Using Computer Models in Directors and Officers
Underwriting Insurance Negotiations

by

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Abstract

This research involved the development of several computer tools for use
in directors and officers underwriting negotiations. The tools were created on
an Apple® Macintosh® computer and included Stella® based system
dynamics models, DATA® based decision analysis models, a customized
negotiator's notebook database, and a tool for doing preference analysis during
the negotiations all integrated under a simple Hypercard® interface.

After an explanation of the directors and officers insurance industry,
the negotiations process used by risk managers, brokers and underwriters is
defined. I then discuss how D&O insurance policies are valued by the
underwriters and how computer tools could be used in these negotiations.
Next I describe the computer tools developed for these negotiations. Finally, I
explain how the computer tools might be evaluated in real and simulated
negotiation.

The appendices include detailed listings of all the models and tools
developed for the toolkit. I used Hypertalk® to write all the customized
applications.

Thesis Supervisor: J.D. Nyhart
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Introduction

Insurance companies insure directors, officers, and other employees for billions of dollar in coverage\(^1\). Each year, risk managers contact their insurance brokers to request bids for coverage from insurance underwriters. These underwriters examine the financial statements of the company, look for other external information and eventually provide quotes to the insured. The ensuing negotiations process, including the analyses, is complex and requires much experience on the part of all the negotiating parties to go smoothly. The legal environment for directors and officers insurance has been very volatile and this volatility has made it very difficult for even experienced D&O insurance negotiators to make assessments of the risk and cost of coverage for an insured.

One way that may improve directors and officers insurance negotiations is to develop computer tools that can help the parties with their analyses during the negotiation process. In order to develop tools that can be useful in negotiations, a thorough understanding of the D&O insurance industry and the traditional underwriting negotiation process must be gained. For the purposes of this paper, an improvement in negotiations occurs when the negotiations are more integrative or effective. Effective negotiations have a process that is seen as legitimate by all negotiating parties, occur in a reasonable amount of time, and have enduring, robust results.

\(^1\)Walter Olson, "The D&O Insurance Disaster," *Across the Board*, July/August 1986, p. 39.
After a brief explanation of the directors and officers insurance industry, the negotiations process used by risk managers, brokers and underwriters will be defined. Then I will discuss how policies are valued and how computer tools could be used in these negotiations. Next I will describe the computer tools developed for D&O underwriting negotiations. Finally, I will explain how the computer tools might be evaluated in real and simulated negotiations.

**Purpose of Directors and Officers Insurance**

Directors and officers, as well as ordinary employees, can be sued and held personally liable for alleged misconduct in the performance of their corporate duties. Shareholders, employees (and former employees), customers, government agencies, suppliers, competitors, bondholders, and public interest groups can sue directors and officers. Claims have been made for misleading representations, breach of employment contracts, breach of duties to minority shareholders, civil rights violations, improper expenditures, conflicts of interest, imprudent investments, and misuse of inside information\(^2\). There have also been product liability claims (e.g., suits against A.H. Robbins for the Dalkon Shield), Racketeer Influenced and Corrupt Organizations Act (RICO) claims, and pension and employee benefits claims. Corporations want to maintain the broadest possible coverage of this liability for their directors and officers in order to ensure that good directors and officers are not reluctant to work for them.

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History of Director and Officer Liability

Insurance companies make money by charging more in premiums than they pay out in claims and by earning interest on the money they receive from premiums before they pay it back in claims. In the late '70s and early '80s interest rates were high; insurers cut premiums in order to get more cash so that they could get interest income. Insurers sold directors and officers insurance at close to or below its expected value.3

Before 1985, there were few cases when directors or officers were held liable for negligence or misconduct in managing their corporations. Directors and officers were protected by the Business Judgment Rule which stated:

In the absence of a showing of bad faith on the part of the directors or of a gross abuse of discretion, the business judgment of the directors will not be interfered with by the courts.... The acts of directors are presumptively acts taken in good faith and inspired for the best interest of the corporation, and a minority stockholder who challenges their bona fides of purpose has the burden of proof (Warshaw v. Calhoun, 221 A. 2d 487 [1966]).

In 1985, a decision by the Delaware Supreme Court to hold a group of directors liable for negligence (Smith v. Van Gorkom 488 A. 2d 858 [1985]) altered the Business Judgment Rule precedent and touched off an enormous increase in litigation against directors and officers. The court did not change the rule, it just reinterpreted the threshold of obligation. Directors and officers liability insurers did not anticipate this increase in litigation and as a result they lost a lot of money. At the same time, interest rates fell, so that insurers' interest income was much lower than anticipated. Many insurers stopped

insuring directors and officers and those that continued directors and officers coverage dramatically increased their premiums. Directors and officers began leaving corporate boards because their personal risk was too high\textsuperscript{4}.

Since 1987, state legislatures have tried to reduce director liability, claiming that directors and officers liability limitations improve the ability of state-incorporated businesses to attract competent board members\textsuperscript{5}. State legislatures have accomplished this by revising the Business Judgment Rule. Insurers that underwrote directors and officers liability found that their expected value of claims against directors and officers was higher than anticipated and the insurers began making large profits. Other insurance companies began underwriting directors and officers policies again and competition drove the premiums back down.

\textsuperscript{4}Walter Olson, p. 40.

\textsuperscript{5}Shaw, p. 48.
Extent of Directors and Officers Insurance Coverage

Generally, directors and officers must meet two requirements to avoid personal liability: 1) understand and act in the corporation's best interest, and 2) use due care in performing corporate duties. This is referred to as the "prudent man" test\(^6\).

The state where the largest number of companies are incorporated is Delaware. The Delaware statutory indemnification provision sets the upward limit of directors and officers liability for Delaware incorporated businesses. If a corporation adopts the provision the corporation will have to "indemnify any person who... is or was a director, officer, employee, or agent of the corporation or is or was serving at the request of the corporation as a director, officer, employee, or agent of another corporation\(^7\), " Serving at the request of the corporation as an employee of another corporation is often called an "outside activity". A request by the corporation does not have to be authorized in writing. "Oral encouragement" can be regarded as a request by the corporation.

The Smith v. Van Gorkom decision was concerned primarily with mergers and acquisitions. When making "substantive" decisions (such as deciding to accept a takeover bid) the board must not only get a good price for the company (referred to as "fairness in substance") but it must also carefully consider its options, comprehend the intrinsic value of the firm, and negotiate (referred to as "fairness in form").

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\(^6\)Kaufman, p. 29.

Directors and officers insurance is written on a claim-made basis. The corporation must notify the insurer of claims against it within a specified amount of time after the claim has been filed. This allows the insurer to assist the corporation with the claim litigation. There are time-based restrictions and limitations to coverage such as retroactive dates, the length of the discovery period, and others. Timely and complete claims reporting is critical for efficient and total indemnification.
Directors and Officers Underwriting Negotiations

Underwriting negotiation serves two primary purposes: 1) establish the premium and coverage of the D&O policy, and 2) an opportunity to establish a relationship with the insured for future directors and officers insurance and other types of corporate insurance. The three major items the underwriter must determine when evaluating a new policy are: 1) the expected value of claims held against the directors and officers during the lifetime of the policy, 2) the volatility (i.e., variance) of that expected value, and 3) the perceived competitive price of the policy. Other considerations such as the premium of the old D&O policy, the insurer's relationship with the corporation, and public relations are also important in determining the D&O policy premium.

Defining the Negotiations

A useful first step in organizing the computer tools and establishing a method for analyzing the tools' effectiveness is to describe the negotiations according to some fundamental identifying characteristics. Howard Raiffa defines different types of negotiations by asking thirteen organizing questions about the negotiations. Answering these questions not only provides a useful taxonomy for defining the negotiation but also illicits some insights into the ways computer tools might be useful in the negotiations. The following discussion is loosely based on Raiffa's organizing questions about negotiations.

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8The characterization of National Union's underwriting negotiations used in this section was developed from interviews with National Union underwriters and managers.

The Number of Negotiating Parties

Directors and officers underwriting negotiations have sometimes been
defined as simple two-party negotiations but this ignores the effects of the two
intermediaries in the negotiations process. Besides the underwriter at
National Union, and the risk manager at the company seeking insurance, a
regional National Union representative and an insurance broker are also
closely involved in the negotiations. A risk manager seeking insurance
contacts a D&O insurance broker who then solicits bids from a variety of
insurance companies. At National Union, a regional representative whose
primary job is to develop a relationship with these brokers, collects this request
and sends it on to the underwriters at National Union. The underwriters then
generate a set of offers based on the request from the brokers. These offers go
back to National Union's regional representative who then sends them to the
broker. The broker collects these bids from National Union and others and
presents them to the risk manager with advice and recommendations. The
risk manager may then ask for changes or accept one of the offers.

National Union's representative and the broker play an interesting role
in the negotiations. These intermediaries act somewhat like arbitrators,
although neither National Union underwriters nor risk managers can
consider the behavior of these two intermediaries to be unbiased. The
intermediaries cannot form explicit coalitions with the other parties, though
they can emphasize the interest of either the insured or National Union.
Moreover, National Union's regional representatives may place a higher value
on their relationships with the brokers than on National Union's negotiating
interests in any given negotiation since it is in the representative's main
interests to maintain a positive and enduring relationship with the broker.
Developing a relationship with the brokers is intended to encourage brokers to advocate National Union's interests, but the broker may or may not behave this way. The broker can encourage or discourage the risk manager to accept an offer from National Union. The broker also can lie to either the risk manager or National Union to get a more acceptable agreement with almost no chance of being detected.

A risk manager may even ask for bids from more than one broker. When this happens, brokers' interests are more likely to be focused on the risk manager since the risk manager may accept a bid from a competing broker.

Competing insurance companies cannot form coalitions and may or may not know the other's competing bids. Knowledge about past bids, competing bids, the insured's interests, and the underwriters' interests are all controlled by the broker. Often National Union will get general information from the broker on the competitiveness of an offer National Union made to a risk manager. Usually the broker will not give specific information on the content of the offers but will tell National Union if their offer is competitive with their competition and who their competition is. It is difficult for National Union to assess how reliable this information is.

To receive an offer from National Union, the risk manager must complete a standardized form from National Union. The form has questions about historical coverage limits, retentions and premiums. National Union will accept the form without this information and the broker can advise the risk manager to fill out this portion of the questionnaire. These data on past
policies form an anchor for the present negotiations. National Union can assess how competitive it is by comparing its present offer to past accepted offers.

Before or after an offer has been accepted by the risk manager, a group of representatives from the potential insured may visit National Union headquarters to discuss the policy in general terms. Besides the risk manager, the group from the insured can include the CEO, the directors and officers, and other senior executives. The broker is always present at these meetings and no actual bargaining takes place. Usually only very general information is exchanged. The purpose of these meetings is to become better acquainted with the senior executives and to make the insurance contract with the insured more personal.

**Internally Monolithic**

One underwriter from National Union will decide to underwrite a policy and send the offer to the broker during a negotiation. However, underwriters are strongly influenced by their regional managers, division managers, and corporate goals. These people may have conflicting interests and the underwriters themselves are faced with conflicting interests. For example, the underwriters may be attempting to achieve monthly or quarterly revenue targets while attempting to manage the risk of the policy so that it will profitable. In the short-run it may be advantageous for the underwriter to compromise long-run profitability for immediate revenue, although this is never in the main interests of National Union.
Similarly, one risk manager will decide which offer to accept, though the risk manager may be strongly influenced by the board of directors, the CEO and by corporate objectives. After establishing a personal relationship with a particular insurance carrier, the board may want to maintain that relationship even if that carrier's policy is not the most competitive. Also the risk manager may be given a target or maximum premium for a given coverage limit. Usually the risk manager will not be given a target retention level. Therefore the risk manager may accept a less competitive policy in terms of total expected costs (due to higher retentions) if it meets the coverage limit and premium targets.

Repeating Negotiations

Most of the offers National Union makes to risk managers are for policy renewals. These renewal negotiations generally take considerably less time than completely new negotiations. Because these are repeating negotiations, the relationship between the underwriters, the brokers and the insured is very important. One way the underwriters try to maintain this relationship mentioned earlier is by bringing the risk manager, broker and directors and officers in for an informal meeting at National Union.

National Union also tries to add extra value to its coverage by providing the insured with extra information on ways to cut insurance costs or the risks of litigation. National Union sends a monthly newsletter to all its customers with articles about changes in the law, the insurance industry, and regional industry practices. Not only does this help National Union establish a better relationship with its customers but, since information about ways of limiting corporate risk is shared with the insured through the newsletter, it provides a way for improving integrative negotiations.
National Union also provides, through an independent company, an audit committee that looks for ways within the insured to improve corporate governance and reduce the risk of exposure to the directors and officers. At the insured's request, the audit committee can send a report that rates the insured's internal accounting procedures. This audit committee is another integrative negotiations technique used by National Union since a high rating on this report provides an automatic reduction in insurance costs for the insured. Through this audit committee, National Union establishes a stronger and unique relationship with the insured.

Because these negotiations are repetitive, the brokers, the insured, and the underwriters all have incentives not to take advantage of the others' ignorance during one set of negotiations. If it is discovered in future negotiations that the one of the negotiating parties or intermediaries took what is thought to be an unfair advantage in the earlier negotiations, ill-will may develop that will damage the reputation of the negotiating party.

Linkage Effects

There are several linkages in directors and officers underwriting negotiations. From the underwriters' perspective all coverage with a particular class of insured, in a particular region of the country may have similar risks and may need an increase in premium to cover higher expected costs for that market. From the insured's perspective, future negotiations are linked to the present negotiation, since decisions to accept certain types and levels of coverage will be used as a baseline in future negotiations.
Changes in the law, in the frequency of litigation, or in industry behavior may also create linkages between negotiations. For example, the savings and loan bankruptcy crisis has caused a large increase in litigation against the directors and officers of savings and loans. Because of changes in expected costs, the premiums charged coverage for insureds that participate in this industry has increased. These increases also create informal internal linkages among the underwriters at National Union. The underwriters, when faced with a policy from an insured in this industry will ask other, more experienced underwriters how they have recently handled similar insureds.

Multiple Issues

Although the premium, retention and coverage limit tend to become the focal points of the negotiation, there are many other issues that the risk managers, brokers and underwriters consider. Most of these other issues deal with policy exclusions or endorsements. The directors and officers insurance industry has developed a standard policy format that serves as the basis for all directors and officers coverage. National Union can deviate from this standard policy through endorsements and exclusions to make the policy coverage either less or more extensive. Although usually few issues are negotiated by the insured and the underwriters, the underwriters are willing to varying degrees to negotiate all aspects of the contract including such things as the length of the contract and standard National Union policy exclusions.

Need to Reach an Agreement

Although the risk manager can use other insurance carriers and a few companies can self-insure for part of the coverage, usually the risk manager must get some form of directors and officers insurance coverage. In some
negotiations this puts the underwriter at a significant advantage. For example, if the coverage is particularly risky, because the insured has declared bankruptcy or is undergoing a large product liability suit, National Union may be the only carrier offering coverage to the insured. The only things limiting National Union's power are the good-will needed for future negotiations and state regulations.

This lack of negotiation power on the part of the risk manager was exemplified in the late 1980s. Because of sudden increases in expected costs, almost all directors and officers insurance carriers left the market. Risk managers were having a very difficult time finding any carrier that would underwriter a policy for them, and rates increased by more than 1000% in one year.

However, since the risk manager does usually receive insurance offers from more than one carrier, the risk manager usually retains the ability to break off negotiations with a particular vendor at any time during the negotiations. In these more common negotiations, the underwriters attempt to keep in contact with the broker to learn more about how attractive their offer will be to the risk manager, and find ways of may their offer more attractive.

*Time Constraints in Negotiations*

The length of the negotiations is usually determined by the expiration date of the previous contract. This often means that the negotiations occur very quickly—often a week or ten days from a request for offers from the risk manager to an agreement. In these short negotiations the underwriters may spend as little as one hour analyzing the insured and preparing an offer. If
National Union has covered the insured during the previous term, then it may agree to extend the coverage at the to-be-agreed-to premium for an additional week or two weeks. This greatly enhances National Union's negotiating power, since the risk manager would have much difficulty accepting insurance from another carrier after the risk manager made an agreement with National Union for extended coverage.

If the risk managers previously used some form of self-insurance and has decided to review offers from outside insurance carriers, there are almost no time constraints on the length of the negotiations, and the risk manager's negotiating power increases. When risk managers are seeking coverage for the first time, the negotiations with the carrier often last several months. Some risk managers increase their negotiating power by asking for quotes long before their current coverage expires. This too, has the effect of increasing the risk manager's negotiating power, but not as much as first time negotiations, since the underwriters are aware of when the current coverage will expire.

**Binding Contracts**

Included as part of all policy contracts the underwriters offer is a statement that the insurance carrier may cancel the policy at any time after a ninety-day notification period. This gives the appearance of making the contracts non-binding, but because of state regulations regarding insurance cancellations and the need of the insurance carrier to maintain a good reputation in the industry, policy cancellations very rarely occur. The policies are essentially binding contracts for both the insured and the carrier during the entire policy period.
**Underwriting Insurance Negotiation Norms**

Insurance underwriters and risk managers involved in policy negotiations can best be described as *cooperative antagonists*. Both parties are primarily concerned about their own interests and both realize that the other party will act primarily according to their own interests. It is unlikely that one party will behave either altruistically or malevolently toward the other. Neither the underwriters nor the risk managers expect that the other will lie to them, but they do expect that the other may attempt to conceal part of the full truth during the negotiations. Correspondingly, both the underwriters and the risk managers will attempt to make their best case to increase their share of the negotiation surplus while obeying legal and ethical negotiation standards.

The underwriters and risk managers are both willing to engage in integrative and distributive bargaining. When negotiations begin, the bargaining tends to be more integrative, as the risk manager and underwriter look for endorsement or exclusions and premium/retention/coverage combinations that suit the particular policy needs of the insured and the carrier. Later the negotiations become more distributive, as the underwriters and the risk managers bargain for different premiums, given a particular policy and retention and coverage limits.

**General Policy Considerations**

The insurer or the corporation can do things that may reduce the expected value of future claims, reduce the volatility of those claims, or at least maintain a friendly relationship between the insurer and the corporation when claims arise. For example, the corporation may establish written
eligibility criteria and a formal acceptance procedure for participation in outside activities. This can reduce the expected value of future claims, and it can make liability indemnification easier to process. The corporation can establish a set of procedures to use when considering a takeover. The insurance carrier can request a survey of directors and officers to determine what outside activities the corporation has requested them to participate in. Finally, the carrier can establish a clear procedure for the notification and handling of claims that the corporation might be responsible for.

The insurance carrier also needs to examine its expected future cash flows so that it can determine its ability to pay on claims as they arise. General economic trends such as interest rate fluctuations play a role in determining the insurance premium, even if the directors and officers underwriting business unit does not consider interest rates as part of its revenue base. Given the corporations willingness and ability to pay, and the competitiveness of the industry, the insurer may try to recover losses by raising premiums.

A large number of decisions are explicitly and implicitly made during directors and officers insurance underwriting negotiations. Insurance companies and the directors and officers they insure can negotiate the extent of directors and officers insurance coverage and the premium charged for the coverage. During negotiations the insurance company must value the policy and maintain the highest degree of customer satisfaction possible to ensure future business with the customer.

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10Tiernety, p. 65.
Directors and Officers Insurance Policy Valuation

When underwriters receive a request from a broker for officers to the insured, they begin to evaluate the riskiness of the potential policy. The evaluation procedure used depends on which underwriter is doing the evaluation. Some steps in the evaluation process are followed by almost all underwriters, but for each underwriter there are procedures followed that are idiosyncratic to that particular underwriter. The following steps, derived from notes and discussions with underwriters, present a general procedure for assessing the value of a D&O policy in negotiations:

1) Review the statutory indemnification provisions for the state in which the business is incorporated.

2) Review the indemnification obligations as established by the bylaws of the corporation and its subsidiaries.

3) Assess the riskiness of the corporation's industry in terms of potential product liability and environmental litigation.

4) Assess the possibility of a merger or hostile takeover.

5) Review the credentials and resumes of the board of directors and corporate officers including attendance to and participation in board meetings.

6) Review stock ownership and transactions of directors and officers.

7) Assess corporation's relationship with its employees.

8) Review history of claims made against directors, officers, and the corporation. Also review ongoing litigation.

9) Determine who will be covered by the insurer during the policy period. This usually includes current directors and officers and those appointed or elected during the policy period.

10) Determine when the insurance becomes effective. For example, the insurance can begin coverage after other kinds of insurance have been used outside of or within the corporation. Also, the insurance may continue to cover terminated employees after they leave the corporation (this is called a tail provision). The policy may or may not cover claim...
made for actions before the policy became effective (i.e., prior acts exclusions).

11) Determine who pays for the defense of the directors and officers.

12) Determine the settlement obligation limitations

13) Determine cancellation rights.

14) Determine what outside activities the corporation will request its employees to participate in\textsuperscript{11}.

15) Determine policy exclusions, including such things as: Active or deliberate dishonesty, Acts involving personal profit or advantage not properly obtained, Suits by a corporation against its own directors (i.e., insurer vs. insurer), Mergers and acquisitions (or hostile takeovers), Greenmail payments (payments made to people to make them stop trying to take the company over), Leveraged buy-outs, Pollution or environmental damage, Discrimination, and Security offerings.

\textsuperscript{11}\textsuperscript{11} Tierney, p. 66.
Using Computer Tools in Negotiations

Using the characterization of underwriting negotiations developed in the previous section, a set of computer tools can be developed that try to improve the effectiveness and integrative quality of the negotiations. After these tools are developed, an experiment must be conducted to test their success.

For this research, a toolkit was developed that includes five major tools: a set of decision analysis models that try to analyze specific risks associated with a policy; a preference analysis tool that analyzes the efficiency and the consistency of offers provided to the broker, a notebook database that provides information on specific negotiation issues; a set of system dynamics models to analyze policy implications of pricing decisions and cost assumptions; and an interface that integrates the functions of all the tools under one structure. A detailed description of the function of these various tools will be provided later in this section.

The challenge in creating computer tools that improve integrative negotiations is to avoid making the computer merely an advocate for one negotiating party. This can occur when the tools only provide substantive analyses of specific issues in negotiations. If the tools are too specific, not only is their use within a negotiation is limited, but their applicability to other kinds of negotiations is constrained. This makes it more difficult to draw general conclusions from research on the tool's effectiveness in negotiations.

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In effect, the limitations of the negotiations toolkit constrain the objectives of the research.

Further, the tools begin as an unconventional method of negotiating. If the tools developed are highly technical or difficult to use, then a negotiator may become even more reluctant to try to use them during a negotiation. The results of the experiment are obvious even before an experiment is attempted, since the tools cannot have an important effect on the negotiations if they are never used.

Finally, if the tools are too technical to be easily understood by the negotiators, instead of improving the effectiveness and integrative quality of the negotiations, negotiation power is simply delegated to technocratic model-builders and computer programmers. The negotiators spend their time arguing about the relative merits of each side's model instead of focusing on their parties' interests.

Several attempts have been made within the toolkit to improve the tools' effectiveness by making the tools less specific, difficult to use and technical. First, the tools' functions follow the traditional analyses and offer styles of the underwriters. Underwriters begin by analyzing the possibility for contingencies such as an initial public offer or a bankruptcy that may affect the cost of the insurance. The decision tree analysis tools in the toolkit help the negotiator analyze and quantify the costs and potential risks of these contingencies. When underwriters are ready to offer a series of quotes for the offer, the preference curve tool can help the underwriter in this analysis. The disadvantage to building tools that follow traditional negotiating styles is that it
does not create new opportunities or stimulate new ways of thinking about the negotiations process. In fact, it further entrenches and systematizes the traditional negotiations method in a framework that makes changes to the process even more difficult. The advantage of building tools in this manner is that their function will be more familiar to the negotiators and this familiarity will make them easier for the negotiators to understand and use. The trade-off between process expansion and ease of use has been made in favor of ease of use.

Another way in which the tools have been designed to be more general, easier to use and less technical is by giving control to the negotiator over the depth of the analyses. In effect, the negotiator controls how specific and technical the tools are. For example, the notebook database in the toolkit will often offer suggestions to the negotiators on related subjects that are either more specific and technical or less specific and technical that the subject they are currently viewing. The decision tree analyses tools require only limited input in the first node of the decision tree to make the trees useful in negotiations, although the negotiator can review the other branches in the tree. The farther the negotiators work their way down the tree, the more specific and technical their negotiations. The trees can be physically altered by the negotiators if they want an even more technical analysis. The system dynamics models in the toolkit provide simplified causal-loop diagrams that reduce the amount that the negotiators must understand about the models in order to use them. Yet, the negotiators have access to the full system dynamics model in STELLA® from within the toolkit. If the negotiators want, they can examine this more highly technical and difficult to use framework to produce a more specific analysis. So, although the tools can be made more
specific and technical if needed, they start by being as general as possible while still relating to directors and officers underwriting negotiations.

The tools have also been made easier to use by reducing the amount of interaction necessary to use the tools. The toolkit avoids the use of submenus in its design; all the options available to the negotiators in the use of the toolkit always appear on the screen. When possible, the negotiator is allowed to select options by using the mouse instead of the keyboard. This should reduce the amount of attention focused directly on the computer and the number of mistakes that negotiators can make while they use the toolkit. A help window is available to the negotiators that provides specific help on the tool the negotiators are using. The help window limits its information to items the negotiators can control at their current stage of analysis.

The Negotiator's Enjoyment of the Negotiations

Besides being general, easy to use and non-technical, the toolkit should be enjoyable for the negotiators to use, or at least not reduce the enjoyment the negotiators receive from participating in the negotiations. Interviews with National Union underwriters revealed that they really enjoy the negotiations process. Their enjoyment partly comes the high level of autonomy and responsibility they have over their decisions they can make during the negotiations. The underwriters are proud of their ability to analyze a company and assess its risks and potential costs to National Union.

