	17 8	1 3
Conseco Inc	American Travelers Corp	774 0	22 2	2 8
Provident Companies	Paul Revere Corp (merger)	1 200 0	13 7	0 9
GE Capital	First Colony Corp	1 782 0	14 6	1 4
1997				
American General Corp	Western National Corp (55% not owned)	1 178 0	19 0	2 2
Lincoln National Corp	Cigna Corp s life insurance and annuity business	1 400 0	17 5	
American General Corp	USLIFE	1 684 1	21 6	1 5
ING Group NV	Equitable of Iowa	2 200 0	18 8	2 7
Great West	London Insurance Group	C$2 940 0	18 8	1 9
American United Life Insurance Co	Indianapolis Life Insurance Company	merger		
1998				
Fortis	John Alden	575 9	26 8	1 6
Lincoln National Corp	Aetna Inc s U.S Individual Life insurance business	1 000 0	14 4	
Swiss Reinsurance Co	Life Re Corp.	1 956 0	38 4	2 6
UNUM Corp	Provident Cos	4 800 0	16 3	1 7
American International Group Ins	SunAmerica Ins	18 200 0	35 6	5 4

TABLE 4 21

INSURANCE M&A ACTIVITY (Continued)

Buyer	Unit To Be Bought	Price (in $millions)	GAAP P/E	GAAP P/B
1999				
Allstate Corp	American Heritage Life Investment Corp	1 094 1	24 3	3 3
Aegon NV	Transamerica Corp	10 688 9	14 3	1 7
2000				
Royal Bank of Canada	Liberty Life Insurance Co & Liberty Insurance Services	578 7	16 1	
Hartford Financial Services	Hartford Life Inc. (20% not owned)	1 308 0	15 1	3 1
ING Groep NV	Aetna Financial Services & Aetna International	5 000 0	13 3	
ING Groep NV	ReliaStar Financial Corp	5 011 2	18 9	2 4
AXA	AXA Financial (39 7% not owned)	9 400 0	29 6	3 9
2001				
American International Group Inc	Chiyoda Mutual Life Ins Co	513 5		
GE Capital Corp	National Mutual Life Assurance Society	524 1		
Old Mutual Plc	Fidelity and Guaranty Life Insurance Co (sub of St Paul Cos)	635 0	10 8	1 1
Hartford Financial Services	Fortis Financial Group	1 120 0		
Nationwide Financial Services Inc	Provident Mutual Life Insurance Co	1 560 0	14 5	1 5
AEGON NV	J C Penney Direct Marketing	1 600 0		
Sun Life	Keyport Life Insurance Co. and Independent Financial Marketing Group	1 702 0		
Swiss Reinsurance Co	Lincoln National Reassurance	2 000 0	16 0	
American International Group Inc	American General	23 400 8	17 5	2 7
Sun Life	Clarica Life Insurance Co	C$7 339 5	19 5	2 4
2002				
MetLife Inc	Aseguradora Hidalgo S A	966 8		3 0
Nationwide Financial Services Inc	Provident Mutual Life Ins Co	1 120 0		
Prudential Financial Inc	American Skandia Inc	1 150 0		0 7
ManuLife Financial Corp	Canada Life Financial Corp	3 817 6	16 8	1 7
2003				
Bank One Corp	Zurich Financial Services Group (most of U S life ins group)	500 0		
Hartford Financial Services Group Inc	CNA Group Life Assurance Co	500 0		0 7
United Health Group	Golden Rule Financial Corp	500 0		
AXA	MONY Group Inc	1 482 0		0 7
Prudential	Retirement Business of Cigna	2 100 0	10 5	1 9
Great-West Life Co	Canada Life Financial Corp	4 800 0	19 4	2 0
Manulife Financial Corp	John Hancock Financial Services	10 400 0	12 4	1 3

TABLE 4 21 Source: The Shapiro Network Inc with assistance of others most recently RW Mattingly & Co (1996 – on)

INSURANCE M&A ACTIVITY
Selected 1987-2003 Announced P&C Transactions
Deals $500 Million or More

