

# 3 THE IMPACT OF TECHNOLOGY ON THE INSURANCE INDUSTRY

*David N. Young*

Today many businesses, both industrial and service, are going through a process of transition. The best publicized examples are auto, steel, and banking; insurance may also be added to this list. How the insurance business came to be in a period of transition requires some explanation.

It may be helpful to divide the insurance business into two broad categories according to the kinds of protection they provide. The first area is the protection of human life values. The generic products of this area include life insurance, annuities, and accident and health coverages. The second broad category is the protection of assets and asset values; it is generally defined as the property and casualty business.

The insurance business can also be divided on the basis of who buys the product. Once more, there are two broad categories: The first group is composed of individuals who buy coverage for their own (or family) protection or for the protection of their assets (home and autos). The second buyer is the corporate purchaser who needs to protect assets or help employees protect themselves through the medium of group life and health products and retirement income funding. The broad category of corporate buyer can be segmented into two markets, the large corporate buyer and the small corporate buyer. The importance of this will emerge in the following discussion.

Insurance is a big business, and it is an important part of each of our daily lives. The need for insurance protection by both individuals and corporations is well documented. Because the insurance business is so vital to our individual needs and such an integral part of our commercial fabric, public policy, developed in the late nineteenth and early twentieth centuries, required that the business be regulated.

Unlike most of the other regulated businesses, the regulation of insurance companies was left solely to the states. However, as a result of the Employee Retirement Income Security Act (ERISA), which was passed into law in 1974, some elements of the employee benefits insurance market have come under federal regulation.

Public utilities have been regulated locally, within state boundaries or much smaller geographic areas within the state. Their service, however, was delivered only to a very local population. Banks, of course, have been regulated both at the federal and the state level, depending upon the source of their charter.

The insurance industry developed under a unique state-by-state process of regulation, even though many of the insurance companies regulated are involved in a commercial venture that is truly nationwide. Over the years, and particularly during the Reagan administration, many arguments for and against regulation have been voiced. Critics argue that regulation provides merely an umbrella of protection for the regulated industry. There is some truth to this allegation since one of the functions of state insurance regulators is to try to assure the solvency of insurance companies authorized to do business in their state.

Once an insurance company receives a charter from a particular state, it is able to enter into the business of insurance in as many states as it wishes, providing it meets the requirements of each and every state to which it applies. The charter it receives enables it to conduct the business of insurance. Anyone without a charter could not enter into the insurance business.

Insurance is a financial arrangement requiring capital. The basic function of insurance is to provide a risk transfer mechanism. The buyer agrees to pay a premium in exchange for the insurance company's guarantee of protection against specified losses listed in the policy. Technology plays no role in the risk transfer function.

Management and administration of the insurance business involves knowing what to underwrite and what not to underwrite, producing and distributing the product, collecting premiums, investing funds, paying claims, keeping records, collecting data, creating information to

manage the business. It is these areas of service and support that provide the opportunity for creative use of technology.

The two functions—risk transfer, and service and support—are inextricably intertwined. For instance, one could have a massive amount of capital with which to absorb risk, but without a support mechanism to provide the services, there would be no insurance product. Similarly, without risk capital, but with the most sophisticated support and service mechanisms, one could not participate fully in the insurance or risk transfer business. If the two parts of the business (risk transfer and service) were separated, some interesting things could happen. This is exactly what occurred in the larger case market for both property and casualty and employee benefits or group insurance.

The property and casualty business, as a result of the risk transfer involved, developed an “underwriting mentality” and over time became underwriting “driven.” Insurance companies went to great expense and devoted considerable time in attempting to select the best risks in order to minimize losses. The service side of the business, with the exception of engineering and loss control, received little attention. Engineering and loss control are important to insurers because they offer an opportunity to limit the potential for loss, thereby improving the quality of the risk. The insurance contract provided not only the risk transfer protection but also all the services bundled together.

There was a similar situation in the large case group insurance market. Originally almost all large corporate health insurance plans were insured. Exceptions were rare. Under the insured approach, the insurance company provided both the risk protection and almost all of the services incidental to the insurance contracts, primarily claim settlement. This was a pretty comfortable arrangement for many years; changes, however, began to take place quickly, and the pressures for change have not yet subsided.