One use of computer negotiation tools might be to automate part of the negotiation process. Although this would simplify the negotiations and possibly increase the effectiveness of the negotiator, it would reduce the feeling
of control the negotiators have over the process. The negotiator might resent this reduction in responsibility. Therefore the models and tools included in the toolkit attempt to enhance and increase the kinds of analyses the negotiators do, instead of merely automating existing analyses. In effect, instead of reducing the complexity of the negotiations, the tools are increasing their complexity. The benefit of this increased complexity is that the negotiator's ability to analyze the negotiations is enhanced and the negotiators might enjoy using the computer instead of resenting it as an intrusion in the negotiating process.

Another way that underwriters enjoy their work is by discussing their analyses and problems with other underwriters. Underwriters learn about the directors and officers insurance business by talking to more experienced underwriters and gaining their insights on real negotiations. Rather than being sequestered away doing private analyses and coming up with completely independent offers, the underwriters talk about all but the simplest aspects of their analyses with their colleagues. Not only does this encourage learning and improve the consistency of the offers (thereby improving the offers' legitimacy, robustness and efficiency) but it also makes the negotiations process fun for the underwriters. If the toolkit is not easy to use, or too technical, or too specific then this interaction would be reduced. Underwriters must be able to discuss easily the assumptions they used in the toolkit with their colleagues. Ideally, the toolkit should simplify discussion between the negotiating parties and among the members of each party. The toolkit facilitates this discussion by being easy to use, general and less technical. The negotiators should always be focused on their negotiations. The computer analyses can be helpful only insofar as the analyses enhance and facilitate
these negotiations. The computer itself cannot be useful in negotiations and should be de-emphasized as much as possible.

Requirements for Successful Tools

Samarasan notes two elements necessary in computer negotiations tools that must be present before they can be useful in improving integrative negotiations\textsuperscript{13}. First, the tools must provide some motivation to undermine the "natural distributive tendencies" of the negotiations. Second, the tools must provide a conceptual framework that focuses on possibilities for improving integrative negotiations.

An additional challenge has been imposed on the tools used in these particular negotiations. Initially, at least, the tools will only be used by only one negotiating party, namely National Union. If only one party uses the tools, it becomes more difficult to improve the integrative quality of the negotiations. The only way in which the tools may make the negotiations more effective and integrative is by making National Union's offers more effective and integrative. National Union underwriters should want to improve the integrative quality of the negotiations because integrative negotiations imply that gains are made by both negotiating parties. As long as National Union gains (or loses nothing), it should want its clients to be happier with the outcome of the negotiation.

The toolkit has attempted to improve the integrative quality of the negotiations in two ways. First, the database makes explicit suggestions for

\textsuperscript{13}Samarasan, p. 4.
improving integrative negotiations. Second, the tools implicitly encourage integrative negotiations by making it easier to understand how the negotiations could be integrative, by making it easier to create more integrative offers, and by largely ignoring distributive possibilities. The toolkit provides a conceptual framework that avoids distributive negotiations and should discourage the natural distributive tendencies of the negotiator.
The Directors and Officers Underwriting Negotiations Toolkit

The toolkit consists of five major parts: a database "notebook" to look up information on negotiation issues; a set of DATA® decision analysis models to help in the analysis of specific risks that may be associated with a policy; a preference analysis tool to analyze the efficiency and consistency of the offers provided to the broker and to help compare the relative value of quotes from different carriers; a set of STELLA® based system dynamics models to help analyzed the strategic implications of general pricing decisions, cost assumptions, and competitiveness issues; and an interface that integrates the functions of all the tools and models mentioned.

Toolkit Structure

EASI(Evaluation, Simulation and Analysis Interface)

The notebook and EASI (Evaluation, Analysis, and Simulation Interface) are linked to the decision analysis and system dynamics models, and the preference curve analysis tool. The notebook makes suggestions to the negotiator to try a preference curve analysis, decision tree model, or a system dynamics model. After the negotiators have used one of these tools, they can
return to the notebook to get suggestions for others tools that may also be helpful. In this way, EASI and the notebook integrate the functioning of the other tools.

The EASI Interface

One risk of using computer tools in negotiations is that the computer will add complexity to the negotiations process. This can occur because the computer interface is not easy for the negotiator to understand or the functioning of the tools is confusing. EASI was created to reduce some of the complexity in using computer tools during negotiations. The computer should function as an advising and analyzing tool during the negotiations. Ideally, the computer will enhance the interaction of the negotiators.

EASI is designed to provide a simple to understand link between the negotiators and the modeling tools. EASI allows the user to navigate from subjects the negotiator finds interesting or useful in its database notebook and tools that are related to a particular subject or negotiations issue. To the negotiator, EASI and the modeling tools attached to EASI appear to be one comprehensive program, though in reality the toolkit is comprised of twenty-one separate parts.
Almost all the negotiator's interaction with EASI uses the mouse. The rationale behind this is that it is less obtrusive to use one hand on a mouse during negotiations than to use a keyboard that requires the user to face the computer screen, focusing attention away from the other negotiator. A help button is always available and visible in EASI so that, if negotiators forget how the various links function, they can quickly recall the instructions on-line, rather than refer to a manual. Also, all the computer models are always available to the negotiator, though EASI will recommend specific models when the negotiator recalls specific subjects.

**The EASI Notebook**

The EASI notebook has two main functions. First, it provides useful, detailed information on specific negotiations subjects to the negotiator.
Second, it suggests models for the negotiator to use within these subjects. Suggesting models for the negotiators might encourage the negotiators to explore relevant models during the negotiations.

The EASI Notebook

The EASI notebook is a database divided into two modes: Input and Negotiate. Input mode is used by experts to prepare information for use by the negotiator before negotiations begin. Negotiate is the mode used during negotiations to obtain information on specific negotiation subjects and link to the modeling tools in the toolkit. Information in the notebook is categorized by subject and each subject is given one screen of information.

Input mode

Input mode permits negotiation experts and advisors to enter useful negotiation information and link it to specific models. The subject name and other names for that subject are entered at the top of the screen.
The Negotiation Considerations window will hold several pages of information and advice on the negotiation subject. The negotiator and the advisor can scroll through this information in this window. The advisor can enter information in bold, italics, underline or different fonts to highlight information to the negotiator.

The buttons on the left side control the subject screen. New will create a new subject screen. Delete will delete the current subject screen. Find will locate an old subject screen the user may want to modify. Link to Models lets the advisor suggest useful models to the negotiator in the Useful Models window. The Link to Models button controls the entry of suggested models so that only those models that are available can be entered and no typos are made that might cause model linking errors. Finally, the advisor can enter other topics in the Related Topics field. The user can then choose one of these topics to switch quickly to another part of the database.
The advisor and the negotiator might be the same person. As the negotiators are preparing for negotiations, they might find information that would be potentially useful to have readily available during negotiations, but is difficult to remember. The negotiation could enter the information into a subject screen to recall during the negotiations if the need arises.

One weakness of this system is that the computer does not automatically search for and enter useful models and related topics in the subject screen. This requires the advisor to have a comprehensive understanding of the EASI database and of the functioning of all the available models. EASI could be enhanced by searching for key words in the Negotiation Considerations window and guessing at possible Useful Models and Related Topics. However, for this preliminary toolkit design, this feature was not included.

**Negotiate Mode**

The negotiate mode is really the center of the toolkit. From negotiate mode, the negotiator can select any modeling tool or review a negotiations subject in only one step.
The negotiate mode has the same windows as input mode, but the user manipulates these windows differently. The negotiator can initially either search for a subject using the FIND button, or go directly to a computer model using the MODELS button. When FIND is selected, the user can enter any subject that might be in the database. EASI has a simple algorithm built into it that will find a topic even if the user makes a spelling mistake.

The negotiator also can choose any of the models listed in Useful Models or any of the topics listed in Related Topics and quickly move out of the Negotiate mode, or to a suggested topic.

**Decision Tree Models**

Most of the decisions made during underwriting negotiations are based on expectations and uncertainty. The challenge facing the parties involved in a directors and officers underwriting negotiation is deciding what outcomes
are likely to occur and what the effects of those outcomes will be on the negotiators. The negotiating parties must make decisions about the type and limit of coverage, premium, retention, etc. without advanced knowledge of what will happen. Future events will affect the outcome of the negotiators' decisions and for different outcomes, different decisions are best.

Decision tree models provide a method for analyzing other outcomes under uncertainty. Decision tree models are comprised of two components: decision nodes and event nodes. Decision nodes represent those parts of the decision process over which the negotiator has control. For example, the decision to insure a potential customer is represented in a decision tree with a decision node. Event nodes represent outcomes that have some probability of occurring, but cannot be entirely controlled by the negotiator. For example, a suit against the directors and officers of a corporation for wrongful termination of an employee is represented by an event node. Decision nodes and event nodes are linked together to form decisions trees.

Decision tree analysis requires that the outcomes of possible events be mutually exclusive and collectively exhaustive. That is, only one possible outcome may occur at a time and one of the possible events must occur. There are four predefined decision trees included with the toolkit plus a generic contingency tree. The four trees model the likely outcomes from bankruptcy, an initial public offering, a merger, and a wrongful termination suit. Because of the mutual exclusiveness requirement of decision trees, the models will tend to overestimate the costs of insurance if more than one of these four events occurs and pushes the total costs above the coverage limit.
The decision models developed for the underwriting negotiations toolkit are called canonical decision trees. Canonical decision trees model basic decision problems that negotiators often face. Below is an example of one canonical decision tree used in the toolkit. The model provides an analysis of probable events and costs given certain decisions by the negotiators. Some probabilities in this tree are determined in advance by actuaries, and some are determined during the negotiations by the underwriters.

The negotiators have explicit control over two decisions: to insure the customer and, given that they do insure, to insure for the excess or the primary coverage (see decision tree, next page). Implicit in the model are values for the premium received, the coverage limit, and the probability that the customer will go bankrupt. The negotiator can set these parameters by defining the variables in the first decision node.
Determining one's best alternative to a negotiated agreement (BATNA) is a fundamental negotiations problem. In directors and officers underwriting negotiations, underwriters must find the minimum acceptable premium for the coverage they are offering and the insured must find the maximum acceptable premium for this coverage. The range between these two values forms the zone of possible agreement (ZOPA). Decision analysis can help underwriting negotiators calculate their BATNAs and the ZOPA.

Underwriters can decide if they will insure a potential customer and, given that they do insure the customer, whether they will provide primary or excess coverage. These two decisions form the first two decision nodes in all the decision tree models in the toolkit. The decision to provide insurance and, if insurance is provided, the amount that it will cost, are based on the underwriter's assessment of the likelihood that the customer will go bankrupt. If the customer goes bankrupt, there is a higher probability that a claim will be made against the customer's directors and officers. Given that a claim has been filed, there is a chance that the claim will be settled before going to trial. Given that the suit goes to trial, there is a chance that the insured will be found liable. Finally, given that the insured is liable there is a chance that there will be insufficient assets to cover the claim. The costs incurred to the insured and National Union depend of which of these events occur. For example, there are costs to settling out of court to the insurer and the insured which are different from the costs incurred if the insured is found liable for damages. Similarly, a claim may still occur if the insured does not go bankrupt, but the probability of a claim occurring and the expected outcomes of the claim are different. The probabilities and outcomes for each event node are calculated from actuarial information on old policies.
An Example

The underwriter inputs information from the policy under consideration into the first node of the decision tree. The underwriter sets the expected primary coverage premium (PPremium), excess coverage premium (EPremium), the probability of bankruptcy (PBankrupt), the primary coverage limit (PCoverage), and the excess coverage limit (ECoverage).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Formula or Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>PPremium</td>
<td>200000</td>
</tr>
<tr>
<td>EPremium</td>
<td>120000</td>
</tr>
<tr>
<td>PBankrupt</td>
<td>0.2</td>
</tr>
<tr>
<td>PCoverage</td>
<td>5000000</td>
</tr>
<tr>
<td>ECoverage</td>
<td>5000000</td>
</tr>
</tbody>
</table>

For this example the primary premium is set to $200,000, the excess premium to $120,000, the probability of bankruptcy to 20%, the primary coverage to $5 million and the excess coverage to $5 million.
The underwriter then tells the decision modeling software, called DATA®, to roll back the tree to derive the expected values from the tree. At each decision and event node DATA® provides an estimate of the node’s expected value. For decision nodes, DATA® also provides its assessment of the optimal decision for the underwriter. DATA® crosses out suboptimal choices by marking them with two slashes.

Besides calculating an expected value of the insurance to the insured and the underwriter, the decision tree modeling software provides a sensitivity analysis of important, difficult to calculate parameters. For example, underwriters can examine the effect of an increased probability of bankruptcy on their BATNA and find a breakeven point for the policy, given a prespecified coverage limit and premium.

**Decision Tree Sensitivity Analysis**

**Sensitivity Analysis on PBankrupt**

![Graph showing the relationship between the probability of the insured going bankrupt and the value of insuring. The graph illustrates the decision to insure or not based on the probability of bankruptcy.]
The sensitivity analysis shown above examines the probability of bankruptcy between 0 and 0.5 for the premium and coverage values used above. This analysis shows that underwriters should select their BATNAs (i.e., do not provide D&O coverage) when the probability of bankruptcy is greater than 27% for these premium and coverage values. The sensitivity analysis also shows the expected value of the coverage if the probability of bankruptcy is less than 20%. For example, if the insured does not go bankrupt during the coverage period, the analysis shows that the expected profit from the coverage is $140,000.

DATA® is the decision tree modeling software used in the EASI toolkit. Each of the four predefined decision trees, bankruptcy, an initial public offering, a merger, and the wrongful termination suit, included with the toolkit plus the generic contingency tree are read into DATA® through EASI.

To summarize, the benefits of decision trees in negotiations are:

Providing a structured methodology for thinking of the various contingencies that can occur after an event (such as a bankruptcy) occurs.

Providing a rough assessment of the expected revenues and costs from the policy.

Creating a prescriptive analysis of which decision will benefit the negotiator most, given the present uncertainties.

Analyzing the breakeven points for the likelihood of specified events occurring.
Preference Curve Analysis

A negotiator can use decision trees to help estimate premiums and coverage limits, but this kind of analysis will only provide a single point estimate, and usually the negotiator would like to examine several quotes of premiums, limits and retentions. To examine a set of premiums, limits and retentions, the negotiator requires a procedure that will consistently assess the risk of a set of quotes that correspond to that negotiator's risk preferences.

The premium received by an underwriter directly corresponds to the underwriter's return on a policy. An underwriter adjusts the premium up or down depending on the coverage limit and the retention values. If a set of quotes provided to a broker and to the insured are efficient, then the underwriter will be indifferent to any of the quotes the insured decides to accept. Preference curves are formed by the series of quotes given by the underwriter.

The relationship of the premium to the coverage limit forms a monotonically increasing curve that bows toward the premium.

Preference Analysis Premium/Limit Relationship

[Diagram of relationship between premium and limit]
As the coverage limit increases, the premium will increase at a slower rate. This occurs because the risk of incurring incremental costs from claims against the insured's directors and officers is lower for incremental increases in limits.

The relationship of the premium to the retention forms a monotonically decreasing curve that bows toward the premium.

As the retention declines, the premium will increase at an increasing rate until the premium increases at the same rate that the retention declines. This occurs because the risk of incurring incremental costs from claims against the insured's directors and officers is higher for incrementally lower retention. 
Usually preference curves are created based on alternative probabilities of preferred consequences and expected values. Implementing a preference analysis of this kind is very difficult and error-prone because decision makers are required to specify their subjective value of a predefined series of alternative probabilities. This preference analysis tool uses a different approach- it tries to fit a curve to quotes that the negotiator has already generated. The tool then uses this curve to estimate a range of possible values for the premium, limit or retention.

The tool starts by analyzing existing quotes to determine if they are efficiently priced. The tool examines the quotes to see if it is possible to fit a curve that is monotonically increasing at a decreasing rate to the premium and limit relationship and if it is possible to fit a curve that is monotonically decreasing at a decreasing rate to the premium and retention relationship. It then checks for independence between the retention and the limit. The retention and limit are not independent if, for a given change in retention, the change in premium is different at different coverage limits.

If the analysis detects some inefficiency or error, it reports it in the analysis and calculation results window of the preference analysis tool. To help the negotiator better understand the relationship between the premium, limit and retention, a graphing function was included that plots out the current acceptable negotiation points. The graph will plot the retention, premium and limit on an X, Y and Z axes. The Z axis is represented by differing circle sizes. The negotiator can choose on which axis the premium, limit and retention are plotted.
If the current quotes have no inefficiencies or errors, then the negotiator can use the tool to calculate new quotes. The range of acceptable quotes depends on the feasible shape of the preference curves, based on the current quotes.

**An Example**

After an underwriter has done an analysis of the risks and potential costs associated with the insured (possibly by using decision tree analysis), the underwriter will calculate some quotes for different limit and retention levels for a particular policy. Since the underwriter does not know what premium/retention/limit combination will be ideal for the risk manager it will
be helpful to both the underwriter and the risk manager if the underwriter offers many quotes. Assume that the risk manager has asked for quotes at a $5 million coverage limit and the underwriter has already decided on four premium/retention combinations: at a $200,000 retention, the premium will be $62,500; at a $300,000 retention the premium will be $61,000; at a $500,000 retention, the premium will be $60,625; and at a $750,000 retention the premium will be $59,375. Note that as the retention increases, the premium declines because, as explained earlier, the insurer will incur lower costs at higher retentions if a claim occurs. The underwriter can now analyze this set of quotes to see if they are efficient. The preference analysis tool tries to fit a curve to the premium retention combinations and then offers advice if a curve cannot be fit. The results of this analysis for these quotes are shown below:

Preference Analysis Input Screen

<table>
<thead>
<tr>
<th>Preference Analysis</th>
<th>X Axis: Retention</th>
<th>Y Axis: Premium</th>
<th>Z Axis: Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analyze</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calculate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Graph</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Edit Quotes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Help</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Return to EASI</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Analysis and Calculation Results:
The change in the premiums from 59375 to 60625 is inconsistent with the change from 60625 to 61000 for the $5000000 limit. These values imply that smaller retentions are less risky than larger retentions.

<table>
<thead>
<tr>
<th>Premium</th>
<th>Limit</th>
<th>Retention</th>
</tr>
</thead>
<tbody>
<tr>
<td>5000000</td>
<td>750000</td>
<td>59375</td>
</tr>
<tr>
<td>5000000</td>
<td>500000</td>
<td>60625</td>
</tr>
<tr>
<td>5000000</td>
<td>500000</td>
<td>61000</td>
</tr>
<tr>
<td>5000000</td>
<td>300000</td>
<td>62500</td>
</tr>
<tr>
<td>5000000</td>
<td>200000</td>
<td></td>
</tr>
</tbody>
</table>

50
The preference analysis was unable to fit a curve to the existing quotes. Therefore, one of the quotes will need to be adjusted to be consistent with the other three. The underwriter cannot be indifferent to which quote the risk manager accepts. If the risk manager is unconcerned about retention levels and carefully analyzes these quotes, the risk manager will always choose the $61,000 premium at the $300,000 retention, since the increase in premium is not commensurate with the increased risk. The following graph displays this inconsistency.

![Inefficient Premium/Retention Combination](image)

Although the cheapest quote is $61,000/$300,000 premium/retention combination, the underwriter can change any one of three quotes to create an efficient set of prices. By changing one of these three quotes, the underwriter determines what the indifference curve looks like and what the underwriter's risk/return preferences are.
Assume that the underwriter chooses to adjust the $61,000/$300,000 premium/retention combination. The underwriter first deletes this quote from the set of existing quotes, and then selects the calculate premium option. The preference analysis tool now calculates a range of premiums that will make a quote with a $300,000 retention efficient with the other retentions.

Efficient Pricing Analysis

The results of this analysis show that for a $300,000 limit, the premium must be between $61,625 and $61,875 in order to be efficiently priced with the other quotes.

This tool can also be used by brokers or the risk managers to determine if the offers they received are efficiently priced. Brokers and risk managers
can also use this tool to compare prices among competitors. The tool helps the negotiators think about what their risk/return preferences are and how these preferences might change for different premium/retention/limit combinations.

The benefits of using preference analysis in negotiations are:

Ensuring that the quotes generated by the underwriters are efficiently priced.

Providing a simple and quick means of generating more new quotes to potential customers.

Providing a way of comparing competitor's quotes with National Union's quotes.
System Dynamics Modeling

System dynamics is another approach to modeling that uses computer simulations to evaluate policy decisions and test assumptions. The fundamental structure of system dynamics models is the feedback loop. Feedback loops are created when some action or decision influences other behavior which, in turn, influences future decisions. An example of feedback in directors and officers insurance underwriting is a decision by National Union to enter or exit a particular market segment. Its decisions not only influence the profit margin in that market segment, but also influence its competitors' decisions, which will influence its decisions in the future.

When several feedback loops are connected, a model can be created that exhibits behavior similar to that of the actual system. Often the behavior exhibited by the model is surprising or nonintuitive, providing insights that are not easily discovered when using other forms of policy analysis. After a system has been modeled and studied, different policy decisions can be easily tested on the model to learn about the effects of those decisions on the system.

System dynamics models provide no prescriptive suggestions for improving decision making. Instead, the models describe the effects of decisions on some aspect of the business environment. Therefore system dynamics models are especially effective in testing negotiations and business strategies and explaining the outcomes of these strategies. The negotiator can examine different scenarios and use the output to help make decisions about what strategy will work best in a particular market segment.
System dynamics theory states that behavior is caused by structure. The structure of systems can be separated into three parts: the physical structure, the organizational structure and the decision-making structure.\(^\text{14}\) Although the physical and organizational structures may be more or less permanent, the decision-making structure can be changed as quickly as decision makers are willing to change their minds. Therefore, the most useful model parameters to decision-makers are those that can be changed by them. The models used in the underwriter's toolkit use simplified causal-loop diagrams that highlight the decision-making structure within the models. If the models are to be used in negotiations, the way they function and their purpose must be obvious. Although decision-makers can view and change the models in STELLA®, for the most part they will probably focus on using only the simplified Hypercard® diagrams.

Not only do the models used have a simplified interface, but the models themselves have been disaggregated and simplified. Originally, a system dynamics model of the directors and officers insurance industry was produced that incorporated many more causal effects. Traditionally, instead of disaggregating, system dynamics models have attempted to integrate all relevant functional areas in the physical, organizational and cognitive environments.\(^\text{15}\) Models of this type are capable of simulating complex causal relationships which are otherwise difficult to understand.


However, because the models are to be used in negotiations, their legitimacy to all negotiating parties must be accepted. Unfortunately, because of time constraints in the negotiation, the modeler will not have the advantage of building the model with the negotiators to help establish legitimacy of the simulation results. Therefore, for this application, the models have been simplified to the point where only one causal relationship is used. The advantage of using such a simple model is that it is far easier and faster to comprehend this simple system than it would be for a full-blown model. The negotiators can understand the effects of changes in their decision-making on a portion of the environment after running only a few scenarios. The negotiators should then feel more comfortable modifying their decision-making based on these simple models. Since the models are used to test hypothetical scenarios instead of actual historical events, the results of a more complete model would still only be very approximate. There is trade-off between legitimacy and potentially improved accuracy. Incremental improvements in accuracy have been traded for what is hopefully a much higher probability that the models will be considered fair and legitimate.

**Business Cycles**

The Business Cycles model is a system dynamics simulation of changes in premiums, competitive pressure and profitability over a ten year period. The actual model was created using STELLA® simulation software, and was then converted to STELLA® Stacks for use in Hypercard®. The business cycles model uses a Hypercard® interface that gives the negotiator access to key decision variables while ignoring unimportant variables that are required by STELLA®. The negotiator is required to enter expected policy costs over a ten year period, the expected normal profit margin, the time it takes
competitors to enter and exit the market, and the competitors' average expected profit margin.

This model shows that changes in the speed at which competitors can enter and exit the market, the difference in premium charged, and changes in policy costs can affect business cycles and profitability. Business cycles are caused by changes in expected costs and profitability that affect competitive pressure. As competitive pressure increases, premiums and real profits decline which eventually reduces competitive pressure. The length of the business cycles depends on the time it takes competitors to enter a market segment, and the changes in expected claims costs over time. The relative
expected profit margins of National Union and its competitors affect their behavior as actual profit margins change.

**Details on business cycles modeling parameters**

The simulation time horizon for the business cycles model was set to ten years. A time horizon of ten years was used because industry cycles for the directors and officers insurance industry usually take between five and ten years. The time horizon had to be long enough to show the effects of the underwriters and insured's reactions to exogenous changes in the environment.

The time step used in the simulations was one-eighth a year or six weeks. This restricted the minimum time for competitors to enter and exit the market to three months (2 x 6 weeks = 12 weeks = 3 months). The Hypercard® interface restricted users from entering a number less than three months for the time to enter or exit the market. The trade-off in using a smaller time step was simulation time.

The system dynamics models were designed with iterative analyses in mind. That is, the negotiator would test several different scenarios during one set of negotiations to help determine which set of decisions created the most favorable result. With a time step of one-eighth a year, the simulation took a over a minute on slower, low-end Macintosh SE computers. If the time step were reduced to one-sixteenth, the simulation would have taken well over two minutes, which was unacceptably slow for iterative analyses taking place during live negotiations.
The focus of the Business Cycles model is on National Union's premium. National Union's premiums is determined by its managers' Desired Profit Margin and the Forecasted Policy Costs (Forecasted Policy Costs x (1 + Desired Profit Margin) = Premium). The managers' Desired Profit Margin is based on National Union's Normal Profit Margin and altered by managers' perception of competitive pressure. If managers' perception of competitive pressure is higher, then managers' desired profit margin is lower than normal. If managers' perception of competitive pressure is low, then managers' desired profit margin is higher than normal. When managers perceive competitive pressure to be normal, then National Union's Desired Profit Margin equal its Normal Profit Margin. I assumed that managers could perceive most of the change in competitive pressure three months after a change occurred (i.e., perceived competitive pressure is a first-order smoothed function of actual competitive pressure).

