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QUANTIFYING THE C-2 RISK (PREMIUM INSUFFICIENCIES, INCLUDING INCREASING CLAIMS AND EXPENSES)

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Panelist: MICHAEL J. COWELL
Recorder: DANIEL J. MCCARTHY

- Discussion of research to date on quantifying the C-2 Risk, including the impact of:
  - What is surplus?
    - Generally Accepted Accounting Principles?
    - Statutory?
    - Other?
  - Medical technology
  - AIDS
  - Superbugs
  - Economic factors (inflation, depression, etc.)
  - Catastrophic events, such as airplane crashes and earthquakes
  - Anti-selection
  - Poor underwriting
  - Very long-term interest rate guarantees
- This session also will include a discussion of how reinsurance may be used to modify or control the C-2 risk.

MR. DANIEL J. MCCARTHY: I am a Consulting Actuary with the New York office of Milliman & Robertson. With me is Michael J. Cowell, Vice President and Actuary, State Mutual Life.

The program defines the C-2 Risk as premium insufficiencies. Almost any kind of a risk, I suppose, can be said to resolve in a premium insufficiency. From the point of view of talking about the C-2 Risk or for that matter, any category

of risk, I think it's important to figure out at the outset whether your focus begins from the aspect of pricing -- that is, the initial pricing of a product -- or whether it begins from the aspect of solvency.

My own view is that the framework in which the risks have been discussed is such that we begin essentially with solvency considerations -- that is, the presumption that there is business in force and a company that has a certain amount of reserves and capital, the question being how much of that capital is, in fact, required to maintain company solvency. In the end, however, the conclusions that you will draw from a solvency analysis are going to spin back around to pricing. I believe the issue there is principally your starting framework rather than solvency or pricing.

The second issue that we have to grapple with when we are talking about C-2 Risk is whether we are talking simply about quantifying the amount of mortality or morbidity risk that might result from a particular hazard by itself, or whether we are also trying to deal with the way company management can make the product respond to the emergence of that risk. For example, while there are still products being sold by insurance companies that are guaranteed in all of their terms forever -- structured settlements are a good example, sometimes term insurance is a good example -- most products today are in one fashion or another repriceable and it seems that it is not sufficient to say that we measure a risk of excess mortality, excess morbidity or pricing insufficiency. It's important to couple with that the way the product can be made to respond to that change in economic condition. We will have some particular illustrations on that later in the area of group insurance.

In addition, there has been a lot of discussion about whether in talking about C-2 or other risks from the point of view of solvency, we should be talking principally about reserves in the statutory sense of that term, or whether we should be talking about reserves and surplus. For the sake of discussion, we are going to disregard the significance of that distinction -- I don't mean to suggest that it's unimportant, it obviously is important to management and regulators -- and focus on risks and the potential response to those risks viewing a company's entire capital as available to deal with.

It has become clear in recent years and increasingly clear within the last 12 months that the risks to mortality and morbidity brought about by the emergence of the Acquired Immune Deficiency Syndrome (AIDS) hazard is becoming extremely significant to the life insurance industry and will be extremely significant as a professional matter to the actuarial profession. The Society's Board of Governors has recently formed a task force on the subject of AIDS. David Holland is its chair. Its charge stated very simply is "to analyze the impact of AIDS on the solvency of life insurance companies in North America." I don't think that charge understates the gravity of the issue in terms of the necessity for companies to look at the AIDS hazard both as it relates to business in force and business about to be written.

Mike Cowell has done a lot of research on this question and has been, with his associates, the foremost model builder in the area of trying to quantify the significance of AIDS for the in-force business of life insurance companies. In the course of that he has learned a tremendous amount about the medical literature available and has kept up with it remarkably well. Mike will now present to us some of his findings and a framework on the question of AIDS as it relates to life insurance companies' business in force and as it relates to some of the other points in our outline, including underwriting issues for new business.

MR. MICHAEL J. COWELL: I think most of you were at the general session in which Fred Carr made a presentation entitled "Risk is Your Enemy." I'm not sure I came away from that session agreeing with him, but I understood what he was saying. I tend to think of risk somewhat in the way I think of fire -- that is, it is a very good servant, but a very poor master. I probably would make some exceptions when I talk about the specific risk we are going to discuss.