Changes are taking place in the insurance business for many reasons. An early cause for change was the growing conviction among risk managers for large corporations that they could absorb significant risk without the use of insurance since much of their risk was predictable.

Regulation is also a cause for change. The group health marketplace provides an excellent example. Many states mandate benefits that must be included in insurance contracts issued within their jurisdiction. Often these mandated benefits are expensive, and employers can escape the expense of these mandated benefits by self-insuring.

Ironically, the states that mandate benefits to “protect” their residents (voters) end up creating incentives for employers to self-insure. When employers self-insure, the regulators lose the opportunity to provide “consumer protection” for employees since the plans are no longer insured and thus subject to their regulation. Additionally, employees covered under self-insured plans no longer have the insurance guarantee. This can be important in the event of bankruptcy or employer default.

Tax policy can also provide an impetus for change. Insurance premiums are taxed by the states; the tax is generally about 2 percent but can vary from state to state. If an employer chooses to self-insure, he escapes the tax liability. Thus the state provides an incentive to employers to self-insure to escape taxation.

Buyers believe that insurers took excessive pricing actions after periods of high losses (sometimes caused by excessive inflation) or, in the case of the property and casualty business, during “hard” markets. This situation, too, created pressure for change.

The high levels of inflation and high interest rates, which began in 1973 and are still a problem in the mid-1980s, are significant factors for change. Inflation has had a particularly strong impact on the insurance industry. In the property and casualty business, inflation builds up the cost and value of assets and the cost of replacing these assets. Thus the cost of insurance to cover these risks increases. Risk managers for large corporations often had risks that were geographically dispersed (both plants and people). Also, for some coverages (such as workers compensation) they had relatively predictable loss experience, given their size. These risk managers felt comfortable with accepting more and more of the risk by using significantly higher deductibles. Risk managers still continued to buy excess or “catastrophe” coverage, but premiums paid to insurance companies decreased significantly. Some coverages became totally self-insured by large corporations (workers compensation), where legally permissible.

Since insurance companies viewed some of the services they provided as an integral part of the insurance contract, they were not initially interested in providing these services with either a total or a significant elimination of the risk transfer. This opened the door for others to provide these services. Many corporations valued the engineering and loss control advice that had a favorable impact on their loss experience and thus their costs. Some of the major brokers moved into this void and began to offer their own services in these areas. This was the beginning of the unbundling of the insurance contract in the property and casualty large case market.

Later on, the same phenomenon occurred in the large case group insurance market. Originally almost all large corporate health insurance plans were insured. However, in the late sixties and early seventies, as inflation and resulting double digit interest rates became commonplace, corporate financial officers looked wistfully at the large reserve funds accumulated for incurred but unreported claim liabilities under their corporate employee health plan. As the cost of money escalated, inflation drove up the dollar value of these loss reserves that were an asset of the insurance companies.

Even though interest was credited on these reserves by insurers it was less than the cost of money. Ultimately, cracks began to appear in the solid wall of the insurance industry. Arrangements were slowly made to return these loss reserves to the buyer under a variety of arrangements. Many large corporations finally dropped all pretense of insurance and converted their plans to self-insurance, while often retaining the insurance company as the administrator.

Much like the property and casualty arrangements described earlier, the group insurance plan became first financially unbundled (from an insured arrangement to an uninsured arrangement) and then unbundled with regard to the services that were necessary to support the plan. Corporate benefit managers began to look for suppliers who might improve upon services previously provided by the insurer. Under the bundled concept, insurers did not always provide the highest level of service. There was not pressure to do so, since specific services were bundled together and not subject to individual negotiations and pricing. The buyer bought the entire package, risk transfer and the supporting services. Again, many of the major insurance brokerage and benefit consulting firms began to offer their clients those services that previously had been provided under the umbrella of the insurance contract.

Eventually, the trend to accept more risk, and buy less insurance, spread and moved down to ever smaller corporate buyers. The percentage of risk that the smaller corporations retained was less than the larger corporations, but the concept is the same. Less insurance premium was paid to the insurance companies and more services to support corporate purchasers were being provided by non-insurance company vendors.