Competitive Pressure is determined by Competitors' Normal Profit Margin and the Competitors' Assessment of the Business Segment Profit Margin. If competitors' assessment of the segment's profit is higher than their average Normal Profit Margin, then competitive pressure will be increased. If the competitors' assessed profitability for the segment is lower than competitor's normal profit margin, then competitors will reduce their investment in that market segment, and competitive pressure will decline. The time it takes competitors to enter or exit the market segment after they realize they want to is determined by the negotiator.
The actual change in competitive pressure is a third-order smoothed function of the desired change in competitive pressure. For example, if the negotiator enters six months as the time to enter or exit the market, then most of the competitors will begin trying to increase their market share after six months, though some will begin immediately. More than 95% of the competitors will have entered the market after eighteen months, if the attractiveness of the market segment is sustained that long.

Competitor's Assessment of the Business Cycle Profit Margin is based
on Total Policy Costs and Competitors' Perception of National Unions

Premium (Competitors' Assessment of Business Segment Profit Margin = Perceived of National Union's Premium - Expected Total Policy Costs per Policy). This perception of National Union's policy costs is based on National Union's actual premium. I assumed that most of the information of changes in National Union's Premium would take roughly six months to leak to competitors (i.e., Competitors' perception of NU's premium is a first-order smooth of NU's actual premium).

Besides being affected by desired profits, National Union's premium is also affected by forecasted policy costs. Forecasted policy costs are based on smoothed trends historical policy costs extrapolated one year into the future.\textsuperscript{16} Total policy costs are the sum of expected policy costs plus overhead.

Cumulative profit is calculated by subtracting total revenue per policy from total expected policy costs per policy. Total revenue per policy is equal to National Union's premium per policy.

As illustrated above, the linkages from National Union's Premium to Competitors' Perception of National Union Premium to their assessment of the segment's profit margin to changes in competitive pressure to National Union's Perception of changes in competitive pressure to changes in National Union's desired profit margin, returning again to National Union's premium, is a negative feedback loop. Negative feedback loops with delays tend to exhibit

\textsuperscript{16}The model structure and formulae used to trend historical policy costs were modified from a generic trend forecasting model developed by Professor John Sterman of the MIT Sloan School of Management, John D. Sterman, 1990.
oscillating behavior. A increase in National Union's premium will eventually increase competitive pressure which will eventually force National Union's premium lower. How fast these changes occur and how strong these effects are are largely determined by the time it takes competitors to enter or leave the market segment, the changes in expected costs over time, and the relative difference in National Union's expected normal profit margin and its competitors' average expected normal profit margin.

An Example

A manager may feel that there is some chance that many businesses in a particular market segment will go bankrupt in the next few years, increasing the number of claims against the directors and officers of these businesses. The manager can examine the general effect of this increase in costs on the business cycle and profitability by plotting the increase in costs over time.

![Expected Cost per Policy (in $1,000s)](image)

Next the manager determines the time it takes competitors to enter and exit
the market and the average expected profit margins for National Union and its competitors. Assume for this example that it takes competitors six months to exit or enter the market and that National Union's expected profit margin is 5% higher than its competitors.

The model shows that National Union could expect below normal profitability while costs increased followed by above normal profitability as the competition exited the market, followed again by slightly below normal profitability as the competition responded to National Union's improved performance. The business cycles in this scenario last roughly three years from peak to peak.
The model also shows that forecasted costs tended to be higher than actual costs for most of the simulated period. This is because, as costs increase, the managers have expectations of costs increasing further, and it takes time to gather data on actual costs that determine the next periods forecasted costs. In this scenario, this delay has a positive influence on National Union's profitability since underwriters are unwilling to price below forecasted cost estimates.

This model could also be tested under other scenarios. For example, managers could examine the effect of National Union pricing at or below the competitive profit margin.
Distributed Lag Model

The distributed lag model examines the effect of the five-year claims cost tail on outstanding claims and expenses. The model accepts ten year estimations of premium increases, expected costs and number of policies written. The negotiator also can adjust the shape and length of the cost lag.

![Distributed Lag Model - Input Screen](image)

The premium multiplied by the number of policies written determines the revenue flow which affects cumulative profit. Meanwhile, the number of policies written times the expected costs determines the outstanding claims, which become actual claims according the cost tail on the policies. These actual claims become expenses that reduce cumulative profit over time. The underwriter can use this model to understand better the effect of the cost lag on expenses and outstanding claims over time and as a demonstration tool to help National Union's customers better understand directors and officers insurance.
The simulation time horizon for the distributed lag model was set to ten years. A time horizon of ten years was used because the tail for claims costs lags approximately five years behind the policy coverage. The time horizon had to be long enough to show the effects of changes in premiums and expected costs over time. The time step used in the distributed lag model was one-eighth a year or six weeks. No model parameters were affected by the length of the time step and a six week time step provided acceptably smooth and accurate output in a reasonable amount of time. The expected policy costs, the expected premiums and the number of policies written per year for the ten year simulation period are all exogenously determined.

An Example

Suppose a manager expected costs to increase over time and planned to increase premiums to maintain roughly the same profit margin over time for a particular market segment. Further, the underwriter expected the number of policies written to increase for four years and then begin to decline again, eventually returning to their current number per year. The following graphs illustrate possible inputs for this scenario:
The underwriter has determined that these claims have a five year tail and claims costs peak around the third year after the coverage period.
The underwriter can then simulate these assumptions and graph the number of policies written, costs and outstanding claims over time.

Graph of Policies, Costs, and Claims (in millions)

Note that although expected costs peaked in the fourth year, outstanding claims peaked after the sixth year.
Also, although the policies written have been consistently profitable during the entire ten year period, expenses are higher than revenue for most of the last three years.

*System dynamics and underwriting negotiations*

As illustrated in these two models, system dynamics can only describe the effects of decisions on some aspect of the business environment. System dynamics models are effective in testing negotiations and business strategies and explaining the outcomes of these strategies. Negotiators can examine different scenarios and use the output to help make decisions about what strategy will work best in a particular market segment.
The benefits of using system dynamics models in negotiations are:

Examining strategic assumptions and describing alternatives that are potentially more beneficial to the negotiator.

Providing an explanation of National Union's costs and revenues that can help legitimize changes in costs to its customers.

Improving the legitimacy and robustness of current negotiation decisions by examining how present decisions might affect future negotiations.

Helping to explain underwriting and directors and officers insurance concepts to colleagues and customers.

The Underwriting Negotiations Toolkit

The toolkit has several parts that are integrated under the EASI interface. EASI has been designed to provide a simple to understand link between the negotiators and the modeling tools. The tools provide various means of analyzing and evaluating different aspects of underwriting negotiations. The purpose of using computer tools in negotiations is to improve the effectiveness and integrative quality of these negotiations.

Negotiation effectiveness can be separated into three parts: efficiency, legitimacy and robustness. The underwriting toolkit could potentially improve efficiency by making it possible to calculate more quotes more accurately for individual policies. Legitimacy is potentially improved by providing an understandable structure to the underwriting process that could be communicated to the insured. Robustness is improved by examining the effects of decisions over time and how present decisions might affect future negotiations.
Evaluating the Effect of Computer Tools on Negotiations

The central objective of this research is to discover what effect the computer tools have on improving integrative negotiations. The tools may improve, impair or have no effect on the integrative quality of the negotiations. In addition, their impact on the effectiveness of the negotiations can be measured in terms of improving the efficiency, legitimacy and the feasibility or robustness of the negotiations. Data must be collected that can directly or indirectly measure if the tools have improved integrative negotiations and how the tools have affected the efficiency, legitimacy and robustness of the negotiations process and outcome.

The biggest challenge in measuring the effect of the tools on the research objective is resource limitations. Traditionally, the brokers, underwriters and risk managers do not come together to negotiate in one place. The negotiations take place over time and the most extensive contact the negotiating parties have is over the phone and through correspondence, all of which is delivered via the broker. This makes it considerably more difficult to introduce the computer as a tool to be used as a third- (or fourth-) party during the negotiations. Instead of participating with the computer tools available jointly, each party and the brokers must do their analyses individually and hence there is no opportunity to create a joint model that incorporates the needs and perspectives of all the negotiating parties.

17The term resource limitations and many of the ideas about research objectives, experiment design, characterization and questionnaire format included in this paper were developed from research group memos and discussions with Paul Cort, a research assistant for the Project on Modeling for Negotiation Management at MIT.
Ideally, the computer tools could influence the way in which negotiations occur, bringing the parties together and changing the format and method of the negotiations, but this would require a substantial organizational change for all parties involved in the negotiation. A first, but by no means sufficient, requirement for this kind of organizational change to occur is that the tools be seen as useful and legitimate by all the negotiating parties in advance. As a first step to establishing the tools' usefulness and legitimacy, an exercise was developed to test the tools in analyzing and creating offers from the underwriters to the risk managers.

Even given this very limited scope for the evaluation, there were additional constraints that have made evaluating the tools impossible for now. The problem is that managers only have an interest in testing tools they think will be useful in advance of the testing. Their academic interests in exploring the tools' effects are essentially nonexistent; they only want to use tools that they think will be help them be better negotiators. While this is certainly rational behavior for managers who are trying to improve their business, it limits and potentially biases the research results. Under these circumstances, it is very difficult to run controlled experiments. Since the managers feel that they know in advance that the tools will be useful, they want to introduce the tools immediately to everyone who the tools may be able to help, instead of testing the results against a portion of the entire group.

Although questionnaires and a small experiment were prepared to test the effectiveness of the tools for creating offers to the risk managers, no useful data were obtained from an exercise session in which underwriters and managers evaluated a simulated case. At the time, the managers were only
interested in learning more about what the tools did and how they might be useful. Moreover, the managers were reluctant to provide information in the questionnaire on their negotiation behavior since this information did not benefit them directly. All the information collected on the underwriters' negotiation behavior was collected from interviews while the tools were under development.

As an alternative to running an experiment with a control and experimental group, historical data could be compared with present negotiations that incorporate the use of computer tools. Essentially, the historical data becomes the control group and the present data is the experiment. Although this kind of experimental design is easy to perform, it has some limitations. The most obvious limitation is that comparisons can only be made on data that happened to be collected by the carrier. National Union does keep detailed quantitative records of all past directors and officers insurance negotiations, but not much qualitative information is available. For instance, it would be impossible to determine directly if the style of a particular negotiator was more adversarial or collaborative in past negotiations.

However, some potentially interesting results could be gathered from this kind of experimental design. The standard deviation of the premium among similar insureds might be higher or lower when using computer tools than without. This information would indicate something about the consistency of the negotiations which would further imply something about the legitimacy of the negotiations (i.e., more consistent premiums across insureds might indicate that the negotiations are somehow more fair to the insureds, increasing the legitimacy of the negotiations).
More or fewer quotes might be offered by the underwriters when using computer negotiation tools. This might indicate something about the integrative quality of the negotiations. Presumably more quotes leaves more options to the insureds and they would be able to more closely approximate their ideal policy agreement.

The length of time the negotiations took in computer assisted negotiations versus historical negotiations would convey some information about the efficiency of the negotiations. If computer negotiations took a significantly longer amount to reach an agreement then computer negotiations may be considered less efficient with respect to time.

Finally, in the longer term, current negotiations using computer tools could be compared with historical negotiations to indicate something about the robustness of the negotiations. The frequency of insurance cancellations could be compared across the two groups. Also the frequency of repeat agreements could be measured. Fewer insurance cancellation and more repeat agreements would indicate that one set of negotiations were more robust than the other.

Ideally, though an experiment could be conducted that would involve a control and an experimental group. This would allow the researcher to gather more qualitative information about the negotiations. The kinds of qualitative questions a researcher might ask are included in the questionnaire which comprise one of the appendices to this paper.
Part A of the questionnaire is designed to be used with real or simulated underwriting offers before the underwriter begins using the computer tools. The questions attempt to define the negotiator's style in terms of the underwriter's risk aversion, competitive nature, adversarial qualities, willingness to share information, effectiveness, and familiarity with computers and specific computer tools. This information could be correlated to the results of the negotiations to indicate something about the relationship between negotiating style and the effectiveness of computer tools in negotiations.

Part B of the questionnaire is designed to be used after a real or simulated underwriting offer has been made. The answers to these questions will be especially helpful in finding ways to improve both the computer tools and future simulation exercises. Also part B is useful in directly and immediately ascertaining the negotiator's opinion about specific computer tools and their use in the negotiations process. For example, part B of the questionnaire asks the negotiators to elaborate in detail about their use of all the various tools and models in the toolkit, how the computers affected the negotiators' ability to communicate with colleagues, the negotiators' opinions on the influence of the computer tools on their effectiveness as negotiators. Part B of the questionnaire also reevaluates the negotiating style of the underwriters, to see if anything was influenced by either the simulation exercise or the use of the computer tools in the offer analyses.

Controlled experiments using simulation exercises are especially helpful in assessing the effect of computer tools on the integrative quality and effectiveness of the negotiations. Direct comparisons can be made between the
two groups in terms of perceived and actual changes in the integrative quality and effectiveness with fewer distortions due to exogenous influences on the negotiations.

In all of these experiments, whenever possible, the questions asked by the researchers should be worded consistently with past negotiation experiments and evaluations. This will improve the possibility that result can be compared across different types of negotiations and among similar negotiations over time.

Conclusion

This thesis has sought to explore how computer tools could be made to assist with and potentially improve the quality of negotiations. In order to make tools useful for a negotiations process as complex as D&O underwriting, an understanding of the insurance industry and of the traditional negotiations process must be gained.

A variety of computer tools have some potential for improving underwriting negotiations. The toolkit developed for these negotiations included four completely different kinds of tools all integrated under one interface. These tools have been explained to managers and underwriters at National Union and, for some of the tools at least, these negotiators feel that the tools could improve their negotiations.

The next step in this research will be to carefully examine the tools' effectiveness and their ability to improve integrative quality in real and simulated underwriting negotiations. There may be some difficulties in
examining these tools but, with the cooperation of the negotiating parties, it should be possible to learn much about the use of these tools in underwriting negotiations as well as the function of computer tools in the negotiations process.
Selected Bibliography


Appendix A - Negotiations Questionnaire

Project on Modeling for Negotiation Management

Massachusetts Institute of Technology, Cambridge, Massachusetts 02139

D&O Underwriting Negotiations Toolkit

Negotiation Questionnaire

Part A

Please answer these questions before you have read any of the Chromochemical Corporation case material. If you don't know the answer to a question or think that it is inapplicable, just ignore it.
Director and Officer Underwriting Insurance Negotiations Questionnaire  

Part A: General Information

Please answer these questions before you have read any of the Chromochemical Corporation case material. If you don’t know the answer to a question or think that it is inapplicable, just ignore it.

1. How much do you enjoy negotiation?
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<th>10</th>
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2. Which negotiation style is usually more effective for you, an adversarial or a collaborative one?
   | Purely adversarial | Mixed | Purely collaborative |
   | 5 4 3 2 1 0 1 2 3 4 5 |

3. Would you call yourself a good listener?
   | No | Sometimes | Yes |
   | 5 4 3 2 1 0 1 2 3 4 5 |

4. Are you more competitive or cooperative by nature?
   | Purely competitive | Mixed | Purely cooperative |
   | 5 4 3 2 1 0 1 2 3 4 5 |
5. Please use this space to describe your negotiation style in more detail:


6. To what extent do you see the ability to negotiate well as being an uncommon skill rather than a general ability that is common to most people?

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7. How important is it to you that agreements you reach are accepted by those on whose behalf you are negotiating?

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8. Some negotiated agreements fall apart because “things change,” leading one or more parties to ask for a new agreement. How important is it to you that agreements you reach not fall apart in this way?

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9. In general, how important is it to you that negotiation lead to agreement?

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10. In general, how important is it to you that all interested parties be given an equal voice?

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11. In negotiating an agreement, how important is it that you maximize the benefits that your side will receive?

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12. How important is it to you that agreements you reach take the concerns of all parties into account?

$$\begin{array}{ccccccccccc}
\text{Not important} & 0 & 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 \\
\text{Critical} & & & & & & & & & & & \\
\end{array}$$

13. In negotiating an agreement, how important is it that you maximize the benefits your side will receive at the expense of other parties?

$$\begin{array}{ccccccccccc}
\text{Not important} & 0 & 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 \\
\text{Critical} & & & & & & & & & & & \\
\end{array}$$

14. How important is it to you that all parties feel that their basic rights are respected over the course of negotiation?

$$\begin{array}{ccccccccccc}
\text{Not important} & 0 & 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 \\
\text{Critical} & & & & & & & & & & & \\
\end{array}$$

15. How important is it to you that all parties feel a sense of ownership over the process and outcome of negotiation?

$$\begin{array}{ccccccccccc}
\text{Not important} & 0 & 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 \\
\text{Critical} & & & & & & & & & & & \\
\end{array}$$

16. In negotiating an agreement, how important is it that you not give up individual benefits to increase joint benefits?

$$\begin{array}{ccccccccccc}
\text{Not important} & 0 & 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 \\
\text{Critical} & & & & & & & & & & & \\
\end{array}$$
17. In negotiating an agreement, how important is it that parties share information about their underlying interests?

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18. How important is it to you that negotiation take as little time and effort as possible?

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19. To what extent can parties increase the potential benefit of negotiation by sharing more information?

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20. How important is it to you that negotiating parties introduce as many issues as possible into discussion so as to increase the potential benefits of negotiation?

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21. How would you rate your own effectiveness as a negotiator?

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<th>Effective</th>
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22. How frequently do you use personal computers?

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23. How frequently do you use Apple® Macintosh® personal computers?

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24. How familiar are you with EASI?

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25. How familiar are you with STELLA™?

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26. How familiar are you with DATA™?

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<th>Not at all familiar</th>
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27. How familiar are you with the Preference Curve Analysis software?

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28. Please describe any analytical methods or computer programs that you have used in negotiation:

________________________________________________________________________
________________________________________________________________________
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29. What effect do you think the use of computer tools might have on negotiation?
   A  No effect whatsoever
   B  Very negative effect
   C  Somewhat negative effect
   D  Mixed negative and positive effect
   E  Somewhat positive effect
   F  Very positive effect

30. How familiar are you with *system dynamics modeling*?

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31. How familiar are you with *decision tree analysis*?

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<tr>
<td>0       1       2</td>
<td>3  4  5  6   7 8  9  10</td>
</tr>
</tbody>
</table>

32. How familiar are you with *preference curve analysis*?

<table>
<thead>
<tr>
<th>Not at all familiar</th>
<th>Very familiar</th>
</tr>
</thead>
<tbody>
<tr>
<td>0       1       2</td>
<td>3  4  5  6   7 8  9  10</td>
</tr>
</tbody>
</table>

33. How much time have you spent filling out this questionnaire?
Part B

Please answer these questions after you have finished the Chromochemical Corporation case material. If you don't know the answer to a question or think that it is inapplicable, just ignore it. This part of the questionnaire will be collected from you at the end of the exercise.
Chromochemical Corporation Negotiation Questionnaire

Part B: After the Chromochemical Corporation analysis

Please fill out the following questionnaire after you have completed the Chromochemical corporation exercise. If you don’t know the answer to a question or think that it is inapplicable, just ignore it.

1. How helpful were the instructions on using the computer toolkit in completing the exercise?
   - Not at all
   - Somewhat
   - Very helpful
   - Ratings: 0 1 2 3 4 5 6 7 8 9 10

2. How well do you think you understood how the tools in the toolkit could be used in underwriting negotiations?
   - Not at all
   - Somewhat
   - Completely understood
   - Ratings: 0 1 2 3 4 5 6 7 8 9 10

3. How much did you enjoy the exercise?
   - Not at all
   - Somewhat
   - A great deal
   - Ratings: 0 1 2 3 4 5 6 7 8 9 10

4. How would rate the complexity of the simulation relative to actual underwriting negotiations?
   - Much simpler
   - About the same
   - Much more complex
   - Ratings: 5 4 3 2 1 0 1 2 3 4 5
5. How much information, relative to an actual underwriting negotiation, was provided?
   Much less  About the same  Much more
   5  4  3  2  1  0  1  2  3  4  5

6. Please describe what you did during the first ten minutes of the exercise:
   ____________________________________________
   ____________________________________________
   ____________________________________________
   ____________________________________________
   ____________________________________________
   ____________________________________________
   ____________________________________________
   ____________________________________________

7. How useful would additional training be prior to using the tools in actual negotiations?
   Not at all  Somewhat  A great deal
   0  1  2  3  4  5  6  7  8  9  10

8. Please describe what you did during the last ten minutes of the exercise:
   ____________________________________________
   ____________________________________________
   ____________________________________________
   ____________________________________________
   ____________________________________________
   ____________________________________________
   ____________________________________________
   ____________________________________________

9. Please use this space to describe your main objectives in this exercise. What was your general strategy?
   ____________________________________________
   ____________________________________________
   ____________________________________________
   ____________________________________________
   ____________________________________________
   ____________________________________________
   ____________________________________________
   ____________________________________________

90
10. What was the most critical negotiations problem in the exercise?

11. Was the negotiation style that you used more collaborative or adversarial than the style you normally use?

<table>
<thead>
<tr>
<th>More adversarial</th>
<th>About the same</th>
<th>More collaborative</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 4 3 2 1 0 1 2 3 4 5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

12. To what extent was the negotiating style that you used an unusual one for you?

<table>
<thead>
<tr>
<th>Not unusual</th>
<th>Somewhat unusual</th>
<th>Very unusual</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

13. To what extent did the computer tools help you create more negotiation options?

<table>
<thead>
<tr>
<th>Not at all</th>
<th>Somewhat</th>
<th>A lot</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

14. Did you use the computer tools primarily to provide new analyses or to justify your decisions?

<table>
<thead>
<tr>
<th>Mostly provide new analyses</th>
<th>Both</th>
<th>Mostly justify decisions</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 4 3 2 1 0 1 2 3 4 5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

15. How much more do you feel the insured gained than it normally would in past negotiations?

<table>
<thead>
<tr>
<th>Nothing</th>
<th>A little</th>
<th>A lot</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

16. Would you characterize the exercise as more "confrontational" or "conciliatory"?

<table>
<thead>
<tr>
<th>More confrontational</th>
<th>More conciliatory</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 4 3 2 1 0 1 2 3 4 5</td>
<td></td>
</tr>
</tbody>
</table>
17. Would you characterize the exercise as more “irritating” or “challenging”?  

<table>
<thead>
<tr>
<th>More irritating</th>
<th>More challenging</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 4 3 2 1 0 1 2 3 4 5</td>
<td></td>
</tr>
</tbody>
</table>

18. Would you characterize the exercise as more “stressful” or “enjoyable”?  

<table>
<thead>
<tr>
<th>More stressful</th>
<th>More enjoyable</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 4 3 2 1 0 1 2 3 4 5</td>
<td></td>
</tr>
</tbody>
</table>

19. How difficult was the EASI interface to use?  

<table>
<thead>
<tr>
<th>Simple</th>
<th>Somewhat difficult</th>
<th>Very difficult</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

20. How much control did you feel you had over the analyses relative to past negotiations?  

<table>
<thead>
<tr>
<th>Considerably less</th>
<th>Roughly the same</th>
<th>Considerably more</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 4 3 2 1 0 1 2 3 4 5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

21. How confident were you in the results of the analyses provided by the toolkit?  

<table>
<thead>
<tr>
<th>Not at all</th>
<th>Somewhat</th>
<th>Very confident</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

22. How satisfied are you with the outcome of the analysis?  

<table>
<thead>
<tr>
<th>Dissatisfied</th>
<th>Same as usual</th>
<th>Very satisfied</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 4 3 2 1 0 1 2 3 4 5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

23. To which group did the toolkit provide more advantage?  

<table>
<thead>
<tr>
<th>National Union</th>
<th>Equal advantage</th>
<th>Insured</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 4 3 2 1 0 1 2 3 4 5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
24. In the first column below, please list the issues that you examined. In the second column, indicate whether you expected beforehand that the issue would come up. In the third column, indicate the importance of each issue on the negotiation using the following scale. Finally, in the fourth column, if you used a computer tool for the issue, indicate which computer tool you used (decision tree, preference analysis, system dynamics, notebook).

<table>
<thead>
<tr>
<th>Issue</th>
<th>Expected?</th>
<th>Importance</th>
<th>Computer Tool</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Yes___No</td>
<td>___</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Yes___No</td>
<td>___</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Yes___No</td>
<td>___</td>
<td></td>
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<tr>
<td>4.</td>
<td>Yes___No</td>
<td>___</td>
<td></td>
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<tr>
<td>5.</td>
<td>Yes___No</td>
<td>___</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Yes___No</td>
<td>___</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Yes___No</td>
<td>___</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Yes___No</td>
<td>___</td>
<td></td>
</tr>
</tbody>
</table>
25. How realistic was the simulation exercise?

<table>
<thead>
<tr>
<th>Unrealistic</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
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</table>

IF YOU OFFERED QUOTES TO THE INSURED’S BROKER, ANSWER QUESTIONS 26-33 AND THEN SKIP TO QUESTION 34.
IF YOU DID NOT OFFER QUOTES TO THE INSURED’S BROKER, SKIP QUESTIONS 26-33.

26. Please describe your offer to the insured:

<p>| | | | | | | | | | | | |</p>
<table>
<thead>
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</tbody>
</table>

27. How likely do you think it is that the insured would accept your offer?

<table>
<thead>
<tr>
<th>Not likely</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
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<td></td>
</tr>
</tbody>
</table>
28. How advantageous is your offer over the insured's previous insurance?