On the AIDS front there is very little good news. Fred also mentioned that news on the liability side of business would be far worse -- he didn't say far worse than what. Certainly as it relates to this particular C-2 Risk, I could not agree with him more. It is a lot easier if you are prepared for the worst possible risk, and I'm going to try to give you a range of possible risks that we might be looking at, so that if it really does come to pass you will be prepared.

To do this I will give you an understanding of the epidemiology of this disease and how we went about estimating its spread in the population. I think it's

important to give a sense of the financial and related consequences of this disease to the insurance industry. This was subject to considerable discussion in the first task force meeting yesterday so if I said, "Here are the results of my AIDS research and it's going to cost the industry so many billion dollars before the end of the century" and walk out, you would have a lot of unanswered questions.

AIDS has been described as the most serious epidemic in our lifetime. Unfortunately, most of what we have learned or read in *Time, Newsweek*, the *New York Times*, the *Wall Street Journal*, and other sources is that there is far too little hard data. Over the last year or so I have been trying to pull together what little hard data I can in an attempt to substitute some facts for appearances, and demonstrations for impressions. I found the classical approach that we used to deal with mortality didn't work too well. We came up with a number of methods that we thought were working, but we found increasingly that we had to go back to basics to get a different perspective on what probability, statistics, operations research methods and construction of tables mean when we have something that we have never had to deal with before.

It's not a classical exposed-to-risk environment; we can't go out and underwrite AIDS cases, follow the claim experience, see how it compares to standard and say well that's so many percent of standard as though it were a coronary risk impairment. It's very unlikely that you will have or would even want to have the opportunity to underwrite any of this business. We will not be likely to have an opportunity to study it in what I call the classical actuarial study mode. We had to back into this problem.

AIDS is unlike a lot of epidemics within our recent memory -- certainly within the memory of some people still alive -- like the influenza epidemic of 1918 and going back further in time to the black death of the fourteenth century. These are more classic in that they involved a very significant percentage of the population becoming immune or dying within an relatively short period of time -- a matter of months or maybe a year or so. The black death, for example, was reported to have wiped out a quarter of Europe's population in a matter of months or a few years at most. Some of these reported and recorded epidemics were much greater in terms of numbers of population effected and fitted the classical epidemiological mode a lot closer than AIDS does. The reason for this

is that Acquired Immune Deficiency Syndrome has a very long latency period. After 5 years of infection maybe only 15-25% reach full clinical AIDS. Later data from the Centers for Disease Control (CDC) suggest that much higher percentages will eventually progress to AIDS. I will be showing some of the numbers that we put together on this.

Prevailing medical thinking is that almost 100% of people infected now will eventually wind up with a seriously impaired immune system and that most of them will die prematurely from an opportunistic infectious disease. I emphasize prevailing medical thinking because the knowledge on this subject is so new and constantly changing that you cannot get two AIDS researchers or physicians to agree. You can read in the same newspaper the same day that we almost have a vaccine or a cure in sight, or on the contrary, it's unlikely we'll have a vaccine or cure in the lifetime of anyone living. You will get stories that transmission of the disease is up to record proportions in certain segments of the population, then you will read an article that the disease is slowing down. We don't know enough about it, so the smallest increment of knowledge assumes a lot more importance than it would if our knowledge about AIDS were more established.

How many of you who are from life insurance companies or organizations where you have access to claims data have some knowledge about your organization's claims -- individual or group, whether its life, medical or anything -- think that you have not had any claims at all from AIDS? Two people. That's about normal in a group this size. A little bit of spot research tells me that there are no major companies operating across the United States or across Canada that have not had at least one AIDS claim. They go from there to large companies some of which are now counting them in the hundreds, and it will not be too long before some of them will be counting their claims in the thousands.

There will be a survey form coming from the ACLI to those of you in the United States and I would encourage everyone who has responsibility for reporting claims to make sure that the data the ACLI and the Health Insurance Association of America (HIAA) are requesting are provided to those organizations.