It has been well documented that the commercial property and casualty business has been engaged in a competitive rate war for the past five years. It has been truly a buyers' market. Recent reports indicate that 1984 will be the first year of an overall operating loss for the commercial property and casualty companies since 1906, the year of the San Francisco earthquake and resulting fire. Now, however, the market

is hardening and prices are rising. The expectation by some in the commercial property and casualty business is that as prices increase, more buyers will balk and they will increase deductibles and turn more and more to self-insurance or other alternatives such as offshore captives. An offshore captive is an insurance company, usually owned by its corporate sponsor, and established outside the continental limits of the United States in an area with very favorable laws or regulations concerning establishment of insurance companies and/or taxation of income.

Inflation, meanwhile, was also having an impact on that most stable of insurance businesses, individual life insurance. For years, some financial planners had been advising their clients to buy term insurance instead of ordinary life insurance and invest the difference in some other type of investment vehicle. Little by little they convinced people that this advice was sound.

The high interest rates of the 1970s probably did more to change consumer buying practice than anything else, however. Financial planners were able to eliminate even the risk of equities for conservative investors by using money market funds that were providing returns in double digits. This certainly was an improvement over the interest accumulation on cash values under an ordinary life contract.

Some smaller insurance companies, with little inforce business, saw these high interest returns as an opportunity and created universal life insurance. Universal life was a clear improvement over ordinary life because the insured's fund was immediately credited with the higher interest earnings earned by his premium dollars. This innovative new product proved to be immensely popular with the public, and the early proponents of universal life experienced significant growth. The larger, more mature life insurance companies were slow to introduce this revolutionary new product because they accurately foresaw that it would result in cannibalization of their inforce business. High margin products would be replaced by universal life, with reduced profit margins. When the IRS confirmed the tax-free buildup within a universal life policy, however, the large companies moved to protect their asset base and responded to growing market demands.

Changes have also taken place in the personal automobile and homeowner insurance lines. These changes were caused not so much by inflation or by limitation of risk transfer, but by different methods of distribution that created apparent efficiencies.

Most of the insurance industry relies upon independent agents and brokers as their sales arms. Agents typically represent several insurance

companies, and through this multiplicity of carriers they are able to meet customers' needs.

Not all companies, however, use the independent insurance agent network. Some of these so-called "direct writers" developed a "captive" sales force in which their agents produced business only for them. State Farm and Allstate are primary examples.

Still other insurance companies decided to market their products directly by mail, advertising, and telemarketing without any agent involvement. GEICO used this approach.

Differentiated distribution systems appear to be more cost effective than the distribution system utilizing independent insurance agents. Using "controlled" distribution systems apparently enables these insurance companies to have a more positive impact on their underwriting results. Some of these companies, particularly State Farm, moved more quickly into automation, and this also had a favorable impact upon their expense level. In time, the market share of these companies began to increase, at the expense of those companies relying on the independent insurance agents.

Armed with this success, these direct writers who had previously limited their operation to personal lines coverages (auto, homeowners, life) have now moved into the small case commercial property and casualty market. They are becoming a significant factor in this market, which previously had been almost totally dominated by insurance companies utilizing independent agents.

Most segments of the insurance industry face significant challenges. Changes have to be made to survive in the current environment. Those who do not wish to change, or who cannot, will pay the ultimate market price—extinction.

Before I move on to examining the role that technology will play in restructuring the insurance and service business of the future, let me remind the reader that technology has an impact on the manner in which the service business is conducted, the scope and quality of services provided, the way products are distributed, and how money is transferred. It does not, however, have an impact on the actual risk transfer or capital intensive part of insurance.

One of the problems faced by major portions of the insurance industry is high expenses. This problem surfaces when services are unbundled from the risk transfer. It is also a factor in the bundled environment where the independent agency companies compete against those using direct or controlled distribution systems.

Here is an interesting example taken from the small commercial and personal auto/homeowners' markets. Various efforts at automation have been undertaken by the insurance industry to modernize the independent agent's office. Before automation, an agent would underwrite a risk and, being familiar with the insurance companies he represented, would submit the risk to the insurance company that he felt would be most appropriate for his customer. When the local branch office of the insurance company received the information from the agent, it underwrote the risk again.