<table>
<thead>
<tr>
<th>No advantages</th>
<th>Very advantageous</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
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<tr>
<td>4</td>
<td>5</td>
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<td>6</td>
<td>7</td>
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<td>8</td>
<td>9</td>
</tr>
<tr>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

29. How likely is it that your offer would be considered acceptable by your colleagues at National Union?

<table>
<thead>
<tr>
<th>Not likely</th>
<th>Very likely</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
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<tr>
<td>6</td>
<td>7</td>
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<tr>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

30. Some negotiated agreements fall apart because "things change," leading one or more parties to ask for a new agreement. How likely is it that, if your offer is accepted by the insured, the agreement will fall apart in this way?

<table>
<thead>
<tr>
<th>Not likely</th>
<th>Very likely</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

31. Does it appear likely that your offer takes the concerns of all parties into account?

<table>
<thead>
<tr>
<th>Not likely</th>
<th>Very likely</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
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<tr>
<td>6</td>
<td>7</td>
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<tr>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

32. Does it appear likely that your offer allocates as much of the potential benefits of negotiation as possible, leaving as little as possible on the negotiating table?

<table>
<thead>
<tr>
<th>Not likely</th>
<th>Very likely</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
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<td>6</td>
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<td>8</td>
<td>9</td>
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<tr>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

33. How could either side scuttle a potential agreement if it became expedient to do so?
34. Does it appear likely that the analyses took much more time and effort than strictly necessary?

Not likely | Very likely
---|---
0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10

35. Does it appear likely that the analyses saved you time, effort, and money, as compared to the usual methods of analyses?

Not likely | Very likely
---|---
0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10

36. Please use this scale to answer the following questions about the process and outcome of this evaluation exercise:

Not at all | Somewhat | Very
---|---|---
0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10

Is the offer satisfactory? [ ]
Is the offer surprising? [ ]
Is the offer fair? [ ]
Is the offer efficient? [ ]
Is the offer feasible? [ ]
Was the analysis process satisfactory? [ ]
Was the analysis process surprising? [ ]
Was the analysis process fair? [ ]
Was the analysis process efficient? [ ]
Was the analysis process feasible? [ ]
37. To what extent do you feel you controlled the analyses you performed?

<table>
<thead>
<tr>
<th>Not at all</th>
<th>Very much so</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
<td></td>
</tr>
</tbody>
</table>

38. To what extent do you feel a sense of ownership over the process and outcome of the analyses?

<table>
<thead>
<tr>
<th>Not at all</th>
<th>Very much so</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
<td></td>
</tr>
</tbody>
</table>

39. How would you rate your own effectiveness in this exercise?

<table>
<thead>
<tr>
<th>Ineffective</th>
<th>Effective</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 4 3 2 1 0 1 2 3 4 5</td>
<td></td>
</tr>
</tbody>
</table>

40. If you could do the exercise over again, what would you do differently?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

41. What effect do you think the use of computer tools might have had on this particular analysis?

- A  No effect whatsoever
- B  Very negative effect
- C  Somewhat negative effect
- D  Mixed negative and positive effect
- E  Somewhat positive effect
- F  Very positive effect
42. A number of specific computer tools are listed in the first column below. For each tool, indicate in the second column how extensively you used it, according to the following scale. Please elaborate on your use or non-use in the third column.

<table>
<thead>
<tr>
<th>Tool</th>
<th>Not at all</th>
<th>Used</th>
<th>Elaboration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Notebook</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cycles</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Model</td>
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<td></td>
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<tr>
<td>Distributed</td>
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<td></td>
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<tr>
<td>Lag</td>
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<td></td>
<td></td>
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<tr>
<td>DATA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decision Tree</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Models</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Preference</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Curve Analysis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tool</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


43. What other tools did you use besides those provided on the computer? Please elaborate.

44. Would you be willing to show your analysis to the insured?

<table>
<thead>
<tr>
<th>Absolutely not</th>
<th>Definitely</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1 2 3 4 5 6 7 8 9 10</td>
</tr>
</tbody>
</table>

45. How did the presence of the computer affect the human element of your analysis?

46. How did the presence of the computer affect your ability to communicate to your colleagues?

<table>
<thead>
<tr>
<th>Hurt</th>
<th>No effect</th>
<th>Helped</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 4 3 2 1 0 1 2 3 4 5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
47. Did the presence of the computer decrease or increase your effectiveness as a negotiator?

<table>
<thead>
<tr>
<th>Decreased effectiveness</th>
<th>No change</th>
<th>Increased effectiveness</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>4</td>
<td>3</td>
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<tr>
<td>2</td>
<td>1</td>
<td>0</td>
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<td>1</td>
<td>2</td>
<td>3</td>
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<tr>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

48. Over the course of the analysis, to what extent did you develop an understanding of the insured's interests?

<table>
<thead>
<tr>
<th>Not at all</th>
<th>Very much so</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
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<tr>
<td>1</td>
<td>2</td>
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<td>9</td>
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<td>9</td>
<td>10</td>
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</table>

49. To what extent did you take the insured's interests and opinions into account when you suggested proposals and offers?

<table>
<thead>
<tr>
<th>Not at all</th>
<th>Very much so</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
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<td>1</td>
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<td>10</td>
</tr>
</tbody>
</table>

50. How well did you understand the terms of the insured's requests?

<table>
<thead>
<tr>
<th>Did not understand at all</th>
<th>Understood very well</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
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<tr>
<td>1</td>
<td>2</td>
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<td>8</td>
<td>9</td>
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<tr>
<td>9</td>
<td>10</td>
</tr>
</tbody>
</table>

51. How well did you understand the potential benefits and disadvantages of accepting the insured's requests?

<table>
<thead>
<tr>
<th>Did not understand at all</th>
<th>Understood very well</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
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<tr>
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<td>3</td>
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<td>4</td>
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<td>8</td>
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<td>8</td>
<td>9</td>
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<tr>
<td>9</td>
<td>10</td>
</tr>
</tbody>
</table>

52. How important was it for you to maximize the benefits that your side received?

<table>
<thead>
<tr>
<th>Not important</th>
<th>Critical</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
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<td>4</td>
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<td>5</td>
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<td>6</td>
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<td>7</td>
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<td>7</td>
<td>8</td>
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<tr>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>9</td>
<td>10</td>
</tr>
</tbody>
</table>

100
53. How important was it for you to maximize the benefits your side received at the expense of the insured?

<table>
<thead>
<tr>
<th>Not important</th>
<th>Critical</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
<td></td>
</tr>
</tbody>
</table>

54. How important was it for you not to give up individual benefits to increase joint benefits?

<table>
<thead>
<tr>
<th>Not important</th>
<th>Critical</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
<td></td>
</tr>
</tbody>
</table>

55. How many different scenarios did you consider explicitly as you evaluated the case?

A. None
B. One
C. A few
D. Many

56. Please estimate the number of scenarios that you considered: ___

57. Several kinds of materials were available to you for use in your planning and negotiation. Please use the following categories to indicate how you used these materials. If you used something in more than one way, please list all such uses.

A. Did not use at all
B. Reviewed but did not use in the analysis
C. Kept in mind while doing analyses
D. Explicitly used data from this material in analysis
How did you use each of the following materials?

"General Information & Instructions":

10-K Report:

Data on D&O insurance history:

Copy of the insured's application to NU:

Correspondence between NU and its broker:

Coverage request from the insured:

Results from computer models provided to you:

Results from computer models that you modified:

DATA decision tree models provided to you:

STELLA simulation models provided to you:

Notebook data base records and notes:

Preference Curve analysis tool results:

Other (please specify):

<table>
<thead>
<tr>
<th>Inadequate</th>
<th>Sufficient</th>
<th>Complete</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

58. Referring to the list of materials in Question 57 above, please use the following scale to indicate the extent to which you found these materials complete. Then, list any important information you lacked.

<table>
<thead>
<tr>
<th>Inadequate</th>
<th>Sufficient</th>
<th>Complete</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>
59. Referring again to the list of materials in Question 57, please indicate the extent to which you found these materials useful in your planning and analysis:

<table>
<thead>
<tr>
<th>Generally useless</th>
<th>Generally useful</th>
</tr>
</thead>
<tbody>
<tr>
<td>0  1  2  3  4  5  6  7  8  9  10</td>
<td></td>
</tr>
</tbody>
</table>

---

60. To what extent was the outcome of your analysis affected by uncertainty in the facts of the case?

<table>
<thead>
<tr>
<th>Not at all</th>
<th>Very much so</th>
</tr>
</thead>
<tbody>
<tr>
<td>0  1  2  3  4  5  6  7  8  9  10</td>
<td></td>
</tr>
</tbody>
</table>

61. How much time have you spent filling out this questionnaire?

- A  0.0 - 0.5 hours
- B  0.5 - 1.0 hours
- C  1.0 - 2.0 hours
- D  2.0 - 4.0 hours
- E  More than 4.0 hours

62. Please provide the following information about yourself:

- Age: ____________________________________________
- Gender: __________________________________________
- First language: _____________________________________
- Experience: ________________________________________

---

Thank you for participating in the Chromochemical corporation negotiation exercise. We are glad that you have had this opportunity to evaluate the concepts of negotiation management. The information you have provided in this questionnaire will enable us to improve our ideas, to further improve the underwriting negotiations toolkit.
Appendix B - Decision Tree Model Outline and Variables Report

Decision Tree Model Outline

Insure?
  Insure
    Excess
      Bankrupt\PBankrupt
      D\O Claim\PClaim
      Don't Settle\1-PSettle
      Liable\PLiable
        Sufficient Assets\PSufAssets
        Insufficient Assets\1-PSufAssets
        Not Liable\1-PLiable
      Settle\PSettle
        Sufficient Assets\PSufAssets
        Insufficient Assets\1-PSufAssets
      No D\O Claim\1-PClaim
    Liquid\1-PBankrupt
      D\O Claim\PClaim
      Don't Settle\1-PSettle
      Liable\PLiable
        Sufficient Assets\PSufAssets
        Insufficient Assets\1-PSufAssets
        Not Liable\1-PLiable
      Settle\PSettle
        Sufficient Assets\PSufAssets
        Insufficient Assets\1-PSufAssets
      No D\O Claim\1-PClaim

Primary
  Bankrupt\PBankrupt
  D\O Claim\PClaim
  Don't Settle\1-PSettle
  Liable\PLiable
    Sufficient Assets\PSufAssets
    Insufficient Assets\1-PSufAssets
    Not Liable\1-PLiable
  Settle\PSettle
    Sufficient Assets\PSufAssets
    Insufficient Assets\1-PSufAssets
  No D\O Claim\1-PClaim
  Liquid\1-PBankrupt
    D\O Claim\PClaim
    Don't Settle\1-PSettle
    Liable\PLiable
      Sufficient Assets\PSufAssets
      Insufficient Assets\1-PSufAssets
      Not Liable\1-PLiable
    Settle\PSettle
      Sufficient Assets\PSufAssets
      Insufficient Assets\1-PSufAssets
    No D\O Claim\1-PClaim

Don't Insure
Decision Tree Variables Report

Insure? Insure (PSufAssets=0.2)
  Excess (Premium=EPremium;Coverage=ECoverage)
    Bankrupt\PBankrupt (PClaim=0.2;PLiable=0.5)
      D&O Claim\PClaim (PSettle=0.5)
        Don't Settle\1-PSettle
        Liable\PLiable
        Sufficient Assets\PSufAssets (Cost=0)
        Insufficient Assets\1-PSufAssets (Cost=Covrage*0.8)
          Not Liable\1-PLiable (Cost=500000)
    Settle\PSettle
      Sufficient Assets\PSufAssets (Cost=0)
      Insufficient Assets\1-PSufAssets (Cost=Covrage*0.3)
    No D&O Claim\1-PClaim (Cost=0)
  Liquid\1-PBankrupt (PClaim=0.05;PLiable=0.5)
    D&O Claim\PClaim (PSettle=0.5)
      Don't Settle\1-PSettle
      Liable\PLiable
      Sufficient Assets\PSufAssets (Cost=0)
      Insufficient Assets\1-PSufAssets (Cost=Covrage*0.7)
        Not Liable\1-PLiable (Cost=500000)
    Settle\PSettle
      Sufficient Assets\PSufAssets (Cost=0)
      Insufficient Assets\1-PSufAssets (Cost=Covrage*0.2)
    No D&O Claim\1-PClaim (Cost=0)

Primary (Premium=PPremium;Coverage=PCoverage)
  Bankrupt\PBankrupt (PClaim=0.2;PLiable=0.5)
    D&O Claim\PClaim (PSettle=0.5)
      Don't Settle\1-PSettle
      Liable\PLiable
      Sufficient Assets\PSufAssets (Cost=0)
      Insufficient Assets\1-PSufAssets (Cost=Covrage*1)
        Not Liable\1-PLiable (Cost=500000)
    Settle\PSettle
      Sufficient Assets\PSufAssets (Cost=0)
      Insufficient Assets\1-PSufAssets (Cost=Covrage*0.9)
    No D&O Claim\1-PClaim (Cost=0)
  Liquid\1-PBankrupt (PClaim=0.05;PLiable=0.5)
    D&O Claim\PClaim (PSettle=0.5)
      Don't Settle\1-PSettle
      Liable\PLiable
      Sufficient Assets\PSufAssets (Cost=0)
      Insufficient Assets\1-PSufAssets (Cost=Covrage*0.7)
        Not Liable\1-PLiable (Cost=500000)
    Settle\PSettle
      Sufficient Assets\PSufAssets (Cost=0)
      Insufficient Assets\1-PSufAssets (Cost=Covrage*0.2)
    No D&O Claim\1-PClaim (Cost=0)

Don't Insure (Premium=0;Cost=0)
Profit=Premium - Cost
Appendix C - Business Cycles Model Equations and Diagram
CumulativeProfit = CumulativeProfit + dt * (TotRevenue - TotalExpPolicyCosts)
INIT(CumulativeProfit) = 0
(Cumulative Profit ($))

PercCompPressure = PercCompPressure + dt * (ChgInPerCompPres)
INIT(PercCompPressure) = 1
(Perceived Competitor Pressure
Normal Pressure=1 (dimensionless))

PerceivedPremium = PerceivedPremium + dt * (ChgInPrcvdPremium)
INIT(PerceivedPremium) = Premium
(Perceived Premium ($))

PrcvdTotPolicyCosts = PrcvdTotPolicyCosts + dt * (ChgInPrcvdPolCosts)
INIT(PrcvdTotPolicyCosts) = TotalExpPolicyCosts/(1+TPTPC*TrendInTotPolCosts)
(Perceived Total Policy Costs ($))

RefTotPolicyCosts = RefTotPolicyCosts + dt * (ChgInRefPolicyCosts)
INIT(RefTotPolicyCosts) = PrcvdTotPolicyCosts/(1+TimeHorizonForRPC*TrendInTotPolCosts)
(Reference Total Policy Costs ($))

TrendInTotPolCosts = TrendInTotPolCosts + dt * (ChgInTrndInTPC)
INIT(TrendInTotPolCosts) = 0
(Trend in Total Policy Costs (1/year))

AdjProfitMargin = (PerceivedPremium-TotalExpPolicyCosts)/TotalExpPolicyCosts/NormCEPM
(Competitor's Profit ($/year))

ChgInPerCompPres = (CompetitivePressure-PercCompPressure)/TimeToAdjPerCmpPres
(Change In Perceived Competitive Pressure (dimensionless))

ChgInPrcvdPolCosts = (TotalExpPolicyCosts-PrcvdTotPolicyCosts)/TPTPC
(Change in Perceived Total Policy Costs ($/year/year))

ChgInPrcvdPremium = (Premium-PerceivedPremium)/TTTPP
(Change in Perceived Premium ($/year))

ChgInRefPolicyCosts = (PrcvdTotPolicyCosts-RefTotPolicyCosts)/TimeHorizonForRPC
(Change in Reference Policy Costs ($/year/year))

ChgInTrndInTPC = (TrendOffPolCosts-TrendInTotPolCosts)/TPTTPC
(Change in Trend in Total Policy Costs ($/year/year))

CompetitivePressure = SMTH3(ICompPressure,TTBC)
(Competitive Pressure (dimensionless))

C_0 = 100000
C_1 = 100000
C_10 = 100000
C_2 = 100000
C_3 = 100000
C_4 = 100000
C_5 = 100000
C_6 = 100000
C_7 = 100000
C_8 = 100000
C_9 = 100000

DesProfitMargin = NormPMargin*ECPOP
(Profit Margin (dimensionless))

ExpectedPolicyCosts =
T_0+T_1+T_2+T_3+T_4+T_5+T_6+T_7+T_8+T_9+T_10

ITrendOfPolCosts = (PrcvdTotPolicyCosts-
RefTotPolicyCosts)/(RefTotPolicyCosts*TimeHorizonForRPC)
(Indicated Trend of Total Policy Costs (1/years))

NormCEPM = 0.2
(Normal Competitor Expected Profit Margin (dimensionless))

NormPMargin = 0.2
(Normal Profit Margin (dimensionless))

OverheadExp = 3000
(Overhead Expense, including underwriter's salary ($/year))

PolicyCostForecast = TotalExpPolicyCosts*(1+TrendInTotPolCosts)
(Policy Costs Forecasted by Insurers ($/year))

Premium = DELAY(PolicyCostForecast*(1+DesProfitMargin),0.5)
(Premium ($/year))

PremProfitMarg = (Premium-TotalExpPolicyCosts)/TotalExpPolicyCosts

TimeHorizonForRPC = 1
(Time horizon for Reference Policy Costs (years))

TimeToAdjPerCmpPres = 0.25
TotalExpPolicyCosts = ExpectedPolicyCosts + OverheadExp
(Total Policy Costs ($/year))

TotRevenue = Premium

TPTPC = 1
(Time to perceive total policy costs (years))

TPTTPC = 1
(Time to Perceive Trend in Total Policy Costs (years))

TTBC = 0.5
(Time to Become a Competitor (years))

TTPP = 0.5
(Time to Perceive Premium (years))

T_0 = IF (TIME < 1) THEN C_0 ELSE 0
T_1 = IF (TIME >= 1) AND (TIME < 2) THEN C_1 ELSE 0
T_10 = IF (TIME >= 10) THEN C_10 ELSE 0
T_2 = IF (TIME >= 2) AND (TIME < 3) THEN C_2 ELSE 0
T_3 = IF (TIME >= 3) AND (TIME < 4) THEN C_3 ELSE 0
T_4 = IF (TIME >= 4) AND (TIME < 5) THEN C_4 ELSE 0
T_5 = IF (TIME >= 5) AND (TIME < 6) THEN C_5 ELSE 0
T_6 = IF (TIME >= 6) AND (TIME < 7) THEN C_6 ELSE 0
T_7 = IF (TIME >= 7) AND (TIME < 8) THEN C_7 ELSE 0
T_8 = IF (TIME >= 8) AND (TIME < 9) THEN C_8 ELSE 0
T_9 = IF (TIME >= 9) AND (TIME < 10) THEN C_9 ELSE 0

ECPOPM = graph(PercCompPressure)
(0.0, 0.200), (0.200, 1.95), (0.400, 1.85), (0.600, 1.65), (0.800, 1.40), (1.00, 1.00), (1.20, 0.600),
(1.40, 0.350), (1.60, 0.150), (1.80, 0.0500), (2.00, 0.0)

ICompPressure = graph(AdjProfitMargin)
(0.0, 0.0100), (0.200, 0.0500), (0.400, 0.150), (0.600, 0.300), (0.800, 0.550), (1.00, 1.00),
(1.20, 1.45), (1.40, 1.70), (1.60, 1.85), (1.80, 1.95), (2.00, 2.00)
Appendix D - Distributed Lag Model Equations and Diagram

OutstandingClaims = OutstandingClaims + dt * (TotalAnnualPolicies - PolicyCosts)
INIT(OutstandingClaims) = 0
(Outstanding Claims ($))

TotalCumProfit = TotalCumProfit + dt * (TotalRevenue - TotalExpenses)
INIT(TotalCumProfit) = 0
(Total Cumulative Profit ($))

CostPerPolicy = CostStdDev + PolicyCostGraph
(Total Accumulated Costs per Policy)

CostStdDev = NORMAL*PolicyCostGraph*0.01
(Cost Standard Deviation ($/year))

C_0 = 100000
C_1 = 100000
C_2 = 100000
C_3 = 100000
C_4 = 100000
C_5 = 100000
C_6 = 100000
C_7 = 100000
C_8 = 100000
C_9 = 100000

ExpectedPolicyCosts =
T_0 + T_1 + T_2 + T_3 + T_4 + T_5 + T_6 + T_7 + T_8 + T_9 + T_10
ExpectedRevenue =
RT0 + RT1 + RT2 + RT3 + RT4 + RT5 + RT6 + RT7 + RT8 + RT9 + RT10
ExpPoliciesWritten =
PT0 + PT1 + PT2 + PT3 + PT4 + PT5 + PT6 + PT7 + PT8 + PT9 + PT10
NewPoliciesWritten = ExpPoliciesWritten

OverheadExpense = 10000
(Overhead Expense ($/year))

PolicyCostGraph = ExpectedPolicyCosts

PolicyCosts = (Yr0 + Yr1 + Yr2 + Yr3 + Yr4 + Yr5 + Yr6 + Yr7 + Yr8 + Yr9 + Yr10)
(Policy Costs ($/year))

PolicyRevenueGraph = ExpectedRevenue

PT0 = IF (TIME < 1) THEN P_0 ELSE 0
PT1 = IF (TIME >= 1) AND (TIME < 2) THEN P_1 ELSE 0
PT10 = IF (TIME >= 10) THEN P_10 ELSE 0
PT2 = IF (TIME >= 2) AND (TIME < 3) THEN P_2 ELSE 0
PT3 = IF (TIME >= 3) AND (TIME < 4) THEN P_3 ELSE 0
PT4 = IF (TIME >= 4) AND (TIME < 5) THEN P_4 ELSE 0
PT5 = IF (TIME >= 5) AND (TIME < 6) THEN P_5 ELSE 0
PT6 = IF (TIME >= 6) AND (TIME < 7) THEN P_6 ELSE 0
PT7 = IF (TIME >= 7) AND (TIME < 8) THEN P_7 ELSE 0
PT8 = IF (TIME >= 8) AND (TIME < 9) THEN P_8 ELSE 0
PT9 = IF (TIME >= 9) AND (TIME < 10) THEN P_9 ELSE 0

PYr0 = 0

PYr1 = 0.05
(Section of distribution lag (dimensionless))

PYr10 = 0.0
(Section of distribution lag (dimensionless))

PYr2 = 0.05
(Section of distribution lag (dimensionless))

PYr3 = 0.10
(Section of distribution lag (dimensionless))

PYr4 = 0.20
(Section of distribution lag (dimensionless))

PYr5 = 0.25
(Section of distribution lag (dimensionless))

PYr6 = 0.20
(Section of distribution lag (dimensionless))

PYr7 = 0.05
(Section of distribution lag (dimensionless))

PYr8 = 0.05
(Section of distribution lag (dimensionless))

PYr9 = 0.0
(Section of distribution lag (dimensionless))