Let me get into the disease itself, what we know about it in the general population. We know quite a bit about deaths and a little bit about the number of AIDS cases, but we know far too little about the population that is infected with

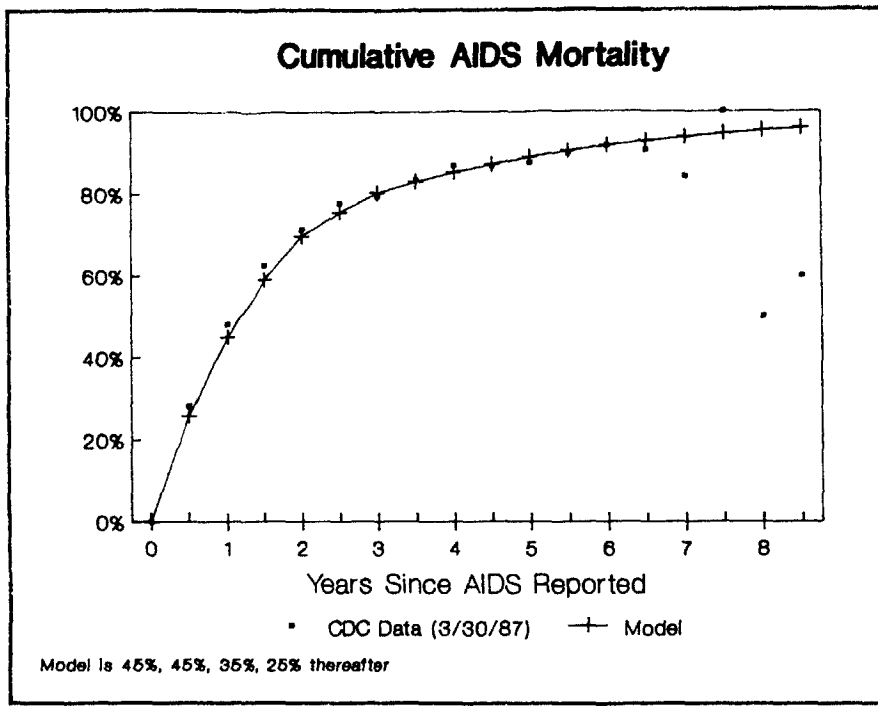
the virus. We sort of had to back into this problem. You may have noticed that I started talking about AIDS and the program is about AIDS, but I have deliberately shifted to HIV infection because the major respect in which our study differs from most others is that we consider HIV infection the disease. We consider AIDS merely a stage, in the life insurance case and usually one of the end stages in the health insurance case at which point most of health claims will have been paid, most of the disability would have been paid or incurred, and the death claim won't be too far away because once the disease has progressed to full clinical AIDS as defined by CDC, the life expectancy is similar to that of terminal cancer patients. I am going to use a series of slides.

An article by Dan Case in *The Actuary* for February 1987 raised the question, How many icebergs or how large an iceberg? We are dealing with something that is in the nature of a mortality iceberg and what we have seen to date is barely the tip of the tip. There have been 35,000 AIDS cases reported in the United States and about 1,000 reported in Canada. Also there have been 20,000 deaths reported in the United States and about 500 in Canada. The number of people infected with AIDS Related Complex (ARC) or with other less serious stages of the disease is not as well-known. We're dealing with a disease that progresses from simple HIV infection, that means infection with the virus in otherwise apparently healthy people, to moderate cellular deficiency to severe cellular deficiency, or AIDS Related Complex which is sort of the pre-AIDS, to full clinical AIDS and ultimately to death. I will be getting back in a while to the progression.

What Slide 1 shows is the survival, actually the complement of survival, of patients once they reach full clinical AIDS. The curve carrying the small squares is the actual CDC data based on the 20,000 deaths, the curve carrying crosses is the model. It's a very simple model that says the mortality that means q_x is equal to .45 for the first two years, .35 and then .25 thereafter. Those are very heavy mortality rates. They translate to an expectation of life of 2.1 years or 26 months. That is the end stage.

What about progress from infection to full clinical AIDS? There are three reports in particular that we depended upon and the most significant from our standpoint was published last year by the Center for Internal Medicine for the University of Frankfurt, West Germany. It analyzes the progression from HIV

SLIDE 1


Cumulative AIDS Mortality
100%
80%
60%
40%
20%
0%
0
1
2
3
4
5
6
7
8
Years Since AIDS Reported
CDC Data (3/30/87)
Model
Model is 45%, 45%, 35%, 25% thereafter