If the risk was accepted, the policy was issued by the insurance company and delivered to the agent. Unfortunately, this often took a long time. The policy frequently contained numerous and significant errors, in which case it had to be rewritten by the branch office.

With automation, the agent submits his risk electronically after he has underwritten it. The computer rates the risk correctly, issues the policy correctly, and almost instantly bills his client, adjusts his accounts receivable and payable, and updates both his files and the insurance company files. This new process saves considerable time and expense in his office; it also reduces expenses in both the branch office and the head office of the insurance company.

In actual practice, most agents who have automated do not reduce staff (the staff may be their wife, son, daughter-in-law, or next-door neighbor) but are able to double and even triple their volume without adding staff. Since the insurance market is not sufficiently large for all agents to double or triple their volume, the spread of technology will inevitably cause some reduction in the number of agents.

The insurance companies have learned some interesting lessons from their automation effort. Although most of the agency automation systems allow for multiple company interfaces, in fact, the insurance company sponsoring the automation experiences an increase in volume. Much of this increase is the result of doing business electronically, but part of the increase is a result of the cost-sharing aspect of automation. The agent can pay for part of the cost of automation by increasing the amount of insurance placed with the sponsoring insurance company.

All of this automation would eventually enable the insurance industry to make significant staff (and, therefore, expense) reductions. The underwriting staff in both the branch office and home office will be reduced. Also, since much of the data necessary for both the rating bureaus and the insurance company will be automated, the clerical staff may be reduced. Fewer middle managers need to be involved in the process of converting data to information, a function that a computer performs so well.



The potential for technology to create opportunities for expense reduction is only one facet of the unfolding scenario. Right now it takes years to train a property and casualty insurance underwriter. Much of the training comes as a result of experience gained by evaluating numerous risks. However, through the use of expert systems, based on artificial intelligence technology, a novice underwriter could gain the knowledge of the most experienced underwriter. Further, the availability of computerized data bases would enable the novice actually to outperform his more experienced associate working without a decision support mechanism. With this capability underwriters will make better decisions and apply more equitable and accurate rating, which should improve profitability.

In the large case group health market, change is occurring at an accelerated rate. The large insurers have significant market shares on a national basis. They have automated much of the claim settlement activity, which represents the majority of their expense charges.

With the unbundling of services, however, new competitors have gained entry into this business. Besides some of the national brokers, new entrants—generically called third party administrators (TPAs)—have been created by entrepreneurs. These new firms offer a variety of services, the most important of which is claim service.

These TPAs are local and therefore very close to their customers. They are able to deliver an electronic claim settlement service promptly, accurately, flexibly, and—most importantly—for less cost than most of the insurers. They are able to do this because they concentrate on providing only claim service, not staffing to provide the broad array of services that some insurers offer. The unbundling of the insurance risk from the service function and the ability of the TPA to choose selectively both customers and services to offer has created competitive problems for the insurance industry. At the present time, the market share of the TPAs is growing more rapidly than either the commercial carriers or Blue Cross/Blue Shield.

Interestingly, some of the larger TPAs are growing into national concerns. One of the largest, Galbraith and Greene, is owned by a major insurance broker, Fred S. James, which is in turn owned by Transamerica, which also owns Occidental Life, a major life insurance company. Another large third party claim administrator is owned by Dun & Bradstreet and provides a variety of services, including claim service for many smaller insurance companies. It appears that TPAs are being integrated into the financial services marketplace.

The price of hardware continues to move in the right direction for these TPAs, as well as for the smaller local or regional insurance companies.

Also, the software to run the smaller and lower cost hardware is becoming more readily available, less expensive, and more user friendly. In essence, one of the barriers to enter the service business related to employee benefits has been reduced, if not eliminated.

In the large case property and casualty market, insurers are now trying to compete for service business by automating much of the information needed by corporations to manage the risk effectively. Now they have to compete not only against the large brokers but also against new, specialized firms that provide necessary data on losses and other specialized and personalized services. Much of the insurer's motivation for this commitment to service is to help retain whatever insurance coverage is available and to maintain relationships with customers.

Much of the insurance industry has an expense problem, and the automation effort must be directed toward the reduction of the number of workers required to support a given volume of business. This will be extremely helpful for several reasons. Lower expenses will improve the competitiveness of the insurance product and *possibly* reduce the tendency toward self-insurance. In addition, more of each dollar of revenue will be going to support risk transfer and should, over time, improve the company surplus position.