Buyer	Unit To Be Bought	Price (in $millions)	GAAP P/E	GAAP P/B
1987				
1988				
1989				
G E Capital	FGIC	642 0	9 9	1 2
Zurich Insurance	P&C sub of American General	740 0		0 8
1990				
Winterthur Swiss Insurance	General Casualty Cos	630 0		2 9
Allianz AG	Fireman s Fund Ins Co	3 300 0	17 0	1 7
Investor Group	Home Insurance Co	970 0	19 0	8 0
1991				
1992				
KKR (with Am Re Mgt)	American Re-Insurance Corp	1 400 0	131 0	1 3
1993				
Primerica Corp	Travelers Corp	4 600 0		0 9
1994				
Commercial Union Plc	Group Victoire	2 310 0		
CNA Financial	Continental Corp.	1 100 0		
General Re	Cologne Re (50 1%)	595 0		
1995				
Berkshire Hathaway	GEICO (remaining 49%)	2 329 0	21 3	3 0
Travelers	Aetna Property Casualty Operations	4 000 0		
1996				
ACE Ltd.	Tempest Reins Co Ltd	976 0	2 2	
Aetna L&C Co	U S Healthcare Inc.	8 900 0		
American Financial	Allmerica Property/Casualty	700 0		
General Re	National Re Corp	940 0	17 3	2 4
Munich Reinsurance Co	American Re Corp	3 178 0		3 8
Scor US Corp	Allstate Reinsurance (U S operations)	500 0		
Swiss Re	Mercantile & General Re (from Prudential UK)	2 650 0		
1997				
American International Group	American Bankers	2 200 0	21 0	2 7
AON Corp	Alexander & Alexander Services	1 200 0		
Credit Suisse Group	Winterthur Insurance Co	9 510 0		
Exel Ltd	GCR Holding Limited	645 1	8 3	1 6
G E Capital Corp	Colonial Penn Group	950 0		
General Motors Acceptance Corp	Integon Corp.	518 8		3 0
MBIA Inc	CapMac Holding Inc	652 5	19 6	1 9
Partner Re Ltd	Societe Anonyme Francaise de Reassurances	972 2		
Partner Re Ltd	Swiss Reinsurance Co	950 0		
Safeco	American States Financial Corp	2 822 4	15 6	2 3
TRG Holdings Corp	Resolution Group - sub of Xerox	612 0		

TABLE 4 22

INSURANCE M&A ACTIVITY (Continued)

Buyer	Unit To Be Bought	Price (in $millions)	GAAP P/E	GAAP P/B
1998				
Ace Ltd.	CAT Ltd	711 5		1 5
Assoc 1st Capital Corp	Northland Co	600 0		
Berkshire Hathaway	General Re Corp	22 300 0	22 9	2 7
CMAC Investment Corp	American Corp	646 4		
Exel Ltd	Mid Ocean (73% not owned)	2 143 5	12 6	2 1
Fairfax Financial	Crum & Forster Holdings sub of Xerox	565 0		0 5
General Electric Co	Kemper Reins Co	500 0		
Guardian Royal Exchange	Netherlands Insurance Cos (Sub ING Groep NV)	1 150 0		2 0
Hannover Re	Clarendon Ins Group	500 0	18 3	1 9
Nationwide Mutual	Allied Group	1 488 9	26 9	4 0
Norwich Union Plc	London & Edinburgh Insurance Co	523 9		
Partner Re Ltd	Credit Swisse Group (Reinsurance operations)	781 0		
St Paul Cos	USF&G	2 670 8	13 0	1 4
1999				
ACE Ltd.	Cigna Corp - P&C Business	3 450 0	17 4	1 5
Chubb Corp	Executive Risk Inc	902 3	20 0	2 5
Farmers Insurance Exchange	Foremost Corp of America	814 0	15 0	2 9
Fidelity National Financial	Chicago Title Corp	1 139 6	10 4	2 4
Fortis	American Bankers Insurance Group	2 600 0	9 7	2 5
Liberty Mutual	Guardian Royal Exchange PLC (U S operations)	1 465 0		
Markel Corp	Terra Nova Holdings Ltd.	886 4	12 1	1 6
Metropolitan Life Insurance Company	St Paul Cos (personal lines insurance operations)	600 0		
Royal & Sun Alliance Insurance Group	Orion Capital Corp	1 400 0		2 2
Swiss Reinsurance Company	Underwriters Re Group Inc	725 0		
XL Capital Ltd	NAC Re Corp	1 185 4	11 6	1 4
2000				
American International Group	HSB Group Inc	1 203 8	31 3	3 1
Citigroup	Reliance Group Holdings surety business	580 0		3 6
Dexia SA	Financial Security Assur Holdings	2 649 2	18 1	2 1
Radian Group Inc	Enhance Financial Services Group	549 8	12 2	0 8
2001				
White Mountains Insurance	CGU Corp	2 170 0		
XL Capital Ltd	Winterthur International Ins Co (sub of Credit Suisse)	598 5		
2002				
2003				
AIG	GE Edison Life (Japan) & U S auto & home ins	2 150 0		
Liberty Mutual Insurance Group	Prudential Financial (property & casualty business)	540 0		0 8
PMI Group Inc + Investors	Financial Guaranty Insurance Co (sub of G E)	1 835 0	8 2	1 0
St Paul Cos Inc	Travelers Property Casualty Corp	16 138 5	56 3	1 4

TABLE 4 22 **Source:** The Shapiro Network Inc with assistance of others most recently RW Mattingly & Co (1996 – on)