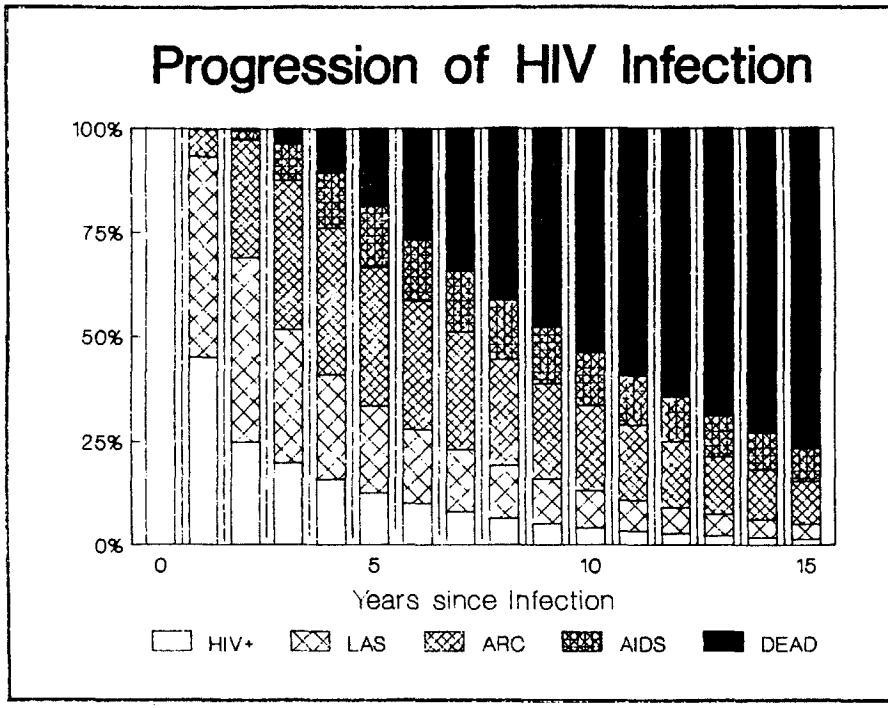
infection, through the more serious stages, to AIDS and to death. It provides a particularly valuable link that was previously missing because it does in fact trace the progress from each stage to the next. Most of the prior studies simply reported on the three-year or five-year AIDS incidence in an HIV infected population.

The Frankfurt study really is at the core of our model. We were able to take the data and with a fairly simple Markov Chain model, Part 3 technology, we combined it with the results of progressions from the mortality from the CDC data. Our resulting phase of the model then simulated the progression of a group of newly infected HIV subjects through the various stages of the infection.

Slide 2 is a chart that starts out with 100% of the HIV infected population and what would perhaps be better thought of as a series of vertical slices as you progress through time so that five years after infection you have only got about 15% who are still HIV infected and otherwise about 30% have progressed further to ARC, some to AIDS and we have about 20% dead. This model projects that approximately 10-11 years is the expectation of life into the process -- half the group is dead. This is the result of taking the Frankfurt study and combining it with the CDC study to get a model that can be used both for life insurance purposes and for disability and medical purposes -- presumably the disability and the health claims start being incurred through various stages.

The extra mortality produces a life expectancy of about 11 years for a healthy male the same age. It is equivalent to moving a healthy person about 35-40 years along the mortality scale. You'd have to increase standard mortality by more than 5,000% to produce the same reduction in life expectancy. Although I will show you some mortality curves, I normally don't like to describe AIDS mortality in terms of standard experience terms because the mortality patterns just don't bear any resemblance to what you are comfortable with seeing. You write most of your business on standard cases and some on various multiples and substandard. Very few companies, except some specialty reinsurance markets, write business on mortality much above 500% of standard. I think you will quickly conclude when you see some of these mortality curves that HIV infection cannot really be treated in terms of individually underwritten life insurance in a conventional sense. We have not been able to think of any kind of insurance

SLIDE 2


Progression of HIV Infection
100%
75%
50%
25%
0%
0
5
10
15
Years since Infection
HIV+
LAS
ARC
AIDS
DEAD