Surplus is critical to the insurance business since it enables carriers to write more business. With improved expense control, part of the savings could be used to reduce price, and part of the savings could be used to increase surplus. The latter is important because there is evidence that capacity in the commercial property and casualty field may be squeezed by the end of the decade.

The reduction in the number of employees of insurance companies will be matched by the reduction in the number of agents. Surviving agents will be highly automated and thus will be able to handle a substantially greater volume of business without staff additions.

The agent's efficiency will increase significantly in a variety of ways, and this will lead to greater efficiencies in the companies the agent represents. For instance, successful agents currently spend considerable time out of the office meeting with clients and prospects. If the agent needs to quote coverages, he must either gather the necessary information and go back to his office to prepare a quote or telephone his office and have the office prepare a quote and call him back.

The agent of the future will be armed with a portable computer that will enable him to quote and bind coverages on the spot. Some of these briefcase computers are currently in use in the individual life insurance business, but they are crude compared to what the future holds in store.

Think of the productivity gains for the agent and for the insurance industry. The data capture and entry that is done by the agent or agency is transmitted electronically to the insurance company and saves the company the expense of the data input.

The spread of automation will also result in reduction in the number of companies that an independent agent will represent. This will be good for both parties, the agent and the carriers. Experience to date with agency automation has confirmed this trend. Agents will find it too expensive to deal with many companies, and the companies have already concluded that it is not cost effective to try and wire up agents from whom they receive relatively little business. This will put pressure on insurance companies to write more and more of an individual agent's business.

Use of automation and telecommunication networks will enable insurance companies to disperse much of the work activity and decision-making so that it is accomplished closer to the customer. In the commercial property and casualty business the underwriting function will be materially aided by the use of expert systems and sophisticated data bases for decision support. This will be accomplished locally. Powerful personal computers linked to centrally located mainframes will enable many users to take advantage of the power of the mainframe but still allow a central control of data.

This move closer to the customer will help the insurance business become more market oriented rather than underwriting or product oriented. Teleconferencing and video conferencing will be used to communicate policy decisions and to allow a "face to face" discussion and resolution of business problems. This technology will also enhance the dispersion of function and decisionmaking to local offices. Furthermore, employee training and education will be greatly facilitated by teleconferencing and video conferencing.

Right now, Aetna Life and Casualty Company uses teleconferencing facilities utilizing satellite technology connecting Hartford with their offices in Chicago, Washington, and San Francisco. In addition to this teleconferencing facility, Aetna uses land lines to connect four different offices in and around Hartford. The latter arrangement saves considerable time and expense in commuting between the offices for meetings, and the former allows the company to communicate effectively with both people and customers in the distant locations. The company has found that the "culture" has not changed as rapidly as the technology; thus, it is still too "remote" for sales presentations where the buyers and the sellers are unknown to each other.

The electronic transfer of funds (EFT) will expand significantly. Aetna's uninsured group health business now uses wire transfers almost exclusively to obtain reimbursement from the policyholder for funds that have been paid on behalf of their employees. That is just the tip of the iceberg. Providers of services (doctors, dentists, hospitals) are being paid on a bulk basis, but not yet with EFT. In the future, Aetna will make payments not only to providers but also to individual employees by EFT. Commissions or other payments that are payable to agents and brokers will also be transferred and deposited electronically.

All of this will reduce expenses, since paper (checks, drafts) will be eliminated and reconciliation will be accomplished electronically. There will be additional savings generated by a reduction in mail volume.

In the large case market, particularly group health and workers compensation, the customer's computers will be linked electronically to their insurer's computers. In this way the insurer's data base will be available for data manipulation and report generation by the customer on his own premises. There will be some security problems, of course, but no doubt they will be solved.

One intriguing example of the opportunity afforded by the new technology is in the area of flexible benefits or "cafeteria" plans. These plans allow employees to choose from among a variety of plan options and thus build a package that more closely meets their personal needs. One of the reasons for the growing popularity of these plans with employers is the changing demographic composition of the work force. Flexible benefit plans can deliver a variety of insurance, savings, day care, legal, and other benefit plans through the group delivery mechanism at lower distribution costs than the individual products traditionally sold by agents.