P_0 = 100000
P_1 = 100000
P_10 = 100000
P_2 = 100000
P_3 = 100000
P_4 = 100000
P_5 = 100000
P_6 = 100000
\[ P_7 = 100000 \]
\[ P_8 = 100000 \]
\[ P_9 = 100000 \]

\[ \text{RevenuePerPolicy} = \max(0, (\text{RevenueStdDev} \times \text{NORMAL}) + \text{PolicyRevenueGraph}) \]
(Revenue per policy ($/year))

\[ \text{RevenueStdDev} = \text{PolicyRevenueGraph} \times 0.05 \]
(Revenue Standard Deviation ($/Year))

\[ \text{RT0} = \text{IF} \ (\text{TIME} < 1) \ \text{THEN} \ R_0 \ \text{ELSE} \ 0 \]
\[ \text{RT1} = \text{IF} \ (\text{TIME} >= 1) \ \text{AND} \ (\text{TIME} < 2) \ \text{THEN} \ R_1 \ \text{ELSE} \ 0 \]
\[ \text{RT10} = \text{IF} \ (\text{TIME} >= 10) \ \text{THEN} \ R_{10} \ \text{ELSE} \ 0 \]
\[ \text{RT2} = \text{IF} \ (\text{TIME} >= 2) \ \text{AND} \ (\text{TIME} < 3) \ \text{THEN} \ R_2 \ \text{ELSE} \ 0 \]
\[ \text{RT3} = \text{IF} \ (\text{TIME} >= 3) \ \text{AND} \ (\text{TIME} < 4) \ \text{THEN} \ R_3 \ \text{ELSE} \ 0 \]
\[ \text{RT4} = \text{IF} \ (\text{TIME} >= 4) \ \text{AND} \ (\text{TIME} < 5) \ \text{THEN} \ R_4 \ \text{ELSE} \ 0 \]
\[ \text{RT5} = \text{IF} \ (\text{TIME} >= 5) \ \text{AND} \ (\text{TIME} < 6) \ \text{THEN} \ R_5 \ \text{ELSE} \ 0 \]
\[ \text{RT6} = \text{IF} \ (\text{TIME} >= 6) \ \text{AND} \ (\text{TIME} < 7) \ \text{THEN} \ R_6 \ \text{ELSE} \ 0 \]
\[ \text{RT7} = \text{IF} \ (\text{TIME} >= 7) \ \text{AND} \ (\text{TIME} < 8) \ \text{THEN} \ R_7 \ \text{ELSE} \ 0 \]
\[ \text{RT8} = \text{IF} \ (\text{TIME} >= 8) \ \text{AND} \ (\text{TIME} < 9) \ \text{THEN} \ R_8 \ \text{ELSE} \ 0 \]
\[ \text{RT9} = \text{IF} \ (\text{TIME} >= 9) \ \text{AND} \ (\text{TIME} < 10) \ \text{THEN} \ R_9 \ \text{ELSE} \ 0 \]

\[ R_0 = 100000 \]
\[ R_1 = 100000 \]
\[ R_{10} = 100000 \]
\[ R_2 = 100000 \]
\[ R_3 = 100000 \]
\[ R_4 = 100000 \]
\[ R_5 = 100000 \]
\[ R_6 = 100000 \]
\[ R_7 = 100000 \]
\[ R_8 = 100000 \]
\[ R_9 = 100000 \]

\[ \text{TotalAnnualPolicies} = \text{NewPoliciesWritten} \times \text{CostPerPerPolicy} \]
\[ \text{TotalExpenses} = \text{PolicyCosts} + \text{OverheadExpense} \]
(Total Expenses ($/Year))

\[ \text{TotalRevenue} = \text{RevenuePerPolicy} \times \text{NewPoliciesWritten} \]
(Total Revenue ($/year))

\[ T_0 = \text{IF} \ (\text{TIME} < 1) \ \text{THEN} \ C_0 \ \text{ELSE} \ 0 \]
\[ T_1 = \text{IF} \ (\text{TIME} >= 1) \ \text{AND} \ (\text{TIME} < 2) \ \text{THEN} \ C_1 \ \text{ELSE} \ 0 \]
\[ T_{10} = \text{IF} \ (\text{TIME} >= 10) \ \text{THEN} \ C_{10} \ \text{ELSE} \ 0 \]
\[ T_2 = \text{IF} \ (\text{TIME} >= 2) \ \text{AND} \ (\text{TIME} < 3) \ \text{THEN} \ C_2 \ \text{ELSE} \ 0 \]
\[ T_3 = \text{IF} \ (\text{TIME} >= 3) \ \text{AND} \ (\text{TIME} < 4) \ \text{THEN} \ C_3 \ \text{ELSE} \ 0 \]
\[ T_4 = \text{IF} \ (\text{TIME} >= 4) \ \text{AND} \ (\text{TIME} < 5) \ \text{THEN} \ C_4 \ \text{ELSE} \ 0 \]
\[ T_5 = \text{IF} \ (\text{TIME} >= 5) \ \text{AND} \ (\text{TIME} < 6) \ \text{THEN} \ C_5 \ \text{ELSE} \ 0 \]
\[ T_6 = \text{IF} \ (\text{TIME} \geq 6) \ \text{AND} \ (\text{TIME} < 7) \ \text{THEN} \ C_6 \ \text{ELSE} \ 0 \]
\[ T_7 = \text{IF} \ (\text{TIME} \geq 7) \ \text{AND} \ (\text{TIME} < 8) \ \text{THEN} \ C_7 \ \text{ELSE} \ 0 \]
\[ T_8 = \text{IF} \ (\text{TIME} \geq 8) \ \text{AND} \ (\text{TIME} < 9) \ \text{THEN} \ C_8 \ \text{ELSE} \ 0 \]
\[ T_9 = \text{IF} \ (\text{TIME} \geq 9) \ \text{AND} \ (\text{TIME} < 10) \ \text{THEN} \ C_9 \ \text{ELSE} \ 0 \]

\[ Yr0 = \text{TotalAnnualPolicies} \times PYr0 \]
\{Part of the Ten Period Distributed Lag of Total Annual Policies\}

\[ Yr1 = \text{DELAY(TotalAnnualPolicies,1,0)} \times PYr1 \]
\{Part of the Ten Period Distributed Lag of Total Annual Policies\}

\[ Yr10 = \text{DELAY(TotalAnnualPolicies,10,0)} \times PYr10 \]
\{Part of the Ten Period Distributed Lag of Total Annual Policies\}

\[ Yr2 = \text{DELAY(TotalAnnualPolicies,2,0)} \times PYr2 \]
\{Part of the Ten Period Distributed Lag of Total Annual Policies\}

\[ Yr3 = \text{DELAY(TotalAnnualPolicies,3,0)} \times PYr3 \]
\{Part of the Ten Period Distributed Lag of Total Annual Policies\}

\[ Yr4 = \text{DELAY(TotalAnnualPolicies,4,0)} \times PYr4 \]
\{Part of the Ten Period Distributed Lag of Total Annual Policies\}

\[ Yr5 = \text{DELAY(TotalAnnualPolicies,5,0)} \times PYr5 \]
\{Part of the Ten Period Distributed Lag of Total Annual Policies\}

\[ Yr6 = \text{DELAY(TotalAnnualPolicies,6,0)} \times PYr6 \]
\{Part of the Ten Period Distributed Lag of Total Annual Policies\}

\[ Yr7 = \text{DELAY(TotalAnnualPolicies,7,0)} \times PYr7 \]
\{Part of the Ten Period Distributed Lag of Total Annual Policies\}

\[ Yr8 = \text{DELAY(TotalAnnualPolicies,8,0)} \times PYr8 \]
\{Part of the Ten Period Distributed Lag of Total Annual Policies\}

\[ Yr9 = \text{DELAY(TotalAnnualPolicies,9,0)} \times PYr9 \]
\{Part of the Ten Period Distributed Lag of Total Annual Policies\}
Appendix E - EASI Interface Listing
STACK: EASI

... ...
... ...
on openStack
  hide menubar
end openStack

... ...
on resumeStack
  hide menubar
end resumeStack

... ...
on idle
  hide menubar
end idle

... ...

BACKGROUND: File Card

... ...
on closeField

... ...
on newCard
  tabKey
end newCard

BACKGROUNDBUTTON: Help

... ...
on mouseUp
  show card field "help"
end mouseUp

BACKGROUNDBUTTON: Return

... ...
on mouseUp
  visual effect stretch from center
go to card id 2819
end mouseUp

... ...

CARD: card id 2819
[This object has no script.]

... ...

CARD BUTTON: Notebook

... ...
on mouseUp
  visual effect shrink to center
go to card id 4264
end mouseUp

... ...

CARD BUTTON: card button id 7
[This object has no script.]
CARD BUTTON: Quit

... ...

on mouseUp
  doMenu quit hypercard
end mouseUp

CARD BUTTON: Data

... ...

on mouseUp

  answer "Which kind of model?" with ¬
  "STELLA" or "DATA" or "Preferences"

  if it is "data" then
    show card field "get data models title"
    show card field "get data models"
  end if

  if it is "stella" then
    show card field "get stella models title"
    show card field "get stella models"
  end if

  if it is "Preferences" then
    answer "Really go to Preference Analysis tool?" with¬
    "Yes" or "Cancel"
    if it is "Yes" then
      visual effect shrink to center
      go to stack "preference analysis"
    end if
  end if

end mouseUp

CARD FIELD: Version
[This object has no script.]

CARD FIELD: get stella models title
[This object has no script.]

CARD FIELD: get Stella Models
on mouseUp
  set cursor to watch
  selectWholeLine word 2 of the clickLine, the target
  put the selection into modelName
  hide card field "get stella models"
  hide card field "get stella models title"
  if "Business Cycles" is in modelName then
    answer "Go to Stella Business Cycles model?" with "Okay" or "Cancel"
    if it is "Okay" then
      visual effect shrink to center
      go to stack "Business Cycles"
    else
      exit mouseUp
end if
end if
if "Distributed Lag" is in modelName then
    answer "Go to Stella Distributed Lag model?" with "Okay" or "Cancel"
    if it is "Okay" then
        visual effect shrink to center
        go to stack "distributed lag"
    else
        exit mouseUp
    end if
end if
end mouseUp

CARD FIELD: get data models title
[This object has no script.]

on mouseUp
    set cursor to watch
    selectWholeLine word 2 of the clickLine, the target
    put the selection into modelName
    delete the last char of modelName
    hide card field "get data models"
    hide card field "get data models title"
    if "" <> modelName then
        answer "Go to Data " & ¬
        modelName & " model?" with "Okay" or "Cancel"
        if it is "Okay" then
            open modelName with "Data"
        else
            exit mouseUp
        end if
    else
        exit mouseUp
    end if
end mouseUp

CARD FIELD: Help
[This object has no script.]

on mouseUp
    hide card fld "help"
end mouseUp

CARD: card id 4264
[This object has no script.]

CARD BUTTON: Input
[This object has no script.]

on mouseUp
    visual effect shrink to center
    go to last card of stack "Teach"
end mouseUp

CARD BUTTON: card button id 7
on mouseUp
   visual effect shrink to center
   go to first card of stack "teach"
   put empty into card field "input subject"
   put empty into card field "input information"
   put empty into card field "input models"
   put empty into card field "input related topics"
end mouseUp

CARD FIELD: Help

on mouseUp
   hide card fld "help"
end mouseUp

CARD: card id 3787
[This object has no script.]
Appendix F - EASI Notebook Listing

STACK: Teach

on openStack
    hide menubar
end openStack

on resumeStack
    hide menubar
end resumeStack

on idle
    hide menubar
end idle

BACKGROUND: File Card

on newCard
    end newCard

on openCard
    pass openCard
end openCard

BACKGROUND BUTTON: Help

on mouseUp
    show bkgnd fld "help"
end mouseUp

BACKGROUND BUTTON: Return

on mouseUp
    visual effect stretch from center
    go to first card of stack "easi"
end mouseUp

BACKGROUND BUTTON: New

on mouseUp
    visual effect scroll left
    go to last card of this background
    doMenu "New Card"
end mouseUp

BACKGROUND BUTTON: Delete

on mouseUp
    answer "Do you really want to delete this subject?" with ¬
    "Yes" or "No"
    if it is "Yes" then
        doMenu "Delete Card"
end if
1991
visual effect dissolve
go this card
end mouseUp

BACKGROUND BUTTON: Find

on mouseUp
  ask "Enter subject:" with ""
  put it into searchText
  find chars searchText in bknd field subject
  if the foundText <> "" then
    exit mouseUp
  end if
  find chars searchText in bknd field akas
  if the foundText <> "" then
    exit mouseUp
  end if
  put 1 into counter
  repeat for length of searchText
    put first char of searchText into moreSearchText
    put char 2 of searchText after moreSearchText
    put char 3 of searchText after moreSearchText
    delete first char of searchText
    delete first char of searchText
    delete first char of searchText
    find chars moreSearchText in bknd field subject
    if the foundText <> "" then
      exit mouseUp
    end if
    find chars moreSearchText in bknd field akas
    if the foundText <> "" then
      exit mouseUp
    end if
  end repeat
  answer "Sorry, nothing on that subject is available."
  visual effect scroll down
  go this card
end mouseUp

BACKGROUND BUTTON: Link To Models

on mouseUp
  answer "Add or Delete model?" with "Add" or "Delete" or "Cancel"
  if it is "Add" then

    answer "What kind of model?" with "STELLA" or "DATA" or "Preferences"

  if it is "stella" then
    show bknd fld "stella models title"
    show bknd fld "stella models"
  exit mouseUp

124
end if

1991

if it is "data" then
  show bknd fl "data models title"
  show bknd fl "data models"
  exit mouseUp
end if

if it is "preferences" then
  put "Preferences" &return after field "models"
end if

end if

if it is "delete" then
  delete the last line of field "models"
end if

end mouseUp

.............................................................
BACKGROUND BUTTON: bknd button id 101
.............................................................
on mouseUp
  visual effect scroll right
  go back
end mouseUp

.............................................................
BACKGROUND FIELD: Subject
[This object has no script.]

.............................................................
BACKGROUND FIELD: AKAs
[This object has no script.]

.............................................................
BACKGROUND FIELD: Information
[This object has no script.]

.............................................................
BACKGROUND FIELD: Related Topics
[This object has no script.]

.............................................................
BACKGROUND FIELD: Models
.............................................................
on mouseUp
  answer "Add or Delete model?" with "Add" or "Delete" or "Cancel"
  if it is "Add" then
    answer "What kind of model?" with "STELLA"~
    or "DATA" or "Preferences"
  if it is "stella" then
    show bknd fl "stella models title"
    show bknd fl "stella models"
    exit mouseUp
end if
1991
if it is "data" then
  show bkgn d fld "data models title"
  show bkgn d fld "data models"
  exit mouseUp
end if

if it is "preferences" then
  put "Preferences" & return after field "models"
end if
end if

if it is "delete" then
  delete the last line of field "models"
end if
end mouseUp

BACKGROUND FIELD: stella models title
[This object has no script.]

BACKGROUND FIELD: Stella Models
on mouseUp
  set cursor to watch
  selectWholeLine word 2 of the clickLine, the target
  put the selection after field "models"
  hide bkgn d fld "stella models title"
  hide bkgn d fld "stella models"
end mouseUp

BACKGROUND FIELD: data models title
[This object has no script.]

BACKGROUND FIELD: Data Models
on mouseUp
  set cursor to watch
  selectWholeLine word 2 of the clickLine, the target
  put the selection after field "models"
  hide bkgn d fld "data models title"
  hide bkgn d fld "data models"
end mouseUp

BACKGROUND FIELD: Help
... ...

on mouseUp
  hide bkgn d fld "help"
end mouseUp

BACKGROUND: File Card
[This object has no script.]

BACKGROUND BUTTON: Help
on mouseUp
  show card field "help"
end mouseUp

BACKGROUND BUTTON: Return
on mouseUp
  visual effect stretch from center
  go to first card of stack "easi"
end mouseUp

CARD: card id 7120
on mouseUp
end mouseUp

CARD BUTTON: Data
on mouseUp
  1991
  answer "Which kind of model?" with ¬
  "STELLA" or "DATA" or "Preferences"
  if it is "data" then
    show card field "get data models title"
    show card field "get data models"
  end if
  if it is "stella" then
    show card field "get stella models title"
    show card field "get stella models"
  end if
  if it is "Preferences" then
    answer "Really go to Preference Analysis tool?" with¬
    "Yes" or "Cancel"
    if it is "Yes" then
      visual effect shrink to center
      go to stack "preference analysis"
    end if
  end if
end mouseUp

CARD BUTTON: Find
on insertText
  put the number of this card into cardNumber
  pop card
  unlock screen
put field "subject" of card cardNumber into card field "Input Subject"
put field "information" of card cardNumber into card field "Input Information"
put field "models" of card cardNumber into card field "Input models"
put field "related topics" of card cardNumber into card field "input related topics"
end insertText

... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
push card
lock screen
ask "Enter subject:" with ""
put it into searchText
if searchText is "" then
exit mouseUp
end if
find chars searchText in bkgrund field subject
if the foundText <> "" then
insertText
exit mouseUp
end if
find chars searchText in bkgrund field akas
1991
if the foundText <> "" then
insertText
exit mouseUp
end if
repeat for length of searchText
put first char of searchText into moreSearchText
put char 2 of searchText after moreSearchText
put char 3 of searchText after moreSearchText
delete first char of searchText
delete first char of searchText
delete first char of searchText
find chars moreSearchText in bkgrund field subject
if the foundText <> "" then
insertText
exit mouseUp
end if
find chars moreSearchText in bkgrund field akas
if the foundText <> "" then
insertText
exit mouseUp
end if
end repeat
answer "Sorry, nothing on that subject is available."
end mouseUp

CARDBOARD FIELD: ResponseField1
[This object has no script.]
CARD FIELD: ResponseField1
[This object has no script.]

CARD FIELD: ResponseField1
[This object has no script.]

CARD FIELD: ResponseField1
[This object has no script.]

CARD FIELD: ResponseField1
[This object has no script.]

CARD FIELD: ResponseField1
[This object has no script.]

CARD FIELD: ResponseField1
[This object has no script.]

CARD FIELD: Input Information
[This object has no script.]

CARD FIELD: Input Subject
1991
[This object has no script.]

CARD FIELD: Input Models
on mouseUp
  set cursor to watch
  selectWholeLine word 2 of the clickLine, the target
  put the selection into modelName
  delete the last char of modelName

  if "Preferences" is in modelName then
    answer "Go to Preference Analysis tool?" with-
    "Yes" or "Cancel"
    if it is "Yes" then
      visual effect shrink to center
      go to stack "preference analysis"
      exit mouseUp
    else
      exit mouseUp
    end if
  end if

  if "business cycles" is in modelName then
    answer "Go to STELLA business cycles model?" with-
    "Yes" or "Cancel"
    if it is "Yes" then
      visual effect shrink to center
      go to stack "business cycles"
      exit mouseUp
    else
      exit mouseUp
    end if
if "distributed lag" is in modelName then
  answer "Go to STELLA distributed lag model?" with
  "Yes" or "Cancel"

1991
  if it is "Yes" then
    visual effect shrink to center
    go to stack "distributed lag"
    exit mouseUp
  else
    exit mouseUp
  end if
end if

if modelName <> "" then
  answer "Go to DATA " & modelName & " model?" with
  "Yes" or "Cancel"
  if it is "Yes" then
    visual effect shrink to center
    open modelName with "Data"
  end if
end if

end mouseUp

CARD FIELD: Input Related Topics
...

on insertText
  put the number of this card into cardNumber
  pop card
  unlock screen
  put field "subject" of card cardNumber into card field "Input Subject"
  put field "information" of card cardNumber into card field ~
  "Input Information"
  put field "models" of card cardNumber into card field "Input models"
  put field "related topics" of card cardNumber into card field ~
  "input related topics"
end insertText

on mouseUp
  set cursor to watch
  selectWholeLine word 2 of the clickLine, the target
1991
  put the selection into searchText
  push card
  lock screen
  find chars searchText in bknd field subject
  if the foundText <> "" then
    insertText
    exit mouseUp
  end if
  find chars searchText in bknd field akas
  if the foundText <> "" then
    insertText
exit mouseUp
end if
repeat for length of searchText
    put first char of searchText into moreSearchText
    put char 2 of searchText after moreSearchText
    put char 3 of searchText after moreSearchText
delete first char of searchText
delete first char of searchText
delete first char of searchText
find chars moreSearchText in bkground field subject
if the foundText <> "" then
    insertText
    exit mouseUp
end if
find chars moreSearchText in bkground field as is
if the foundText <> "" then
    insertText
    exit mouseUp
end if
end repeat
answer "Sorry, nothing on that subject is available."
end mouseUp

.................................
CARD FIELD: get stella models title
[This object has no script.]

.................................
CARD FIELD: get Stella Models
on mouseUp
    set cursor to watch
    selectWholeLine word 2 of the clickLine, the target
    put the selection into modelName
    hide card field "get stella models"
    hide card field "get stella models title"
if "Business Cycles" is in modelName then
    answer "Go to Stella Business Cycles model?" with "Okay" or "Cancel"
    if it is "Okay" then
        visual effect shrink to center
        go to stack "Business Cycles"
    else
        exit mouseUp
    end if
end if
if "Distributed Lag" is in modelName then
    answer "Go to Stella Distributed Lag model?" with "Okay" or "Cancel"
    if it is "Okay" then
        visual effect shrink to center
        go to stack "distributed lag"
    else
        exit mouseUp
    end if
end if
end mouseUp

.................................
CARD FIELD: get data models title
CARD FIELD: Help

on mouseUp
  hide card fid "help"
end mouseUp

CARD FIELD: get Data Models

on mouseUp
  set cursor to watch
  selectWholeLine word 2 of the clickLine, the target
  put the selection into modelName
  delete the last char of modelName
  hide card field "get data models"
  hide card field "get data models title"
  if "" <> modelName then
    answer "Go to Data " &~
    modelName & " model?" with "Okay" or "Cancel"
    if it is "Okay" then
      open modelName with "DATA"
    else
      exit mouseUp
    end if
  else
    exit mouseUp
  end if
end mouseUp

CARD: card id 9584

on openCard
  hide Message box
end openCard

CARD BUTTON: Hide

[This object has no script.]

CARD: card id 6264

on openCard
  hide Message box
end openCard

CARD BUTTON: Hide

[This object has no script.]

CARD: card id 4695

on openCard
  hide Message box
end openCard

CARD BUTTON: Hide
[This object has no script.]

CARD: card id 2144
[This object has no script.]

CARD: card id 2945
1991
[This object has no script.]

CARD: card id 4016
[This object has no script.]

CARD: card id 4252
[This object has no script.]

CARD: card id 4520
[This object has no script.]

CARD: card id 4998
[This object has no script.]

CARD: card id 5353
[This object has no script.]

CARD: card id 5713
[This object has no script.]

CARD: card id 5378
[This object has no script.]

CARD: card id 6744
[This object has no script.]

CARD: card id 8141
[This object has no script.]

CARD: card id 8313
[This object has no script.]
Appendix G - Preference Curve Analysis Listing

STACK: Preference Analysis

... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ...
on openStack
  hide menubar
end openStack

... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ...
on resumeStack
  hide menubar
end resumeStack

... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ...
on idle
  hide menubar
end idle

... ...

BACKGROUND: File Card

... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ...
on closeField

end closeField

... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ...
on newCard
  tabKey
end newCard

... ...

BACKGROUND BUTTON: Help

... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
  show card field "help"
end mouseUp

... ...

CARD: Analyze

... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ...
on premiumSort
  - Sorting Routine

  put line 1 of card field Premium into testPremium
  put line 1 of card field Retention into testRetention
  put line 1 of card field Limit into testLimit

  repeat for (number of lines in card field Premium)
    repeat with count = 1 to (number of lines in card field Premium -1)
      if line count of card field Premium > line (count + 1) of card field Premium then
        put line count of card field Premium into tempHolder
        put line (count + 1) of card field Premium into line count of card field Premium
        put tempHolder into line (count + 1) of card field Premium
        put line count of card field Retention into tempHolder
        put line (count + 1) of card field Retention into line count of card field Retention
        put tempHolder into line (count + 1) of card field Retention
        put line count of card field Limit into tempHolder
        put line (count + 1) of card field Limit into line count of card field Limit

  ...
put tempHolder into line (count + 1) of card field Limit
end if
end repeat
end repeat

-- End of Sorting Routine
end premiumSort

... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ...
on limitSort

-- Sorting Routine

put line 1 of card field Premium into testPremium
put line 1 of card field Retention into testRetention
put line 1 of card field Limit into testLimit

repeat for (number of lines in card field Premium)
  repeat with count = 1 to (number of lines in card field Premium -1)
    if line count of card field "limit" > line (count+1) of card field "limit" then
      put line count of card field premium into tempHolder
      put line (count + 1) of card field premium into line count of card field premium
      put tempHolder into line (count + 1) of card field premium
      put line count of card field Retention into tempHolder
      put line (count + 1) of card field Retention into line count of card field Retention
      put tempHolder into line (count + 1) of card field Retention
      put line count of card field Limit into tempHolder
      put line (count + 1) of card field Limit into line count of card field Limit
      put tempHolder into line (count + 1) of card field Limit
    end if
  end repeat
end repeat

-- End of Sorting Routine
end limitSort

... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ...
on retentionSort

-- Sorting Routine

put line 1 of card field Premium into testPremium
put line 1 of card field Retention into testRetention
put line 1 of card field Limit into testLimit

repeat for (number of lines in card field Premium)
  repeat with count = 1 to (number of lines in card field Premium -1)
    if line count of card field "retention" > line (count+1) of card field "retention" then
      put line count of card field premium into tempHolder
      put line (count + 1) of card field premium into line count of card field premium
      put tempHolder into line (count + 1) of card field premium
      put line count of card field Retention into tempHolder
      put line (count + 1) of card field Retention into line count of card field Retention
      put tempHolder into line (count + 1) of card field Retention
      put line count of card field Limit into tempHolder
      put line (count + 1) of card field Limit into line count of card field Limit
put tempHolder into line (count + 1) of card field Limit
end if
end repeat
end repeat

-- End of Sorting Routine
end retentionSort

CARD BUTTON: Return

... ... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
visual effect iris close
go to stack "easi"
end mouseUp

CARD BUTTON: Return

... ... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
visual effect stretch from center
go to stack "easi"
end mouseUp

CARD BUTTON: Graph

... ... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
put card field "X Axis" into XName
put card field "Y Axis" into YName
put card field "Z Axis" into ZName

if (number of lines in card field Premium) <> ¬
(number of lines in card field Limit) then
answer "The number of premiums and limits entered must be equal!"
exit mouseUp
end if
if (number of lines in card field Retention) <> ¬
(number of lines in card field Limit) then
answer "The number of retentions and limits must be equal!"
exit mouseUp
end if

put line 1 of card field XName into XMax
put line 1 of card field XName into XMin
put line 1 of card field YName into YMax
put line 1 of card field YName into YMin
put line 1 of card field ZName into ZMax
put line 1 of card field ZName into ZMin
repeat with count = 1 to (number of lines in card field XName)
if line count of card field XName > XMax then
put line count of card field XName into XMax
end if
if line count of card field XName < XMin then
put line count of card field XName into XMin
end if
if line count of card field YName > YMax then
  put line count of card field YName into YMax
end if
if line count of card field YName < YMin then
  put line count of card field YName into YMin
end if
if line count of card field ZName > ZMax then
  put line count of card field ZName into ZMax
end if
if line count of card field ZName < ZMin then
  put line count of card field ZName into ZMin
end if
end repeat
lock screen
go to next card
put round(XMax) into card field "XMax"
put round(YMax) into card field "YMax"
put round(XMin) into card field "XMin"
put round(YMin) into card field "YMin"
put round((XMax-XMin)/2+XMin) into card field "XMean"
put round((YMax-YMin)/2+YMin) into card field "YMean"
put round((ZMax-ZMin)/2+Zmin) into ZMean
put XName into card field "X axis"
put YName into card field "Y axis"
put ZName into card field "Z axis"
reset paint
choose select tool
drag from 0,0 to 520,510
doMenu cut picture
visual effect shrink to center
unlock screen
visual effect shrink to center
set lineSize to 2
choose line tool
drag from 230,20 to 230,280
drag from 230,280 to 490,280
drag from 230,40 to 227,40
drag from 230,145 to 227,145
drag from 230,250 to 227,250
drag from 260,280 to 260,283
drag from 365,280 to 365,283
drag from 470,280 to 470,283
set lineSize to 1
set pattern to 19
set filled to true
choose oval tool
repeat with count = 1 to (number of lines in card field XName of card 1)
  put round(((line count of card field XName of card 1) - XMin)/(XMax - XMin)*210) -
+ 260 into Xcirc
  put round(((line count of card field YName of card 1) - YMin)/(YMax - YMin)*-210) -
+ 250 into YCirc
  put round(((line count of card field ZName of card 1)/ZMin -
*2.5 + 5) into ZCirc
drag from XCirc-ZCirc,YCirc-ZCirc to XCirc+ZCirc,YCirc+ZCirc
end repeat
choose browse tool

end mouseUp

CARD BUTTON: Edit Quotes

on mouseUp
  global desPremium, desLimit, desRetention

  answer "Insert a quote, Delete a quote, or Clear all quotes?"~
  with "Insert" or "Delete" or "Clear"
  put it into editWhat
  if editWhat is "Clear" then
    answer "Really erase all quotes listed?" with "Yes" or "No"
    if it is "Yes" then
      put empty into card field premium
      put empty into card field limit
      put empty into card field retention
    end if
  end if

  if editWhat is "Insert" then
    ask "Enter the new premium:" with desPremium
    if it is "" then exit mouseUp
    put it into desPremium
  end if

  ask "Enter the new coverage Limit:" with desLimit
  if it is "" then exit mouseUp
  put it into desLimit

  ask "Enter the new Retention:" with desRetention
  if it is "" then exit mouseUp
  put it into desRetention

  lock screen
  put despremium & return after card field "premium"
  put desLimit & return after card field "Limit"
  put desRetention & return after card field "Retention"
  unlock screen
end if

  if editWhat is "Delete" then
    ask "Delete which quote?" with (the number of lines in card field premium)
    if it is "" then exit mouseUp
    delete line it of card field premium
    delete line it of card field limit
    delete line it of card field retention
  end if

end mouseUp
CARD BUTTON: Analyze

... ...