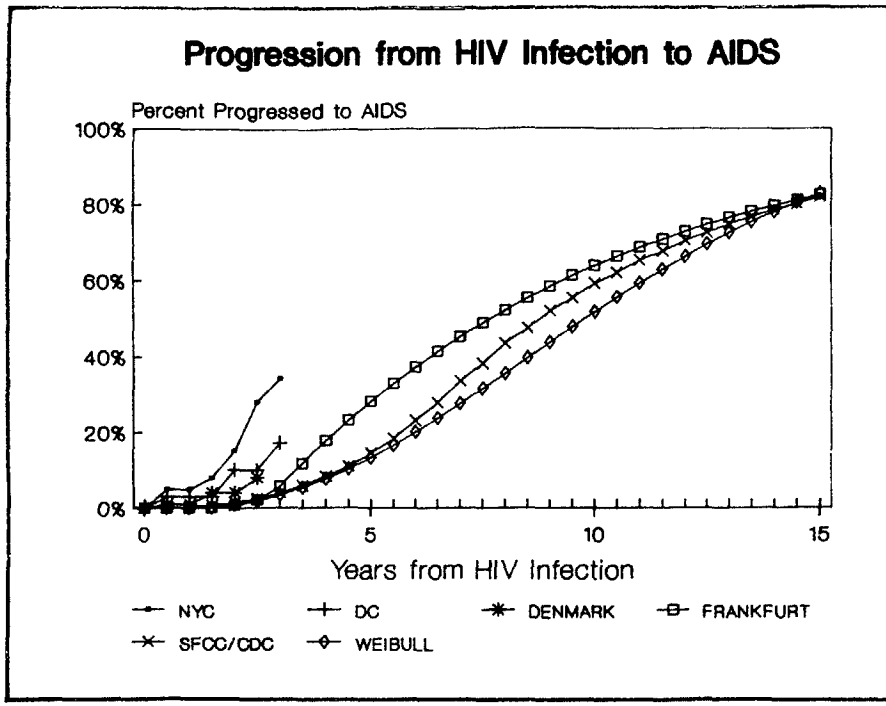
product that could be constructed in a conventional insurance environment for an HIV infected population. The Frankfurt study is not the only one. There are a couple of other supporting studies. They didn't yield as much information but they did help corroborate Frankfurt data.

There was one by the National Cancer Institute in 1985 which showed the three-year instance of AIDS in four populations. I have only shown three of them here in Slide 3 because they were the only ones that had significant numbers. This shows the progression of HIV infection to AIDS in a group of New York City, Copenhagen and District of Columbia male homosexuals. It also shows the Frankfurt data which we have modeled and the CDC study in conjunction with the San Francisco City Clinic. These studies ran for three years and we just have the infection rates from HIV to full clinical AIDS over that three-year period.

The study ran for three years, but through this Markov Chain process, we really chained the data together somewhat in the same way you would do if you had mortality from each of ages 20-21, 21-22, 89-90 and if you strung them all together to recreate the mortality you would expect all the way from 20-90. The CDC San Francisco study was a little different and unusual in one respect. The study wasn't done initially as a study of AIDS. It was a study that the San Francisco City Clinic had started back in 1978 on a very large population of the gay community of San Francisco in which volunteers come in to get tested for hepatitis B. Someone had the brilliant idea a couple of years ago that we have all this stored blood, let's go back and test it for AIDS, because back in 1978 no one knew AIDS existed. They went back in and thawed these blood samples and found that about 4% of the population was HIV infected. They went back into the community through their follow-up system and found some 73% were infected in 1985. They also found that six years after the date most people were assumed to have contracted the HIV infection -- approximately 32% in one controlled group, 36% in another controlled group -- had reached clinical AIDS, and about another 30% had reached ARC.

The significance of this from my perspective is not really the differences, because these were quite different studies taken at different periods of time in the United States, West Germany and Denmark. Rather it is how similar the shape of each curve is. It's just a matter of moving the axis over a little bit and you

SLIDE 3


Progression from HIV Infection to AIDS
Percent Progressed to AIDS
100%
80%
60%
40%
20%
0%
0
5
10
15
Years from HIV Infection
NYC
DC
DENMARK
FRANKFURT
SFCC/CDC
WEIBULL

could virtually overlay these because they are all showing the same progression. It was principally the San Francisco data that led the director of that study to conclude that it is primarily just a matter of time before 100% of an infected population will come down with some infectious disease.

What we have seen so far then is the progression of HIV infection and the ultimate result it produces in terms of survival and I think the numbers here can be treated as reasonably reliable as anything we have for insurance purposes. It predicts a mortality of a cohort of infected subjects with reasonable certainty and it provides a lot of information of the financial consequences of not screening out cohorts of HIV infected people when they apply for life insurance or disability income which could have been detected had they been screened. It also is helpful if a number of companies use this kind of information to establish the level at which they would like to test given other factors such as marketing considerations.