Flexible benefit plans, however, create complexity because of the many benefit variables; they also create additional expense because of the complex administration they require. Automation can provide a value added service to assist employers in resolving these problems. Insurance companies can market these flexible benefit administration packages to employers and thus create another link with their customers. It is likely that in the future an interactive videotex system on the employer premises can be used to guide employees through the option selection process.

In summary, the technological revolution that is currently underway will substantially restructure the insurance industry. This restructuring is absolutely necessary because expense reduction is critical to the industry. Expenses are high now because of the "protection" of regulation

and the bundling together of services and risk transfer under the umbrella of the insurance contract. When the risk transfer was tied so closely to the services, expenses were much less of a problem—there was no other game in town.

The insurance industry will grow significantly larger in terms of premiums and fees for services. The variety of services offered will expand dramatically to meet customer needs. There will be fewer companies. The insurance agency force will also decrease. Insurance companies will become much better marketers; as a result, they will compete aggressively to win back much of the insurance service business that they have lost over the years. This service business, apart from the risk transfer, will enable insurers to stay close to their customers.

It is impossible to discuss how technology affects the insurance industry structure without addressing the human issue. In order for the industry to take advantage of the promise and potential of the technology, it will be necessary to make changes in corporate cultures. Employees will have to be educated and trained to be comfortable with the new technology. This process will be easy for eager new recruits into the industry who are comfortable with this technology. It will be more difficult for older employees at all levels of the organization—including the most senior levels. Technology *will* provide the answers to the business problems. The unanswered question is whether managements can prepare themselves, and their employees, for the change.

By the year 2000, the business of insurance will be radically transformed. The principle of risk transfer will remain unchanged, but the delivery of products and services—and the scope of these services—will be far different from what we know today.

## DISCUSSION OF CHAPTER 3

*Howard Kunreuther*

David Young has presented an excellent summary of the recent changes in the insurance industry and the role that technology is likely to play in marketing the insurance product. Young has clearly outlined the importance of firms moving from an “underwriting driven” mode, where only the good risks are taken, to a more service-oriented mode, where different risk management functions are offered to corporations. As Young points out, technology has aided this process by enabling insurance agents and brokers to offer a spectrum of services that suit the corporation’s needs. Because technology can cut costs, insurance firms may be able to compete with other specialized organizations and banks for this business.

My comments will extend Young’s remarks by addressing four questions:

1. What is the effect of technology on the different interested parties who are involved with insurance?
2. What is the effect of technology on competitive strategy for the insurance industry?
3. What are the welfare implications of new technology on the different interested parties?
4. What differences exist between the insurance industry and the airline industry in the context of competitive strategy?

## THE EFFECT OF TECHNOLOGY ON DIFFERENT INTERESTED PARTIES

Consider the following hypothetical scenario. The Alpha Insurance Company has taken advantage of computerized technology to market special services through one of its independent agents (the Beta Agency) to one of its customers (Kappa Industries). Initially, Alpha offers packages for analyzing its risks (i.e., property losses, product failure, and the nature of its portfolio). It suggests where Kappa can self-insure and where it may need special coverage. It offers what is called a “cafeteria plan,” which provides special features such as the ability to change premiums on a monthly basis so that there is less float than under normal plans, the rapid settlement of claims to reduce float, and special teleconferencing services for personal consultation between Kappa Industries and executives at Alpha Insurance.

These services appeal to Kappa and the company because they meet their own needs. When a rival insurer, Omega Insurance Company, offers another set of computerized services, it is difficult for Kappa to evaluate the rival’s potential benefits since they are not comparable to their current plan. In addition, Kappa knows there would be a large set-up cost associated with investing in new computer software should they decide to switch insurers. They are reluctant even to consider this possibility.

Alpha also provides the Beta Agency with specialized computer packages for almost instantaneously accessing rate data and alternative plans. In return, Alpha requires that Beta represent only them when offering risk management services to different corporations. The result of this arrangement is that Alpha has a degree of monopoly power with its two other stakeholders, Beta and Kappa.