on mouseUp

put empty into card field analysis

if (number of lines in card field Premium) < 2 then
    answer "You must enter at least two sets of quotes for the preference analysis to work."
    exit mouseUp
end if

if (number of lines in card field Premium) <> ~
    (number of lines in card field Limit) then
    answer "The number of premiums and limits entered must be equal!"
    exit mouseUp
end if

if (number of lines in card field Retention) <> ~
    (number of lines in card field Limit) then
    answer "The number of retentions and limits must be equal!"
    exit mouseUp
end if

show card field progress
lock screen

premiumSort

limitSort

repeat with count = 1 to (number of lines in card field Premium -1)
    if line count of card field limit = line (count + 1) of card field limit then
        if line count of card field retention < line (count + 1) of card field retention then
            put "The premium increases from " & line count of card field premium & ~
            " to " & line (count + 1) of card field premium & " when the retention increases from " ~
            & line count of card field retention & " to " & line (count + 1) of card field retention & " for
            the same limit of $" ~
            & line count of card field limit & ". The premium must be lower for higher retentions." ~
            & return & return) after card field analysis
        end if
    end if
end if

if (count +2) <= the number of lines in card field Premium then
    if line count of card field limit = line (count + 2) of card field limit then
        if (line count of card field retention - line (count + 1) of card field retention)/(line (count +
        1) of card field premium ~
        - line count of card field premium) < (line (count + 1) of card field retention - line (count +
        2) of card field retention)/(line (count + 2) of card field premium ~
        - line (count + 1) of card field premium) then
            put "The change in the premiums from " & line count of card field premium ~
            & " to " & line (count + 1) of card field premium & " is inconsistent with the change from " ~
            & line (count + 1) of card field premium & " to " & line (count + 2) of card field premium & " for the $" & ~
line count of card field limit & " limit. These values imply that smaller retentions are " & "less risky that larger retentions." & return & return after card field analysis

end if
end if
end if
end repeat

premiumSort
retentionSort

repeat with count = 1 to (number of lines in card field Premium -1)
if line count of card field retention = line (count + 1) of card field limit then
if line count of card field limit > line (count + 1) of card field limit then
put "The premium increases from " & line count of card field premium & " to " & line (count + 1) of card field premium & " when the limit declines from " & line count of card field retention & " to " & line (count + 1) of card field retention & " for the same limit of $" & line count of card field limit & ". The premium must be higher for higher limits." & return & return) after card field analysis
end if

if line count of card field retention = line (count + 1) of card field retention then
if (line count of card field limit)/(line count of card field premium) > " (line (count + 1) of card field limit - line count of card field limit)/(line - (count + 1) of card field premium - line count of card field premium) then
put "The change in the premium from 0 to " & line count of card field premium & " is inconsistent with the change from " & line count of card field premium & " to " & line (count + 1) of card field premium & " for the $" & " line count of card field retention & " retention. These values imply that incremental increases" & " in limits creates greater than proportional increases in risk." & return & return after card field analysis
end if
end if
end if

if (count + 2) <= the number of lines in card field Premium then
if line count of card field retention = line (count + 2) of card field retention then
if (line (count + 1) of card field limit - line count of card field limit)/(line (count + 1) of card field premium - line count of card field premium) > (line (count + 2) of card field limit - line (count + 1) of card field limit)/(line (count + 2) of card field premium - line (count + 1) of card field premium) then
put "The change in the premium from " & line count of card field premium & " to " & line (count + 1) of card field premium & " for the $" & " line count of card field retention & " retention. These values imply that incremental increases" & " in limits creates greater than proportional increases in risk." & return & return

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after card field analysis
    end if
    end if
end if

end repeat

repeat with count = 1 to (number of lines in card field Premium -1)
    if line count of card field retention = line (count + 1) of card field retention then
        put line (count + 1) of card field premium - line count of card field premium into PremDif
        put line count of card field limit into checkLimit1
        put line (count + 1) of card field limit into checkLimit2
        put line count of card field retention into testRetention
        repeat with count2 = count to (number of lines in card field Premium -1)
            if line count2 of card field retention = line (count2 + 1) of card field retention then
                if line count2 of card field limit = checkLimit1 then
                    if line (count2 + 1) of card field limit = checkLimit2 then
                        if line (count2 +1) of card field premium - line count2 of card field premium <> ¬
                            PremDif then
                            put "The premium change when the limit increases from " & checkLimit1 & " to " &
                            checkLimit2 & " is not the same for retention levels of " & testRetention & " and "¬
                            & line count2 of card field retention & ¬
                            " This implies that the limit and the retention are not independent." ¬
                            & return & return after card field "analysis"
                    end if
                end if
            end if
        end repeat
    end if
end if
end repeat

premiumSort

if card field analysis is empty then
    put "The analysis detected no errors or inconsistencies." into card field analysis end if

hide card field progress
unlock screen

end mouseUp

.......................................................... ..........................................................
CARD BUTTON: test
... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
    put "62500" && return into card field premium
    put "60625" && return after card field premium
    put "58375" && return after card field premium
    put "98750" && return after card field premium
    put "95800" && return after card field premium
put "93800" && return after card field premium
put "5000000" && return into card field limit
put "5000000" && return after card field limit
put "5000000" && return after card field limit
put "10000000" && return after card field limit
put "10000000" && return after card field limit
put "10000000" && return after card field limit

put "200000" && return into card field retention
put "500000" && return after card field retention
put "750000" && return after card field retention
put "200000" && return after card field retention
put "500000" && return after card field retention
put "750000" && return after card field retention
end mouseUp

C A R D  B U T T O N :  C a l c u l a t e
... ... ... ... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp

global desRetention, desLimit, desPremium
show card field setup
lock screen
click at the loc of button "analyze"
unlock screen
hide card field setup
if card field analysis <> "The analysis detected no errors or inconsistencies." then
answer "The quotes must have no errors or inconsistencies before alternatives can be calculated."
exit mouseUp
end if

if the number of lines in card field premium < 2 then
answer "You must enter at least two quotes before alternatives can be calculated."
exit mouseUp
end if

answer "What would you like to calculate?" with "Limit" or "Retention" or "Premium"
put it into doWhat
if doWhat = "Premium" then
ask "What retention amount do you want?" with desRetention
if it = "" then exit mouseUp
put it into desRetention
ask "What coverage limit do you want?" with desLimit
if it = "" then exit mouseUp
put it into desLimit
put 0 into desPremium

show card field calculate
lock screen

put 999999999 into maxPremium
put 0 into minPremium

premiumSort
limitSort

repeat with count = 1 to (number of lines in card field Premium)
if desLimit >= line count of card field limit then
  if desRetention <= line count of card field retention then
    if line count of card field premium > minPremium then
      put line count of card field premium into minPremium
  end if
  if count > 1 then
    if line count of card field limit = line (count - 1) of card field limit then
      put line count of card field premium + ((line count of card field retention - desRetention)/(line (count - 1) of card field retention - line count of card field retention) * (~
        (line count of card field premium - line (count -1) of card field premium)))~
      into tempHolder
      if tempHolder > minPremium then
        put tempHolder into minPremium
      end if
    end if
  end if
end if

if desLimit <= line count of card field limit then
if desRetention >= line count of card field retention then
if count < the number of lines in card field premium then
  if line count of card field limit = line (count + 1) of card field limit then
    put line count of card field premium - (~
      ((desRetention - line count of card field retention)/~
      (line count of card field retention - line (count + 1) of card field retention) * ~
      ((line (count + 1) of card field premium - line count of card field premium)))~
      into tempHolder
      if tempHolder < maxPremium then
        put tempHolder into maxPremium
      end if
  end if
end if
if line count of card field premium < maxPremium then
  put line count of card field premium into maxPremium
end if
else
  if count < the number of lines in card field premium then
    if desRetention >= line (count + 1) of card field retention then
      if line count of card field limit = line (count + 1) of card field limit then
        put line count of card field premium + (~
          (line count of card field retention - desRetention)/~
          (line count of card field retention - line (count + 1) of card field retention) * ~
          ((line (count +1) of card field premium - line count of card field premium)))~
          into tempHolder
          if tempHolder < maxPremium then
            put tempHolder into maxPremium
          end if
        end if
      end if
    end if
  end if
end if

end if
end if
end if
end if
end if
end if
end if

premiumSort
retentionSort

repeat with count = 1 to (number of lines in card field Premium)
if desretention <= line count of card field retention then
  if deslimit >= line count of card field limit then
    if line count of card field premium > minPremium then
      put line count of card field premium into minPremium
    end if
  if line count of card field retention = line (count + 1) of card field retention then
    put line count of card field premium + -
    ((deslimit - line count of card field limit)/ -
    (line (count + 1) of card field limit - line count of card field limit) * -
    ((line (count +1) of card field premium - line count of card field premium)) -
    into tempHolder
    if tempHolder > minPremium then
      put tempHolder into minPremium
    end if
  end if
end if
else
end if
end if

defRetention <= line count of card field retention then
  if desLimit <= line count of card field limit then
    put line count of card field premium * -
    (desLimit/line count of card field limit) into tempHolder
    if tempHolder > minPremium then
      put tempHolder into minPremium
    end if
  end if
end if
end if

if desretention >= line count of card field retention then
  if deslimit <= line count of card field limit then
    if line count of card field retention = line (count + 1) of card field retention then
      put line count of card field premium - -
      (line count of card field limit - deslimit)/ -
      (line (count + 1) of card field limit - line count of card field limit) * -
      ((line (count +1) of card field premium - line count of card field premium)) -
      into tempHolder
  end if
end if
if tempHolder < maxPremium then
  put tempHolder into maxPremium
end if
end if
if line count of card field premium < maxPremium then
  put line count of card field premium into maxPremium
end if
end if
if desLimit >= line count of card field limit then
  put line count of card field premium + ~
  \(((\text{desLimit} - \text{line count of card field limit})/\text{line count of card field limit}))^\sim\)
  \text{line count of card field premium} into tempHolder
if tempHolder < maxPremium then
  put tempHolder into maxPremium
end if
if count > 1 then
  if line count of card field retention = line (count - 1) of card field retention then
    put line count of card field premium + \((\text{deslimit} - \text{line count of card field limit})^\sim\)
    \text{line count of card field limit}^\sim\)
    \text{line count of card field premium - line (count - 1) of card field premium})^\sim\)
  into tempHolder
  if tempHolder < maxPremium then
    answer maxPremium
    put tempHolder into maxPremium
    answer maxPremium & & count
    exit mouseUp
  end if
  end if
end if
end if
else
  if count < the number of lines in card field premium then
    if deslimit <= line (count + 1) of card field limit then
      if line count of card field retention = line (count + 1) of card field retention then
        put line count of card field premium + \((\text{deslimit} - \text{line count of card field limit})^\sim\)
        \text{line count of card field limit}^\sim\)
        \text{line count of card field limit} * \sim\)
        \((\text{line (count + 1) of card field limit - line count of card field limit})^\sim\)
      into tempHolder
      if tempHolder < maxPremium then
        put tempHolder into maxPremium
      end if
      end if
      end if
  end if
end if
end if
end repeat
put 999999999 into limitDif
repeat with count = 1 to (number of lines in card field premium)
  if desRetention = line count of card field retention then
put desLimit - (line count & card field limit) into LimitCheck
if LimitCheck < LimitDiff then
    put LimitCheck into limitDiff
    put count into diffCount
end if
end if
end repeat

put 0 into retCheck
put 1 into retCount
if limitDiff < 999999999 then
    repeat with count = 1 to (number of lines in card field Premium)
        if retCheck <> line count of card field retention then

            if (count - retcount) > 1 then
                repeat with xcount = retCount to (count - 1)
                    put (line (count-1) of card field limit) -
                    (line xcount of card field limit) into checkDiff
                if checkDiff = limitDiff then
                    put (line diffCount of card field premium) +
                    (((line (count-1) of card field premium))
                    (line xcount of card field premium))) into tempHolder
                    put tempHolder into minPremium
                    put tempHolder into maxPremium
                end if
            end repeat
        end if
    end repeat
end if
put count into retCount
put line count of card field retention into retCheck
end if
end repeat

put "For a limit of $" & desLimit & " and a retention of $" ~ & desRetention & ", the premium must be between: "$ & return ~ & minPremium & " and "$ & maxPremium & "." into card field "analysis"
end if

if doWhat is "retention" then
    ask "What premium amount do you want?" with desPremium
    if it = "" then exit mouseUp
    put it into desPremium
    ask "What coverage limit do you want?" with desLimit
    if it = "" then exit mouseUp
    put it into desLimit
    put 0 into desRetention

    show card field calculate
    lock screen
put 999999999 into maxRetention
put 0 into minRetention

retentionSort
limitSort

repeat with count = 1 to (number of lines in card field Retention)
if desLimit >= line count of card field limit then
  if desPremium <= line count of card field Premium then
    if line count of card field Retention > minRetention then
      put line count of card field Retention into minRetention
    end if
  if count > 1 then
    put line count of card field limit = line (count - 1) of card field limit then
      put line count of card field Retention + ((line count of card field Premium - desPremium)/(line (count - 1) of card field Premium - line count of card field Premium) * (~
          (line count of card field Retention - line (count -1) of card field Retention))) ~
      into tempHolder
      if tempHolder > minRetention then
        put tempHolder into minRetention
      end if
    end if
  end if
end if

if desLimit <= line count of card field limit then
  if desPremium >= line count of card field Premium then
    if line count of card field Retention < maxRetention then
      put line count of card field Retention into maxRetention
    end if
  else
    if count < the number of lines in card field Retention then
      if desPremium >= line (count + 1) of card field Premium then
        if line count of card field limit = line (count + 1) of card field limit then
          put line count of card field Retention + ~
            ((line count of card field Premium - desPremium) ~
            (line count of card field Retention - line (count + 1) of card field Retention)) ~
          into tempHolder
          if tempHolder < maxRetention then
            put tempHolder into maxRetention
          end if
        end if
      end if
    end if
  end if
end if
end repeat

PremiumSort

repeat with count = 1 to (number of lines in card field Retention)
if desPremium <= line count of card field Premium then
  if desLimit >= line count of card field limit then
    if line count of card field Retention > minRetention then
      put line count of card field Retention into minRetention
    end if
  end if
end if

if desPremium <= line count of card field Premium then
  if desLimit <= line count of card field limit then
    put line count of card field Retention * \rightarrow (desLimit/line count of card field limit) into tempHolder
    if tempHolder > minRetention then
      put tempHolder into minRetention
    end if
  end if
end if

if desPremium >= line count of card field Premium then
  if desLimit <= line count of card field limit then
    if line count of card field Retention < maxRetention then
      put line count of card field Retention into maxRetention
    end if
  end if
  if desLimit >= line count of card field limit then
    put line count of card field Retention + \rightarrow (((desLimit - (line count of card field limit)/\rightarrow (line count of card field limit))\rightarrow (line count of card field Retention)) into tempHolder
    if tempHolder < maxRetention then
      put tempHolder into maxRetention
    end if
  else
    if count < the number of lines in card field Retention then
      if desLimit <= line (count + 1) of card field limit then
        if line count of card field Premium = line (count + 1) of card field Premium then
          put line count of card field Retention + \rightarrow (((desLimit - line count of card field limit)/\rightarrow (line (count + 1) of card field limit - line count of card field limit)) \rightarrow (line (count +1) of card field Retention - line count of card field Retention)) into tempHolder
          if tempHolder < maxRetention then
            put tempHolder into maxRetention
          end if
        end if
      end if
    end if
  end if
end if
end if
end repeat
put "For a limit of $" & desLimit & " and a premium of $" & desPremium & ", the Retention must be between: "; &return & minRetention & " and "; &maxRetention & "." into card field "analysis"
end if

if doWhat is "limit" then
  ask "What premium amount do you want?" with desPremium
  if it = "" then exit mouseUp
  put it into desPremium
  ask "What coverage retention do you want?" with desRetention
  if it = "" then exit mouseUp
  put it into desRetention
  put 0 into desLimit

  show card field calculate
  lock screen

  put 999999999 into maxLimit
  put 0 into minLimit

  limitSort
  retentionSort

  repeat with count = 1 to (number of lines in card field Limit)
    if desRetention >= line count of card field Retention then
      if desPremium >= line count of card field Premium then
        if line count of card field Limit > minLimit then
          put line count of card field Limit into minLimit
        end if
        if count > 1 then
          if line count of card field Retention = line (count - 1) of card field Retention then
            put line count of card field Limit + ((line count of card field Premium - desPremium)/(line (count - 1) of card field Premium - line count of card field Premium) * (line count of card field Limit - line (count -1) of card field Limit))) into tempHolder
          end if
        end if
      end if
    end if
  end repeat

  if desRetention <= line count of card field Retention then
    if desPremium <= line count of card field Premium then
      if line count of card field Limit < maxLimit then
        put line count of card field Limit into maxLimit
      end if
    else
      if count < the number of lines in card field Limit then
        if desPremium <= line (count + 1) of card field Premium then
if line count of card field Retention = line (count + 1) of card field Retention then
put line count of card field Limit + ¬
(line count of card field Premium - desPremium)/ ¬
(line count of card field Premium - line (count + 1) of card field Premium) * ¬
(line (count +1) of card field Limit - line count of card field Limit))/¬
into tempHolder
if tempHolder < maxLimit then
put tempHolder into maxLimit
end if
end if
end if
end if
end if
end if
end if
end if
end repeat

PremiumSort

repeat with count = 1 to (number of lines in card field Limit)
if desPremium >= line count of card field Premium then
if desRetention >= line count of card field Retention then
if line count of card field Limit > minLimit then
put line count of card field Limit into minLimit
end if
end if
end if
end if

if desPremium >= line count of card field Premium then
if desRetention <= line count of card field Retention then
put line count of card field Limit * ¬
(desRetention/line count of card field Retention) into tempHolder
if tempHolder > minLimit then
put tempHolder into minLimit
end if
end if
end if

if desPremium <= line count of card field Premium then
if desRetention <= line count of card field Retention then
if line count of card field Limit < maxLimit then
put line count of card field Limit into maxLimit
end if
end if
end if

if desRetention >= line count of card field Retention then
put line count of card field Limit + ¬
(((desRetention - (line count of card field Retention))/¬
(line count of card field Retention)))*¬
line count of card field Limit) into tempHolder
if tempHolder < maxLimit then
put tempHolder into maxLimit
end if
end if
end if
end repeat

put "For a retention of $" & desRetention & " and a premium of $" & desPremium & ", the limit must be between: " & return & " & minLimit & " and " & maxLimit & "." into card field "analysis"
end if

unlock screen
hide card field calculate

end mouseUp

CARD FIELD: Premium
[This object has no script.]

CARD FIELD: X Axis
... ...

on mouseUp
answer "What is the X Axis?" with "Premium" or "Limit" or "Retention"
put it into card field "X Axis"
end mouseUp

CARD FIELD: Limit
[This object has no script.]

CARD FIELD: Y Axis
... ...

on mouseUp
answer "What is the Y Axis?" with "Premium" or "Limit" or "Retention"
put it into card field "Y Axis"
end mouseUp

CARD FIELD: Z Axis
... ...

on mouseUp
answer "What is the Z Axis?" with "Premium" or "Limit" or "Retention"
put it into card field "Z Axis"
end mouseUp

CARD FIELD: Retention
... ...

on mouseWithin
if the selectedField is not empty then exit mouseWithin
get the scroll of last item of theFields()
if it > the scroll of first item of theFields() then
put the textHeight of last item of theFields() into baselineSize
lock screen
repeat with count = 1 to (number of items in theFields() - 1)
set scroll of (item count of theFields()) to it
end repeat
unlock screen
end if
end mouseWithin

function theFields
  return "card field 1,card field 3,card field 6"
end theFields

CARD FIELD: analysis
[This object has no script.]

CARD FIELD: Progress
[This object has no script.]

CARD FIELD: Setup
[This object has no script.]

CARD FIELD: calculate
[This object has no script.]

CARD FIELD: Help

on mouseUp
  hide card fld "help"
end mouseUp

CARD: card id 2822
[This object has no script.]

CARD BUTTON: Return

on mouseUp
  visual effect stretch from center
  go to first card
end mouseUp

CARD FIELD: Y axis
[This object has no script.]

CARD FIELD: X axis
[This object has no script.]

CARD FIELD: YMax
[This object has no script.]

CARD FIELD: YMin
[This object has no script.]

CARD FIELD: XMin
[This object has no script.]

CARD FIELD: XMean
[This object has no script.]
CARD FIELD: XMax
[This object has no script.]

CARD FIELD: YMean
[This object has no script.]

CARD FIELD: Z axis
[This object has no script.]

CARD FIELD: card field id 12
[This object has no script.]

End of ScriptFile - - - Produced by ScriptWriter™ 1.0 - - - End of ScriptFile

=================================================================
Appendix H - Business Cycles Listing
STACK: Business Cycles

... ... ... ... ... ... ... ... ... ... ...
on openstack
  hide menubar
end openstack

... ... ... ... ... ... ... ... ... ... ...
on resumeStack
  hide menubar
end resumeStack

... ... ... ... ... ... ... ... ... ... ...
on idle
  hide menubar
end idle

... ... ... ... ... ... ... ... ... ... ...
on stella_start
end stella_start

... ... ... ... ... ... ... ... ... ... ...
on stella_pause
end stella_pause

... ... ... ... ... ... ... ... ... ... ...
on stella_resume
end stella_resume

... ... ... ... ... ... ... ... ... ... ...
on stella_stop
end stella_stop

... ... ... ... ... ... ... ... ... ... ...
on stella_report
  global stella_values
    put item 1 of stella_values &return after-
card field "ydata" of card data
    put item 2 of stella_values &return after-
card field "profitdata" of card data
    put item 3 of stella_values &return after-
card field "revdata" of card data
    put item 4 of stella_values &return after-
card field "costdata" of card data
    put item 5 of stella_values &return after-
card field "forecastdata" of card data
end stella_report

... ...
BACKGROUND: bknd id 2737
  [This object has no script.]

... ...
BACKGROUND: File Card

... ... ... ... ... ... ... ... ... ... ...
on closeField
end closeField

... ...

on newCard
  tabKey
end newCard

BACKGROUND BUTTON: Help

... ...

on mouseUp
  show card field "help"
end mouseUp

... ...

BACKGROUND: bkgnid 5979
(This object has no script.)

... ...

CARD: Diagram
(This object has no script.)

... ...

CARD BUTTON: Return

... ...

on mouseUp
  visual effect iris close
  go to stack "easi"
end mouseUp

... ...

CARD BUTTON: Return

... ...

on mouseUp
  visual effect stretch from center
  go to stack "easi"
end mouseUp

... ...

CARD BUTTON: card button id 14

... ...

on mouseUp
  wait 1 second
  visual effect shrink to center
  go to card id 6258
end mouseUp

... ...

CARD BUTTON: Competitor's Expected Profit Margin

... ...

on mouseUp
  global compMargin
  ask "What is the Competitor's average expected profit margin?" with «
  compMargin
  if it is "" then
    exit mouseUp
  end if
  put it into compMargin
end mouseUp
on mouseUp
  global compTime
  ask "How many years does it take competitors to enter and exit the market after a change has occurred?" with ¬
  compTime
  if it is "" then
    exit mouseUp
  end if
  if it < 0.25 then
    answer "The model can only accept values greater than 0.25 years" & ¬
    "(3 months)." ¬
    exit mouseUp
  end if
  put it into compTime
end mouseUp

________________________________________________________________________
CARD BUTTON: Expected Profit Margin
________________________________________________________________________
on mouseUp
  global profMargin
  ask "What is the your average expected profit margin?" with ¬
  profMargin
  if it is "" then
    exit mouseUp
  end if
  put it into profMargin
end mouseUp

________________________________________________________________________
CARD BUTTON: card button id 18
________________________________________________________________________
on mouseUp
  Global compMargin, compTime, profMargin
  lock screen
  if compTime is empty then
    answer "Please enter Time to Exit/Enter the Market " & ¬
    "before simulating." ¬
    exit mouseUp
  end if
  put "TTBC = " & compTime & return ¬
  into card field "Data to Stella" of card boilerplate

  if compMargin is empty then
    answer "Please enter Competitor's Expected Profit Margin " & ¬
    "before simulating." ¬
    exit mouseUp
  end if
  put "NormCEPM = " & compMargin & return ¬
  after card field "Data to Stella" of card boilerplate

  if NormPMargin is empty then
    answer "Please enter Expected Profit Margin " & ¬
"before simulating."
exit mouseUp
end if
put "NormPMargin = " & profMargin & return
after card field "Data to Stella" of card boilerplate

go to card "expected costs"
repeat with n = 0 to 10
   put "Year " & n into yearName
   put "C." & n & " = " & ((card field yearName)*1000) & return after
   card field "Data to Stella" of card boilerplate
end repeat

go to card "boilerplate"
click at the loc of card button "launch"
go to card diagram
unlock screen
end mouseUp

---------------------------------------------
CARD BUTTON: graph
... ... ... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
   global profMargin

   answer "Graph the Competition or Revenue Graph?" with --
      "Competition" or "Revenue" or "Cancel"
     if it is "Cancel" then exit mouseUp
     put it into graphName

   answer "Show last graph or plot new graph?" with--
      "Last Graph" or "New Graph"
     if it is "Last Graph" then
        visual effect shrink to center
     go to card graphName
     exit mouseUp
     end if

     if graphName is "Competition" then
       lock screen
     go to card data
end mouseUp

---------------------------------------------
CARD BUTTON: graph
... ... ... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
   open "Business cycles model" with "STELLA"
end mouseUp

---------------------------------------------
CARD FIELD: Help
... ... ... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
CARD: Expected Costs

on graphIt
    global yearLoc
    put "What is the TOTAL expected cost of a single policy underwritten in year " into quest1
    put yearLoc after quest1
    put "Year " into cardLoc
    put yearLoc after cardLoc
    put "?" after quest1
    put -1 into yearValue
    repeat until yearValue >= 0
        ask quest1 with "125"
        if it is "" then exit graphIt
        lock screen
        put it into yearValue
        if yearValue >= 0 then
            exit repeat
        end if
        answer "The value must be greater than 0."
    end repeat
    put (the round of (yearValue*100))/100 into yearValue
    put yearValue into card field cardLoc
    reset paint
    choose select tool
    drag from 170+(yearLoc*30),50 to 170+(yearLoc*30)+29,250
    doMenu cut picture
    choose rect tool
    set lineSize to 1
    set pattern to 14
    set filled to true
    drag from 170+(yearLoc*30),250 to 170+(yearLoc*30)+29,250-(the round of (yearValue/2.5))
    choose browse tool
    unlock screen
end graphIt

on downButton
    global yearLoc
    put "Year " into cardLoc
    put yearLoc after cardLoc
    put card field cardLoc into yearValue
    put 50 into incrementValue
    lock screen
    subtract incrementValue from yearValue
    if yearValue < 0 then
        put 0 into yearValue
    end if
    put yearValue into card field cardLoc
    reset paint
    choose select tool
drag from 170+(yearLoc*30),50 to 170+(yearLoc*30)+29,250

doMenu cut picture
choose rect tool
setSize to 1
set pattern to 14
set filled to true

drag from 170+(yearLoc*30),250 to 170+(yearLoc*30)+29,250-(the round of (yearValue/2.5))
choose browse tool
unlock screen
end downButton

on upButton

global yearLoc

put "Year " into cardLoc
put yearLoc after cardLoc
put card field cardLoc into yearValue
put 50 into incrementValue
lock screen
add incrementValue to yearValue
if yearValue > 500 then
  put 500 into yearValue
end if
put yearValue into card field cardLoc
choose select tool
reset paint
choose rect tool
setSize to 1
set pattern to 14
set filled to true

drag from 170+(yearLoc*30),250 to 170+(yearLoc*30)+29,250-(the round of (yearValue/2.5))
choose browse tool
unlock screen
end upButton

******************************************************************************

CARD BUTTON: Diagram

******************************************************************************

on mouseUp
  visual effect stretch from center
go to first card
end mouseUp

******************************************************************************

CARD BUTTON: Import data

******************************************************************************

on mouseUp
  global yearLoc
  answer "Import Expected Cost data from the Distribute Lag model?" ~
  with "Yes" or "Cancel"
  if it is "Cancel" then
    exit mouseUp
  end if
  lock screen
  push card

161
go to stack "Distributed Log"
go to card "Expected Costs"
put card field "Year 0" into year0
put card field "Year 1" into year1
put card field "Year 2" into year2
put card field "Year 3" into year3
put card field "Year 4" into year4
put card field "Year 5" into year5
put card field "Year 6" into year6
put card field "Year 7" into year7
put card field "Year 8" into year8
put card field "Year 9" into year9
put card field "Year 10" into year10
pop card
unlock screen
reset paint
put year0 into card field "Year 0"
put 0 into yearLoc
drawAgain
put year1 into card field "Year 1"
put 1 into yearLoc
drawAgain
put year2 into card field "Year 2"
put 2 into yearLoc
drawAgain
put year3 into card field "Year 3"
put 3 into yearLoc
drawAgain
put year4 into card field "Year 4"
put 4 into yearLoc
drawAgain
put year5 into card field "Year 5"
put 5 into yearLoc
drawAgain
put year6 into card field "Year 6"
put 6 into yearLoc
drawAgain
put year7 into card field "Year 7"
put 7 into yearLoc
drawAgain
put year8 into card field "Year 8"
put 8 into yearLoc
drawAgain
put year9 into card field "Year 9"
put 9 into yearLoc
drawAgain
put year10 into card field "Year 10"
put 10 into yearLoc
drawAgain
choose browse tool
end mouseUp
... ... ... ... ... ... ... ... ... ... ... ... ... ...
on drawAgain
global yearLoc
put "Year " into cardLoc
put yearLoc after cardLoc
put card field cardLoc into yearValue
choose select tool
drag from 170+(yearLoc*30),50 to 170+(yearLoc*30)+29,250
doMenu cut picture
choose rect tool
set lineSize to 1
set pattern to 14
set filled to true
drag from 170+(yearLoc*30),250 to 170+(yearLoc*30)+29,250-(the round of (yearValue/2.5))
end drawAgain

---------------------------------------------------------------------
CARDBUTTON: card button id 59

... ... ... ... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
  global yearLoc
  put 0 into yearLoc
  upButton
end mouseUp

---------------------------------------------------------------------
CARDBUTTON: Down

... ... ... ... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
  global yearLoc
  put 0 into yearLoc
downButton
end mouseUp

-------------------------------------------------------------------------------------------------
CARDBUTTON: Down

... ... ... ... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
  global yearLoc
  put 1 into yearLoc
downButton
end mouseUp

-------------------------------------------------------------------------------------------------
CARDBUTTON: Down

... ... ... ... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
  global yearLoc
  put 2 into yearLoc
downButton
end mouseUp

-------------------------------------------------------------------------------------------------
CARDBUTTON: Down

... ... ... ... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
  global yearLoc
  put 3 into yearLoc
downButton
end mouseUp

-------------------------------------------------------------------------------------------------
CARD BUTTON: Down

... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
  global yearLoc
  put 4 into yearLoc
downButton
end mouseUp

CARD BUTTON: Down

... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
  global yearLoc
  put 5 into yearLoc
downButton
end mouseUp

CARD BUTTON: Down

... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
  global yearLoc
  put 6 into yearLoc
downButton
end mouseUp

CARD BUTTON: Down

... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
  global yearLoc
  put 7 into yearLoc
downButton
end mouseUp

CARD BUTTON: Down

... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
  global yearLoc
  put 8 into yearLoc
downButton
end mouseUp

CARD BUTTON: Down

... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
  global yearLoc
  put 9 into yearLoc
downButton
end mouseUp

CARD BUTTON: Down

... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
  global yearLoc
  put 10 into yearLoc
downButton
end mouseUp

CARD BUTTON: card button id 81
...

on mouseUp
  global yearLoc
  put 1 into yearLoc
  upButton
end mouseUp

CARD BUTTON: card button id 82
...

on mouseUp
  global yearLoc
  put 2 into yearLoc
  upButton
end mouseUp

CARD BUTTON: card button id 83
...

on mouseUp
  global yearLoc
  put 3 into yearLoc
  upButton
end mouseUp

CARD BUTTON: card button id 84
...

on mouseUp
  global yearLoc
  put 4 into yearLoc
  upButton
end mouseUp

CARD BUTTON: card button id 85
...

on mouseUp
  global yearLoc
  put 5 into yearLoc
  upButton
end mouseUp

CARD BUTTON: card button id 86
...

on mouseUp
  global yearLoc
  put 6 into yearLoc
  upButton
end mouseUp

CARD BUTTON: card button id 87
...

on mouseUp
  global yearLoc
put 7 into yearLoc
upButton
end mouseUp

CARD BUTTON: card button id 88

... ... ... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
  global yearLoc
  put 8 into yearLoc
  upButton
end mouseUp

CARD BUTTON: card button id 89

... ... ... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
  global yearLoc
  put 9 into yearLoc
  upButton
end mouseUp

CARD BUTTON: card button id 90

... ... ... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
  global yearLoc
  put 10 into yearLoc
  upButton
end mouseUp

CARD FIELD: get Stella models title
[This object has no script.]

CARD FIELD: get Stella Models
on mouseUp
  set cursor to watch
  selectWholeLine word 2 of the clickLine, the target
  put the selection into modelName
  hide card field "get stella models"
  hide card field "get stella models title"
  if "Business Cycles" is in modelName then
    answer "Go to Stella Business Cycles model?" with "Okay" or "Cancel"
    if it is "Okay" then
      open "D&O Model 1" with "STELLA"
    else
      exit mouseUp
    end if
  else
    answer "Model is not yet available."
  end if
end mouseUp

CARD FIELD: get data models title
[This object has no script.]

CARD FIELD: get Data Models
on mouseUp
  set cursor to watch
  selectWholeLine word 2 of the clickLine, the target
  put the selection into modelName
  hide card field "get data models"
  hide card field "get data models title"
  if "Insure?" is in modelName then
    answer "Go to Data 'Insure? model?' with "Okay" or "Cancel"
    if it is "Okay" then
      open "Insure?" with "DATA"
    else
      exit mouseUp
    end if
  else
    answer "Model is not yet available."
  end if
end mouseUp

CARD FIELD: Year 0

on mouseUp
  global yearLoc
  put 0 into yearLoc
  graphIt
end mouseUp

CARD FIELD: Year 1

on mouseUp
  global yearLoc
  put 1 into yearLoc
  graphIt
end mouseUp

CARD FIELD: Year 2

on mouseUp
  global yearLoc
  put 2 into yearLoc
  graphIt
end mouseUp

CARD FIELD: Year 3

on mouseUp
  global yearLoc
  put 3 into yearLoc
  graphIt
end mouseUp

CARD FIELD: Year 4

on mouseUp
  global yearLoc
put 4 into yearLoc
graphIt
end mouseUp

CARD FIELD: Year 5

... ... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
  global yearLoc
  put 5 into yearLoc
  graphIt
end mouseUp

CARD FIELD: Year 6

... ... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
  global yearLoc
  put 6 into yearLoc
  graphIt
end mouseUp

CARD FIELD: Year 7

... ... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
  global yearLoc
  put 7 into yearLoc
  graphIt
end mouseUp

CARD FIELD: Year 8

... ... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
  global yearLoc
  put 8 into yearLoc
  graphIt
end mouseUp

CARD FIELD: Year 9

... ... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
  global yearLoc
  put 9 into yearLoc
  graphIt
end mouseUp

CARD FIELD: Year 10

... ... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
  global yearLoc
  put 10 into yearLoc
  graphIt
end mouseUp

CARD FIELD: Help

... ... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
  hide card fld "help"
end mouseUp

...  
CARD: competition
[This object has no script.]

CARD BUTTON: Return

...  
CARD FIELD: graphfield
[This object has no script.]

CARD FIELD: CompPressure
[This object has no script.]

CARD FIELD: card field id 16
[This object has no script.]

CARD FIELD: card field id 17
[This object has no script.]

CARD FIELD: ProfitMarg
[This object has no script.]

CARD FIELD: Years
[This object has no script.]

CARD FIELD: card field id 20
[This object has no script.]

CARD: revenue
[This object has no script.]

CARD BUTTON: Return

...  
CARD FIELD: graphfield
[This object has no script.]

CARD FIELD: revenue
[This object has no script.]

CARD FIELD: card field id 16
CARD FIELD: card field id 5
[This object has no script.]

CARD FIELD: min
[This object has no script.]

CARD FIELD: card field id 7
[This object has no script.]

CARD FIELD: max
[This object has no script.]

CARD FIELD: profittdata
[This object has no script.]

CARD FIELD: Revdata
[This object has no script.]

CARD FIELD: Costdata
[This object has no script.]

CARD FIELD: Forecastdata
[This object has no script.]

... CARD: Boilerplate
[This object has no script.]

CARD BUTTON: Launch
... ... ... ... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
  -- DECLARATION of GLOBALS
global ~
stella_state, stella_globals, stella_values, dtValue

  -- CHECKING run-time STATUS
if stella_state = "running" then exit mouseup
if stella_globals ≠ "" then exit mouseup

  put "" into card field ydata of card data
  put "" into card field profittdata of card data
  put "" into card field revdata of card data
  put "" into card field costdata of card data
  put "" into card field forecastdata of card data

  -- INVOKING the KERNEL
  stella ~
card field "model name", ~
card field "Data to STELLA", ~
card field "Data from STELLA", ~
card field "Run Options"
  -- REPORTING ERROR MESSAGES
if the result ≠ "" then put the result
end mouseUp
CARD BUTTON: Stop

... ... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp

global-
    stella_globals, stella_state
put "stop" into stella_state
if stella_globals ≠ "" then
    stella
    if the result ≠ "" then put the result
end if
end mouseUp

CARD BUTTON: Resume

... ... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
    global-
    stellaGlobals

    if stella_globals = "" then exit mouseup
    stella
    if the result ≠ "" then put the result
end mouseUp

CARD BUTTON: About

... ... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
    global stella_state

    if stella_state = "running" then exit mouseup

    put stella_state into temp
    put "about" into stella_state
    stella
    put temp into stella_state
end mouseUp

CARD BUTTON: Pause

... ... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
    global ~
    stella_state

    put "pause" into stella_state
end mouseUp

CARD BUTTON: Quit

... ... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
    domenu "Quit Hypercard"
end mouseUp

CARD FIELD: card field id 26
[This object has no script.]

CARD FIELD: model name
[This object has no script.]

CARD FIELD: Data to STELLA
[This object has no script.]

CARD FIELD: Data from STELLA
[This object has no script.]

CARD FIELD: run options
[This object has no script.]

CARD FIELD: Printed Output
[This object has no script.]

CARD FIELD: card field id 19
[This object has no script.]

CARD FIELD: card field id 20
[This object has no script.]

CARD FIELD: card field id 21
[This object has no script.]

CARD FIELD: card field id 22
[This object has no script.]

CARD FIELD: card field id 23
[This object has no script.]

CARD FIELD: card field id 24
[This object has no script.]

CARD FIELD: card field id 25
[This object has no script.]

End of ScriptFile - - - Produced by ScriptWriter™ 1.0 - - - End of ScriptFile
Appendix I - Distributed Lag Listing
STACK: Distributed Lag

... ... ... ... ... ... ... ... ... ... ... ... ... ...
on openstack
  hide menubar
end openstack

... ... ... ... ... ... ... ... ... ... ... ... ... ...
on resumeStack
  hide menubar
end resumeStack

... ... ... ... ... ... ... ... ... ... ... ... ... ...
on idle
  hide menubar
end idle

... ... ... ... ... ... ... ... ... ... ... ... ... ...
on stella_start
end stella_start

... ... ... ... ... ... ... ... ... ... ... ... ... ...
on stella_pause
end stella_pause

... ... ... ... ... ... ... ... ... ... ... ... ... ...
on stella_resume
end stella_resume

... ... ... ... ... ... ... ... ... ... ... ... ... ...
on stella_stop
end stella_stop

... ... ... ... ... ... ... ... ... ... ... ... ... ...
on stella_report
  global stella_values
  put item 1 of stella_values &return after-
  card field "ydata" of card data
  put item 2 of stella_values &return after-
  card field "costdata" of card data
  put item 3 of stella_values &return after-
  card field "claimdata" of card data
  put item 4 of stella_values &return after-
  card field "profitdata" of card data
  put item 5 of stella_values &return after-
  card field "revdata" of card data
  put item 6 of stella_values &return after-
  card field "expensedata" of card data
end stella_report

... ... ... ... ... ... ... ... ... ... ... ... ... ...

BACKGROUND: bkngd id 2737
[This object has no script.]

... ...

BACKGROUND: File Card
... ... ... ... ... ... ... ... ... ... ... ... ... ...
on closeField

174
end closeField

on newCard
tabKey
end newCard

BACKGROUND BUTTON: Help

on mouseUp
  show card field "help"
end mouseUp

BACKGROUND: bgnd id 5979
[This object has no script.]

CARD: diagram
[This object has no script.]

CARD BUTTON: Return

on mouseUp
  visual effect iris close
  go to stack "easi"
end mouseUp

CARD BUTTON: Return

on mouseUp
  visual effect stretch from center
  go to stack "easi"
end mouseUp

CARD BUTTON: Premium

on mouseUp
  visual effect shrink to center
  go to card premium
end mouseUp

CARD BUTTON: Number of Policies

on mouseUp
  visual effect shrink to center
  go to card "number of policies"
end mouseUp

CARD BUTTON: Expected Costs

on mouseUp
  visual effect shrink to center
  go to card "expected costs"
end mouseUp

CARD BUTTON: Cost Lag

... ... ... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
  visual effect shrink to center
  go to card "cost lag"
end mouseUp

CARD BUTTON: graph

... ... ... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
  open "Distributed Lag Model" with "STELLA"
end mouseUp

CARD BUTTON: graph

... ... ... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
  global profMargin
  answer "Graph the Policy or Profit Graph?" with ¬
    "Policy" or "Profit" or "Cancel"
  if it is "Cancel" then exit mouseUp
  put it into graphName
  answer "Show last graph or plot new graph?" with ¬
    "Last Graph" or "New Graph"
  if it is "Last Graph" then
    visual effect shrink to center
    go to card graphName
    exit mouseUp
  end if

if graphName is "Policy" then
  lock screen
  go to card data
end mouseUp

CARD BUTTON: card button id 14

... ... ... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
  lock screen
  go to card "premium"
  put "R_0 = " & ((card field "Year 0")*1000) &return into¬
card field "Data to Stella" of card boilerplate
repeat with n = 1 to 10
  put "Year " &n into yearName
  put "R_" &n & " = " & ((card field yearName)*1000) &return after ¬
card field "Data to Stella" of card boilerplate
end repeat
go to card "expected costs"
repeat with n = 0 to 10
    put "Year " &n into yearName
    put "C_" &n & " = " & ((card field yearName)*1000) &return after -
    card field "Data to Stella" of card boilerplate
end repeat

go to card "Number of Policies"
repeat with n = 0 to 10
    put "Year " &n into yearName
    put "P_" &n & " = " & ((card field yearName)) &return after -
    card field "Data to Stella" of card boilerplate
end repeat

go to card "Cost Lag"
repeat with n = 0 to 10
    put "Year " &n into yearName
    put "PY" &n & " = " & ((card field yearName)) &return after -
    card field "Data to Stella" of card boilerplate
end repeat

go to card "boilerplate"
    click at the loc of card button "launch"

go to card diagram
    unlock screen
end mouseUp

.......................... ................................................
CARD FIELD: Help
.......................... ............................................
    on mouseUp
        hide card fld "help"
    end mouseUp

.......................... ............................................
CARD: Premium
.......................... ............................................
    on graphIt
        global yearLoc
        put "What is the TOTAL expected cost of a single policy underwritten in year " into quest1
        put yearLoc after quest1
        put "Year " into cardLoc
        put yearLoc after cardLoc
        put "?" after quest1
        put -1 into yearValue
        repeat until yearValue >= 0
            ask quest1 with "150"
            if it is "" then exit graphIt
            lock screen
            put it into yearValue
            if yearValue >= 0 then
                exit repeat
            end if
answer "The value must be greater than 0."
end repeat
put (the round of (yearValue*100))/100 into yearValue
put yearValue into card field cardLoc
reset paint
choose select tool
drag from 170+(yearLoc*30),50 to 170+(yearLoc*30)+29,250
doMenu cut picture
choose rect tool
set size to 1
set pattern to 14
set filled to true
drag from 170+(yearLoc*30),250 to 170+(yearLoc*30)+29,−250-(the round of (yearValue/2.5))
choose browse tool
unlock screen
end graphIt

... ... ... ... ... ... ... ... ... ... ... ... ... ... ...
on downButton
global yearLoc
put "Year " into cardLoc
put yearLoc after cardLoc
put card field cardLoc into yearValue
put 25 into incrementValue
lock screen
subtract incrementValue from yearValue
if yearValue < 0 then
    put 0 into yearValue
end if
put yearValue into card field cardLoc
reset paint
choose select tool
drag from 170+(yearLoc*30),50 to 170+(yearLoc*30)+29,250
doMenu cut picture
choose rect tool
set size to 1
set pattern to 14
set filled to true
drag from 170+(yearLoc*30),250 to 170+(yearLoc*30)+29,−250-(the round of (yearValue/2.5))
choose browse tool
unlock screen
end downButton

... ... ... ... ... ... ... ... ... ... ... ... ... ... ...
on upButton
global yearLoc
put "Year " into cardLoc
put yearLoc after cardLoc
put card field cardLoc into yearValue
put 25 into incrementValue
lock screen
add incrementValue to yearValue
if yearValue > 500 then
    put 500 into yearValue
end if
put yearValue into card field cardLoc
choose select tool
reset paint
choose rect tool
set lineSize to 1
set pattern to 14
set filled to true
drag from 170+(yearLoc*30),250 to 170+(yearLoc*30)+29,250-(the round of (yearValue/2.5))
choose browse tool
unlock screen
end upButton

CARD BUTTON: Diagram

on mouseUp
  visual effect stretch from center
go to first card
end mouseUp

CARD BUTTON: card button id 59

on mouseUp
  global yearLoc
  put 0 into yearLoc
  upButton
end mouseUp

CARD BUTTON: Down

on mouseUp
  global yearLoc
  put 0 into yearLoc
downButton
end mouseUp

CARD BUTTON: Down

on mouseUp
  global yearLoc
  put 1 into yearLoc
downButton
end mouseUp

CARD BUTTON: Down

on mouseUp
  global yearLoc
  put 1 into yearLoc
downButton
end mouseUp

CARD BUTTON: Down
CARD BUTTON: Down

on mouseUp
  global yearLoc
downButton
end mouseUp

CARD BUTTON: Down

on mouseUp
  global yearLoc
downButton
end mouseUp

CARD BUTTON: Down

on mouseUp
  global yearLoc
downButton
end mouseUp

CARD BUTTON: Down

on mouseUp
  global yearLoc
downButton
end mouseUp

CARD BUTTON: Down

on mouseUp
  global yearLoc
downButton
end mouseUp

CARD BUTTON: Down

on mouseUp
  global yearLoc
downButton
end mouseUp

CARD BUTTON: Down

on mouseUp
  global yearLoc
downButton
end mouseUp
CARD BUTTON: Down

... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
  global yearLoc
  put 10 into yearLoc
downButton
end mouseUp

CARD BUTTON: card button id 81

... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
  global yearLoc
  put 1 into yearLoc
upButton
end mouseUp

CARD BUTTON: card button id 82

... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
  global yearLoc
  put 2 into yearLoc
upButton
end mouseUp

CARD BUTTON: card button id 83

... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
  global yearLoc
  put 3 into yearLoc
upButton
end mouseUp

CARD BUTTON: card button id 84

... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
  global yearLoc
  put 4 into yearLoc
upButton
end mouseUp

CARD BUTTON: card button id 85

... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
  global yearLoc
  put 5 into yearLoc
upButton
end mouseUp

CARD BUTTON: card button id 86

... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
  global yearLoc
  put 6 into yearLoc
upButton
end mouseUp

CARD BUTTON: card button id 87
... ... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
  global yearLoc
  put 7 into yearLoc
  upButton
end mouseUp

CARD BUTTON: card button id 88
... ... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
  global yearLoc
  put 8 into yearLoc
  upButton
end mouseUp

CARD BUTTON: card button id 89
... ... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
  global yearLoc
  put 9 into yearLoc
  upButton
end mouseUp

CARD BUTTON: card button id 90
... ... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
  global yearLoc
  put 10 into yearLoc
  upButton
end mouseUp

CARD FIELD: Year 0
... ... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
  global yearLoc
  put 0 into yearLoc
  graphIt
end mouseUp

CARD FIELD: Year 1
... ... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
  global yearLoc
  put 1 into yearLoc
  graphIt
end mouseUp

CARD FIELD: Year 2
... ... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
global yearLoc
put 2 into yearLoc
graphIt
end mouseUp

CARD FIELD: Year 3

on mouseUp
  global yearLoc
  put 3 into yearLoc
  graphIt
end mouseUp

CARD FIELD: Year 4

on mouseUp
  global yearLoc
  put 4 into yearLoc
  graphIt
end mouseUp

CARD FIELD: Year 5

on mouseUp
  global yearLoc
  put 5 into yearLoc
  graphIt
end mouseUp

CARD FIELD: Year 6

on mouseUp
  global yearLoc
  put 6 into yearLoc
  graphIt
end mouseUp

CARD FIELD: Year 7

on mouseUp
  global yearLoc
  put 7 into yearLoc
  graphIt
end mouseUp

CARD FIELD: Year 8

on mouseUp
  global yearLoc
  put 8 into yearLoc
  graphIt
end mouseUp

CARD FIELD: Year 9
on mouseUp
  global yearLoc
  put 9 into yearLoc
  graphIt
end mouseUp