## THE EFFECT OF TECHNOLOGY ON COMPETITIVE STRATEGY

Elements of the above scenario are consistent with ideas that McFarlan (1984) recently offered demonstrating how information technology affects competition. For example, as part of their competitive strategy, firms build barriers to entry. Thus, special features of Alpha’s package make it difficult for rival firms like Omega to compete in the computerized insurance services market.

It can be difficult for firms seeking commercial insurance to obtain comparative data on such items as premiums. Theoretically, computer technology should enable one to make these comparisons but there is no incentive for insurers to share data with others. The Insurance Services Office (ISO) does publish premiums for standard coverage such as automobile and homeowners coverage. When it comes to commercial insurance, however, variations are enormous between types of coverage; there is no standard premium that would have any meaning for industrial firms.

It is desirable, however, for insurers to share data on claims with each other for relatively low probability catastrophic risks. This may help firms to set more meaningful statistical rates given the limited amount of data any one firm has on a particular risk. Sharing data may also help increase the capacity for coverage, as in the case of nuclear power plants, if the variance on losses is reduced by having added information.

Another way to improve the rate making process was noted by Young when he suggested that expert systems may train underwriters to make better decisions by using the knowledge of the most experienced underwriter in the firm. One may be able to go one step further by trying to model the behavior of an expert underwriter. Specifically, one could identify factors influencing his decision and, through statistical regression, determine what weight the underwriter places on each variable. For example, with respect to automobile insurance the rate set by an underwriter (the dependent variable) may be influenced by factors such as age, years of driving, location of car, and miles driven (the independent variables). The regression will determine how important each one of these factors is to the underwriter based on the decisions he has made.

A relevant question from an expert systems perspective is whether the regression does better in terms of performance (e.g., using measures such as the premium/loss ratio for different risk classes). If the answer is "yes," then the rule may serve as a guide for making decisions. For example, the underwriter may want to use the rule as an initial guide for setting rates but still use his own judgment for setting the final rates.

The experience with other decisionmakers, such as stockbrokers making portfolio decisions, admission officers determining which students to accept in college and graduate schools, and medical doctors diagnosing disease, suggests that linear rules perform better than the decisionmaker in many situations (Dawes 1979). Cases that are unusual may require special attention by the decisionmaker and the use of the rule may enable the underwriter, for example, to concentrate his efforts on the unusual rather than the routine.



## WELFARE IMPLICATIONS OF NEW TECHNOLOGY

With respect to industrial firms, I agree with Young that in the short run they will have more options from which to choose. The long-run outlook appears somewhat more uncertain because of the difficulty firms will have in switching services.

Larger insurers will benefit because they can afford to invest in sophisticated new technology because of the volume of their business. Companies like Aetna should do well. Small firms like Alpha may not.

There is likely to be an acceleration toward the direct writer system. Agents or brokers who have a large business will adopt new technology because it is cost effective for them to do so and to commit themselves to one insurance firm. Small agents will very likely find it necessary to join forces and utilize some third party to provide them with computer services in much the same way as small banks that have created interbank networks.

## AIRLINE-INSURANCE COMPARISON

There are some similarities and some differences between the way computer technologies have affected the airline and the insurance industries. Both groups want to differentiate their products in order to have some degree of monopoly power. The structure of the two industries is similar; the travel agent serves in his capacity as a middleman between the airline company and customer in much the same way as the insurance agent or broker does for the insurance company and its customers.

The information sharing function is the principal difference between the two systems. For the airlines there is an interconnection between all carriers through the airline reservation system. The official airline guide displays a flight on a personal computer if you give it departure time, desired arrival time, and cities. The computerized system does not supply prices because the number of fare changes in one day may be as high as 25,000. The differentiation between airlines is through promotions and vertical integration with hotel and rent-a-car companies.

It is difficult to get comparative insurance rates without many phone calls, because companies specialize with agents. Since the type of coverage and services provided will differ between insurers, it will be hard to differentiate between programs and policies purely on the basis of price, as one can do with airfares.

In conclusion, the emergence of computer technology opens new opportunities for new product lines. Specifically, banks are now demanding insurance policies to protect themselves from malfunctioning computer systems and computer crime. Insurance is in the positive position where it follows Says Law: The supply of new technology creates its own demand for insurance protection.

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