CARD FIELD: Year 10

on mouseUp
  global yearLoc
  put 10 into yearLoc
  graphIt
end mouseUp

CARD FIELD: Help

on mouseUp
  hide card fld "help"
end mouseUp

CARD: Expected Costs

on graphIt
  global yearLoc
  put "What is the TOTAL expected cost of a single policy underwritten in year " into quest1
  put yearLoc after quest1
  put "Year " into cardLoc
  put yearLoc after cardLoc
  put "?" after quest1
  put -1 into yearValue
  repeat until yearValue >= 0
    ask quest1 with "125"
    if it is "" then exit graphIt
    lock screen
    put it into yearValue
    if yearValue >= 0 then
      exit repeat
    end if
  answer "The value must be greater than 0."
end repeat
  put (the round of (yearValue*100))/100 into yearValue
  put yearValue into card field cardLoc
  reset paint
  choose select tool
  drag from 170+(yearLoc*30),50 to 170+(yearLoc*30)+29,250
doMenu cut picture
  choose rect tool
  set lineSize to 1
  set pattern to 14
  set filled to true
  drag from 170+(yearLoc*30),250 to 170+(yearLoc*30)+29,-250-(the round of (yearValue/2.5))
choose browse tool
unlock screen
end graphIt

... ...

on downButton
  global yearLoc
  put "Year " into cardLoc
  put yearLoc after cardLoc
  put card field cardLoc into yearValue
  put 25 into incrementValue
  lock screen
  subtract incrementValue from yearValue
  if yearValue < 0 then
    put 0 into yearValue
  end if
  put yearValue into card field cardLoc
  reset paint
  choose select tool
  drag from 170+(yearLoc*30),50 to 170+(yearLoc*30)+29,250
  doMenu cut picture
  choose rect tool
  set lineSize to 1
  set pattern to 14
  set filled to true
  drag from 170+(yearLoc*30),250 to 170+(yearLoc*30)+29,-
  250-(the round of (yearValue/2.5))
  choose browse tool
  unlock screen
end downButton

... ...

on upButton
  global yearLoc
  put "Year " into cardLoc
  put yearLoc after cardLoc
  put card field cardLoc into yearValue
  put 25 into incrementValue
  lock screen
  add incrementValue to yearValue
  if yearValue > 500 then
    put 500 into yearValue
  end if
  put yearValue into card field cardLoc
  choose select tool
  reset paint
  choose rect tool
  set lineSize to 1
  set pattern to 14
  set filled to true
  drag from 170+(yearLoc*30),250 to 170+(yearLoc*30)+29,-
  250-(the round of (yearValue/2.5))
  choose browse tool
  unlock screen
end upButton

... ...
CARD BUTTON: Diagram

on mouseUp
  visual effect stretch from center
go to first card
end mouseUp

CARD BUTTON: card button id 59

on mouseUp
  global yearLoc
  put 0 into yearLoc
  upButton
end mouseUp

CARD BUTTON: Down

on mouseUp
  global yearLoc
  put 0 into yearLoc
downButton
end mouseUp

CARD BUTTON: Down

on mouseUp
  global yearLoc
  put 1 into yearLoc
downButton
end mouseUp

CARD BUTTON: Down

on mouseUp
  global yearLoc
  put 2 into yearLoc
downButton
end mouseUp

CARD BUTTON: Down

on mouseUp
  global yearLoc
  put 3 into yearLoc
downButton
end mouseUp

CARD BUTTON: Down

on mouseUp
  global yearLoc
  put 4 into yearLoc
downButton
end mouseUp
CARD BUTTON: Down

on mouseUp
  global yearLoc
  put 5 into yearLoc
downButton
end mouseUp

CARD BUTTON: Down

on mouseUp
  global yearLoc
  put 6 into yearLoc
downButton
end mouseUp

CARD BUTTON: Down

on mouseUp
  global yearLoc
  put 7 into yearLoc
downButton
end mouseUp

CARD BUTTON: Down

on mouseUp
  global yearLoc
  put 8 into yearLoc
downButton
end mouseUp

CARD BUTTON: Down

on mouseUp
  global yearLoc
  put 9 into yearLoc
downButton
end mouseUp

CARD BUTTON: Down

on mouseUp
  global yearLoc
  put 10 into yearLoc
downButton
end mouseUp

CARD BUTTON: card button id 81

on mouseUp
  global yearLoc
  put 1 into yearLoc
upButtonend mouseUp

CARD BUTTON: card button id 82
.......

on mouseUp
  global yearLoc
  put 2 into yearLoc
  upButton
end mouseUp

CARD BUTTON: card button id 83
.......

on mouseUp
  global yearLoc
  put 3 into yearLoc
  upButton
end mouseUp

CARD BUTTON: card button id 84
.......

on mouseUp
  global yearLoc
  put 4 into yearLoc
  upButton
end mouseUp

CARD BUTTON: card button id 85
.......

on mouseUp
  global yearLoc
  put 5 into yearLoc
  upButton
end mouseUp

CARD BUTTON: card button id 86
.......

on mouseUp
  global yearLoc
  put 6 into yearLoc
  upButton
end mouseUp

CARD BUTTON: card button id 87
.......

on mouseUp
  global yearLoc
  put 7 into yearLoc
  upButton
end mouseUp

CARD BUTTON: card button id 88
.......

on mouseUp
global yearLoc
put 8 into yearLoc
upButton
end mouseUp

CARD BUTTON: card button id 89

... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
global yearLoc
put 9 into yearLoc
upButton
end mouseUp

CARD BUTTON: card button id 90

... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
global yearLoc
put 10 into yearLoc
upButton
end mouseUp

CARD BUTTON: Import data

... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
global yearLoc
answer "Import Expected Cost data from the Business Cycles model?" ¬
with "Yes" or "Cancel"
if it is "Cancel" then
  exit mouseUp
end if
lock screen
push card
go to stack "Business Cycles"
go to card "Expected Costs"
put card field "Year 0" into year0
put card field "Year 1" into year1
put card field "Year 2" into year2
put card field "Year 3" into year3
put card field "Year 4" into year4
put card field "Year 5" into year5
put card field "Year 6" into year6
put card field "Year 7" into year7
put card field "Year 8" into year8
put card field "Year 9" into year9
put card field "Year 10" into year10
pop card
unlock screen
reset paint
put year0 into card field "Year 0"
put 0 into yearLoc
drawAgain
put year1 into card field "Year 1"
put 1 into yearLoc
drawAgain

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put year2 into card field "Year 2"
put 3 into yearLoc
drawAgain
put year3 into card field "Year 3"
put 3 into yearLoc
drawAgain
put year4 into card field "Year 4"
put 4 into yearLoc
drawAgain
put year5 into card field "Year 5"
put 5 into yearLoc
drawAgain
put year6 into card field "Year 6"
put 6 into yearLoc
drawAgain
put year7 into card field "Year 7"
put 7 into yearLoc
drawAgain
put year8 into card field "Year 8"
put 8 into yearLoc
drawAgain
put year9 into card field "Year 9"
put 9 into yearLoc
drawAgain
put year10 into card field "Year 10"
put 10 into yearLoc
drawAgain
choose browse tool
end mouseUp

on drawAgain
  global yearLoc
  put "Year " into cardLoc
  put yearLoc after cardLoc
  put card field cardLoc into yearValue
  choose select tool
drag from 170+(yearLoc*30),50 to 170+(yearLoc*30)+29,250
doMenu cut picture
choose rect tool
set lineSize to 1
set pattern to 14
set filled to true
drag from 170+(yearLoc*30),250 to 170+(yearLoc*30)+29,-
250-(the round of (yearValue/2.5))
end drawAgain

CARD FIELD: Year 0

on mouseUp
  global yearLoc
  put 0 into yearLoc
  graphit
end mouseUp

.................................................................
CARD FIELD: Year 1

... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp  
  global yearLoc  
  put 1 into yearLoc  
  graphIt  
end mouseUp

CARD FIELD: Year 2

... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp  
  global yearLoc  
  put 2 into yearLoc  
  graphIt  
end mouseUp

CARD FIELD: Year 3

... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp  
  global yearLoc  
  put 3 into yearLoc  
  graphIt  
end mouseUp

CARD FIELD: Year 4

... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp  
  global yearLoc  
  put 4 into yearLoc  
  graphIt  
end mouseUp

CARD FIELD: Year 5

... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp  
  global yearLoc  
  put 5 into yearLoc  
  graphIt  
end mouseUp

CARD FIELD: Year 6

... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp  
  global yearLoc  
  put 6 into yearLoc  
  graphIt  
end mouseUp

CARD FIELD: Year 7

... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp  
  global yearLoc  
  put 7 into yearLoc  
  graphIt
end mouseUp

CARD FIELD: Year 8

on mouseUp
  global yearLoc
  put 8 into yearLoc
  graphIt
end mouseUp

CARD FIELD: Year 9

on mouseUp
  global yearLoc
  put 9 into yearLoc
  graphIt
end mouseUp

CARD FIELD: Year 10

on mouseUp
  global yearLoc
  put 10 into yearLoc
  graphIt
end mouseUp

CARD FIELD: Help

on mouseUp
  hide card fld "help"
end mouseUp

CARD: Number of Policies

on idle
  put card field "year 1" + card field "year 2" + card field "year 3" -
  + card field "year 4" + card field "year 5" + card field "year 6" -
  + card field "year 7" + card field "year 8" + card field "year 9" -
  + card field "year 10" into card field "cumulative total"
end idle

on graphIt
  global yearLoc
  put "How many policies will be undrawn in year " into quest1
  put yearLoc after quest1
  put "Year " into cardLoc
  put yearLoc after cardLoc
  put "7" after quest1
  put -1 into yearValue
  repeat until yearValue >= 0
    ask quest1 with "250"
    if it is "" then exit graphIt
  lock screen
put it into yearValue
if yearValue >= 0 then
  exit repeat
end if
  answer "The value must be greater than 0."
end repeat
put (the round of (yearValue*100))/100 into yearValue
put yearValue into card field cardLoc
reset paint
choose select tool
drag from 170+(yearLoc*30),50 to 170+(yearLoc*30)+29,250
doMenu cut picture
choose rect tool
set lineSize to 1
set pattern to 14
set filled to true
drag from 170+(yearLoc*30),250 to 170+(yearLoc*30)+29,~
250-(the round of (yearValue/5))
choose browse tool
unlock screen
end graphIt

... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... on downButton
  global yearLoc
  put "Year " into cardLoc
  put yearLoc after cardLoc
  put card field cardLoc into yearValue
  put 50 into incrementValue
  lock screen
  subtract incrementValue from yearValue
  if yearValue < 0 then
    put 0 into yearValue
  end if
  put yearValue into card field cardLoc
  reset paint
  choose select tool
drag from 170+(yearLoc*30),50 to 170+(yearLoc*30)+29,250
  doMenu cut picture
choose rect tool
set lineSize to 1
set pattern to 14
set filled to true
drag from 170+(yearLoc*30),250 to 170+(yearLoc*30)+29,~
250-(the round of (yearValue/5))
choose browse tool
unlock screen
end downButton

... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... on upButton
  global yearLoc
  put "Year " into cardLoc
  put yearLoc after cardLoc
  put card field cardLoc into yearValue
  put 50 into incrementValue
lock screen
add incrementValue to yearValue
if yearValue > 1000 then
  put 1000 into yearValue
end if
put yearValue into card field cardLoc
choose select tool
reset paint
choose rect tool
set lineSize to 1
set pattern to 14
set filled to true
drag from 170+(yearLoc*30),250 to 170+(yearLoc*30)+29,→
250-(the round of (yearValue/5))
choose browse tool
unlock screen
der end upButton

CARD BUTTON: Diagram

... ... ... ... ... ... ... ... ... ...
on mouseUp
  visual effect stretch from center
  go to first card
end mouseUp

CARD BUTTON: card button id 59

... ... ... ... ... ... ... ... ... ...
on mouseUp
  global yearLoc
  put 0 into yearLoc
  upButton
end mouseUp

CARD BUTTON: Down

... ... ... ... ... ... ... ... ... ...
on mouseUp
  global yearLoc
  put 0 into yearLoc
downButton
end mouseUp

CARD BUTTON: Down

... ... ... ... ... ... ... ... ... ...
on mouseUp
  global yearLoc
  put 1 into yearLoc
downButton
end mouseUp

CARD BUTTON: Down

... ... ... ... ... ... ... ... ... ...
on mouseUp
  global yearLoc
  put 2 into yearLoc
global yearLoc
put 9 into yearLoc
downButton
end mouseUp

-----------------------------------------------------
CARD BUTTON: Down
... ... ... ... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
  global yearLoc
  put 10 into yearLoc
downButton
end mouseUp

-----------------------------------------------------
CARD BUTTON: card button id 81
... ... ... ... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
  global yearLoc
  put 1 into yearLoc
  upButton
end mouseUp

-----------------------------------------------------
CARD BUTTON: card button id 82
... ... ... ... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
  global yearLoc
  put 2 into yearLoc
  upButton
end mouseUp

-----------------------------------------------------
CARD BUTTON: card button id 83
... ... ... ... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
  global yearLoc
  put 3 into yearLoc
  upButton
end mouseUp

-----------------------------------------------------
CARD BUTTON: card button id 84
... ... ... ... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
  global yearLoc
  put 4 into yearLoc
  upButton
end mouseUp

-----------------------------------------------------
CARD BUTTON: card button id 85
... ... ... ... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
  global yearLoc
  put 5 into yearLoc
  upButton
end mouseUp

-----------------------------------------------------
CARD BUTTON: card button id 86
on mouseUp
  global yearLoc
  put 6 into yearLoc
  upButton
end mouseUp

CARD BUTTON: card button id 87

on mouseUp
  global yearLoc
  put 7 into yearLoc
  upButton
end mouseUp

CARD BUTTON: card button id 88

on mouseUp
  global yearLoc
  put 8 into yearLoc
  upButton
end mouseUp

CARD BUTTON: card button id 89

on mouseUp
  global yearLoc
  put 9 into yearLoc
  upButton
end mouseUp

CARD BUTTON: card button id 90

on mouseUp
  global yearLoc
  put 10 into yearLoc
  upButton
end mouseUp

CARD FIELD: Cumulative Total

on mouseUp
end mouseUp

CARD FIELD: Year 0

on mouseUp
  global yearLoc
  put 0 into yearLoc
  graphIt
end mouseUp

CARD FIELD: Year 1
on mouseUp
  global yearLoc
  put 1 into yearLoc
  graphIt
end mouseUp

CARD FIELD: Year 2

on mouseUp
  global yearLoc
  put 2 into yearLoc
  graphIt
end mouseUp

CARD FIELD: Year 3

on mouseUp
  global yearLoc
  put 3 into yearLoc
  graphIt
end mouseUp

CARD FIELD: Year 4

on mouseUp
  global yearLoc
  put 4 into yearLoc
  graphIt
end mouseUp

CARD FIELD: Year 5

on mouseUp
  global yearLoc
  put 5 into yearLoc
  graphIt
end mouseUp

CARD FIELD: Year 6

on mouseUp
  global yearLoc
  put 6 into yearLoc
  graphIt
end mouseUp

CARD FIELD: Year 7

on mouseUp
  global yearLoc
  put 7 into yearLoc
  graphIt
end mouseUp
CARD FIELD: Year 8

on mouseUp
  global yearLoc
  put 8 into yearLoc
graphIt
end mouseUp

CARD FIELD: Year 9

on mouseUp
  global yearLoc
  put 9 into yearLoc
graphIt
end mouseUp

CARD FIELD: Year 10

on mouseUp
  global yearLoc
  put 10 into yearLoc
graphIt
end mouseUp

CARD FIELD: Help

on mouseUp
  hide card fld "help"
end mouseUp

CARD: Cost Lag

on idle
  put card field "year 1" + card field "year 2" + card field "year 3" +
  + card field "year 4" + card field "year 5" + card field "year 6" +
  + card field "year 7" + card field "year 8" + card field "year 9" +
  + card field "year 10" into card field "cumulative total"
end idle

on graphIt
  global yearLoc
  put "What portion of the costs will be claimed in year " into quest1
  put yearLoc after quest1
  put "Year " into cardLoc
  put yearLoc after cardLoc
  put "?" after quest1
  put -1 into yearValue

repeat until yearValue <= 1 and yearValue >= 0
  ask quest1 with "0.1"
  if it is "" then exit graphIt
  lock screen
put it into yearValue
if yearValue <= 1 and yearValue >= 0 then
    exit repeat
end if
answer "The portion must be between 0 and 1."
end repeat

put (the round of (yearValue*100))/100 into yearValue
put yearValue into card field cardLoc
reset paint
choose select tool
drag from 170+(yearLoc*30),50 to 170+(yearLoc*30)+29,250
doMenu cut picture
choose rect tool
set lineSize to 1
set pattern to 14
set filled to true
drag from 170+(yearLoc*30),250 to 170+(yearLoc*30)+29,-250-(200*yearValue)
choose browse tool
unlock screen
end graphIt

on downButton
    global yearLoc
    put "Year " into cardLoc
    put yearLoc after cardLoc
    put card field cardLoc into yearValue
    put 0.05 into incrementValue
    lock screen
    subtract incrementValue from yearValue
    if yearValue < 0 then
        put 0 into yearValue
    end if
    put yearValue into card field cardLoc
    reset paint
    choose select tool
drag from 170+(yearLoc*30),50 to 170+(yearLoc*30)+29,250
doMenu cut picture
choose rect tool
set lineSize to 1
set pattern to 14
set filled to true
drag from 170+(yearLoc*30),250 to 170+(yearLoc*30)+29,-250-(200*yearValue)
choose browse tool
unlock screen
end downButton

on upButton
    global yearLoc
    put "Year " into cardLoc
    put yearLoc after cardLoc
    put card field cardLoc into yearValue

200
put 0.05 into incrementValue
lock screen
add incrementValue to yearValue
if yearValue > 1 then
    put 1 into yearValue
end if
put yearValue into card field cardLoc
choose select tool
reset paint
choose rect tool
set lineSize to 1
set pattern to 14
set filled to true
drag from 170+(yearLoc*30),250 to 170+(yearLoc*30)+29,~
250-(200*yearValue)
choose browse tool
unlock screen
end upButton

.......................................................... CARD BUTTON: Diagram
..........................................................
on mouseUp
    if card field "cumulative total" <> 1 then
        answer "The cumulative total must equal 1.0."
        exit mouseUp
    end if
    visual effect stretch from center
go to first card
end mouseUp

.......................................................... CARD BUTTON: card button id 59
..........................................................
on mouseUp
    global yearLoc
    put 0 into yearLoc
upButton
end mouseUp

.......................................................... CARD BUTTON: Down
..........................................................
on mouseUp
    global yearLoc
    put 0 into yearLoc
downButton
end mouseUp

.......................................................... CARD BUTTON: Down
..........................................................
on mouseUp
    global yearLoc
    put 1 into yearLoc
downButton
end mouseUp
CARD BUTTON: Down

on mouseUp
  global yearLoc
  put 2 into yearLoc
downButton
end mouseUp

CARD BUTTON: Down

on mouseUp
  global yearLoc
  put 3 into yearLoc
downButton
end mouseUp

CARD BUTTON: Down

on mouseUp
  global yearLoc
  put 4 into yearLoc
downButton
end mouseUp

CARD BUTTON: Down

on mouseUp
  global yearLoc
  put 5 into yearLoc
downButton
end mouseUp

CARD BUTTON: Down

on mouseUp
  global yearLoc
  put 6 into yearLoc
downButton
end mouseUp

CARD BUTTON: Down

on mouseUp
  global yearLoc
  put 7 into yearLoc
downButton
end mouseUp

CARD BUTTON: Down

on mouseUp
  global yearLoc
  put 8 into yearLoc
downButton
end mouseUp

CARDBUTTON: Down

on mouseUp
  global yearLoc
  put 9 into yearLoc
  downButton
end mouseUp

CARDBUTTON: Down

on mouseUp
  global yearLoc
  put 10 into yearLoc
  downButton
end mouseUp

CARDBUTTON: card button id 81

on mouseUp
  global yearLoc
  put 1 into yearLoc
  upButton
end mouseUp

CARDBUTTON: card button id 82

on mouseUp
  global yearLoc
  put 2 into yearLoc
  upButton
end mouseUp

CARDBUTTON: card button id 83

on mouseUp
  global yearLoc
  put 3 into yearLoc
  upButton
end mouseUp

CARDBUTTON: card button id 84

on mouseUp
  global yearLoc
  put 4 into yearLoc
  upButton
end mouseUp

CARDBUTTON: card button id 85

on mouseUp
  global yearLoc
put 5 into yearLoc
upButton
end mouseUp

CARD BUTTON: card button id 86
... ... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
  global yearLoc
  put 6 into yearLoc
  upButton
end mouseUp

CARD BUTTON: card button id 87
... ... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
  global yearLoc
  put 7 into yearLoc
  upButton
end mouseUp

CARD BUTTON: card button id 88
... ... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
  global yearLoc
  put 8 into yearLoc
  upButton
end mouseUp

CARD BUTTON: card button id 89
... ... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
  global yearLoc
  put 9 into yearLoc
  upButton
end mouseUp

CARD BUTTON: card button id 90
... ... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
  global yearLoc
  put 10 into yearLoc
  upButton
end mouseUp

CARD FIELD: Cumulative Total
... ... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
end mouseUp

CARD FIELD: Year 0
... ... ... ... ... ... ... ... ... ... ... ... ...
on mouseUp
  global yearLoc
put 0 into yearLoc
graphIt
end mouseUp

..............................................................
CARD FIELD: Year 1
..............................................................
on mouseUp
    global yearLoc
    put 1 into yearLoc
    graphIt
end mouseUp

..............................................................
CARD FIELD: Year 2
..............................................................
on mouseUp
    global yearLoc
    put 2 into yearLoc
    graphIt
end mouseUp

..............................................................
CARD FIELD: Year 3
..............................................................
on mouseUp
    global yearLoc
    put 3 into yearLoc
    graphIt
end mouseUp

..............................................................
CARD FIELD: Year 4
..............................................................
on mouseUp
    global yearLoc
    put 4 into yearLoc
    graphIt
end mouseUp

..............................................................
CARD FIELD: Year 5
..............................................................
on mouseUp
    global yearLoc
    put 5 into yearLoc
    graphIt
end mouseUp

..............................................................
CARD FIELD: Year 6
..............................................................
on mouseUp
    global yearLoc
    put 6 into yearLoc
    graphIt
end mouseUp

..............................................................
CARD FIELD: Year 7
..............................................................
on mouseUp
  global yearLoc
  put 7 into yearLoc
  graphIt
end mouseUp

CARD FIELD: Year 8

on mouseUp
  global yearLoc
  put 8 into yearLoc
  graphIt
end mouseUp

CARD FIELD: Year 9

on mouseUp
  global yearLoc
  put 9 into yearLoc
  graphIt
end mouseUp

CARD FIELD: Year 10

on mouseUp
  global yearLoc
  put 10 into yearLoc
  graphIt
end mouseUp

CARD FIELD: Help

on mouseUp
  hide card fld "help"
end mouseUp

CARD: policy
[This object has no script.]

CARD BUTTON: Return

on mouseUp
  visual effect stretch from center
  go to first card
end mouseUp

CARD FIELD: graphfield
[This object has no script.]

CARD FIELD: revenue
[This object has no script.]

CARD FIELD: card field id 16
CARD FIELD: card field id 21
[This object has no script.]

CARD FIELD: forecast
[This object has no script.]

CARD FIELD: Years
[This object has no script.]

... 
CARD BUTTON: Fill X
... 

on mouseUp
  answer "Really fill X?" with "Yes" or "Cancel"
  if it is "Yes" then
    put "" into card field xdata
    put 0 into dtData
    repeat until dtData > 10
      put dtData &return after card field xdata
      add 0.25 to dtData
    end repeat
  end if
end mouseUp

CARD FIELD: xdata
[This object has no script.]

CARD FIELD: ydata
[This object has no script.]

CARD FIELD: card field id 3
[This object has no script.]

CARD FIELD: card field id 4
[This object has no script.]

CARD FIELD: card field id 5
[This object has no script.]

CARD FIELD: min
[This object has no script.]

CARD FIELD: card field id 7
[This object has no script.]

CARD FIELD: max
[This object has no script.]

CARD FIELD: costdata
[This object has no script.]

CARD FIELD: profitdata
CARD FIELD: revdata

CARD FIELD: expensedata

CARD FIELD: claimsdata

CARD: Boilerplate

CARD BUTTON: Launch

on mouseUp
  -- DECLARATION of GLOBALS
  global ¬
  stella_state, stella_globals, stella_values, dtValue

  -- CHECKING run-time STATUS
  if stella_state = "running" then exit mouseup
  if stella_globals ≠ "" then exit mouseup

  put "" into card field ydata of card data
  put "" into card field profidata of card data
  put "" into card field revdata of card data
  put "" into card field costdata of card data
  put "" into card field claimsdata of card data
  put "" into card field expensedata of card data

  -- INVOKING the KERNEL
  stella ¬
    card field "model name",¬
    card field "Data to STELLA", ¬
    card field "Data from STELLA", ¬
    card field "Run Options"
  -- REPORTING ERROR MESSAGES
  if the result ≠ "" then put the result
end mouseUp

CARD BUTTON: Stop

on mouseUp

  global¬
  stella_globals, stella_state
  put "stop" into stella_state
  if stella_globals ≠ "" then
    stella
    if the result ≠ "" then put the result
  end if
end mouseUp

CARD BUTTON: Resume

... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... on mouseUp
global-
stella_globals

if stella_globals = "" then exit mouseup

stella

if the result ≠ "" then put the result
end mouseUp

CARD BUTTON: About

... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... on mouseUp
global stella_state

if stella_state = "running" then exit mouseup

put stella_state into temp
put "about" into stella_state
stella
put temp into stella_state
end mouseUp

CARD BUTTON: Pause

... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... on mouseUp
global-
stella_state

put "pause" into stella_state
end mouseUp

CARD BUTTON: Quit

... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... ... on mouseUp
domenu "Quit Hypercard"
end mouseUp

CARD FIELD: card field id 26
[This object has no script.]

CARD FIELD: model name
[This object has no script.]

CARD FIELD: Data to STELLA
[This object has no script.]

CARD FIELD: Data from STELLA