I talked about mortality and HIV progression to AIDS. The next question is, what is the extent of this disease in the general population and in particular in the insured population? We don't know the extent of the infection in our insureds since we haven't been testing them until recently, and if we do discover they are HIV positive we don't issue insurance. We have some rough estimates of the percentages in the general population and we can make assumptions. I will go into some of those assumptions shortly as to what the relationship might be in the infection rate of the general population and in the insured population. The Surgeon General is still saying, and I think CDC accepts these numbers, that somewhere between a million and a million and a half people are currently infected in the United States. I don't have those comparable numbers for Canada but I know that the incidence rate in Canada is considerably lower. The principal groups in the United States are male homosexuals, bisexuals and intravenous drug users. The situation is similar in Canada except to the extent that they have a negligible intravenous drug population. Their population is 1/10 of the United States's but their relative levels of infection are lower than we are seeing here. The prevalence of HIV among women is so small that I have ignored it -- at least temporarily -- in terms of establishing what the C-2 Risk might be. I may have to revise that but at least up to date all of my models have been built on assumptions about the male population. The most significant levels of infection are believed to be in males ages 20-59 which of course are the

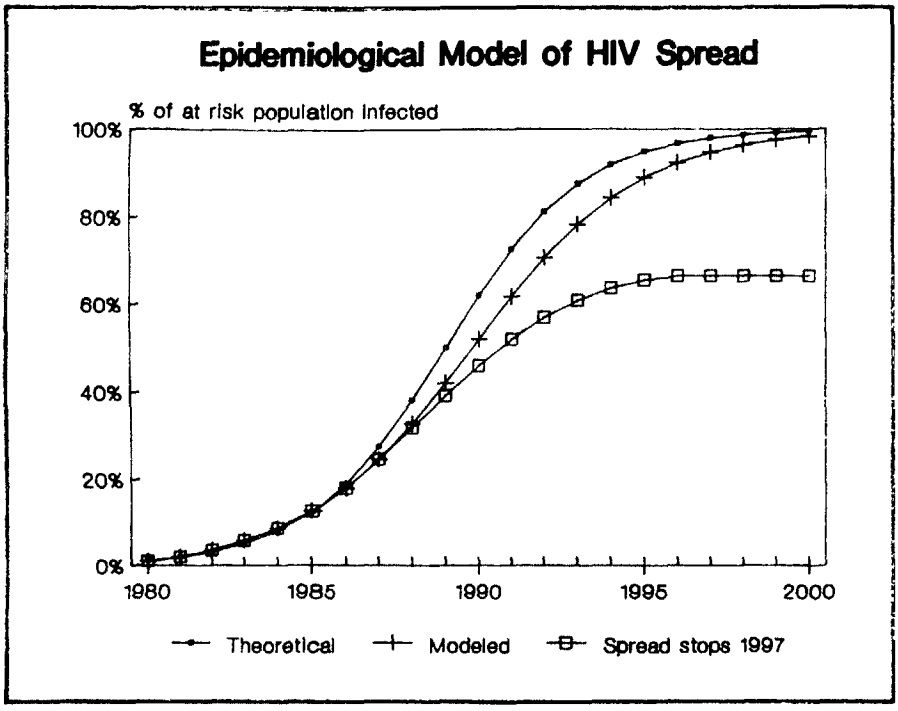
most significant for life and health insurance purposes. As I mentioned earlier, the San Francisco studies are the only published data that we have which show the trend in a specific population over time and we had to do some reverse engineering using some modeling approaches to detect the infection so that when you apply it to our assumptions you can reproduce AIDS cases and deaths that closely replicate the numbers the CDC has provided.

Epidemiology literature shows that most researchers are using what I would call a classic model. Slide 4 shows the shape of the curve. This is the classic epidemiological death curve which can be expressed mathematically, and if anyone wants details I will be glad to share them with you, but it essentially makes the assumption that the first derivative or the difference in the percentage in the population infected is a constant factor times the population infected and one minus the population infected. Once you have assumed an infectivity level you just start off, put in a few infections, then the thing runs its course. I chose a level of infection assumption such that I closely reproduced the million and a quarter of infected and I will show you how I broke that down.

From the San Francisco study we know that there were some who were infected as early as 1978 so we assume that the virus got into the North American population a few years earlier. I chose 1975. I am assuming that we are now about 12 years in, which would suggest about a 30% infection rate and that may be a little conservative.

As I indicated, in some of the highest-risk groups in the San Francisco gay community we are looking at rates of 70%. The New York drug abuse program estimates that approximately half of the IV drug users in New York City are HIV infected and there are other projections of various numbers, but certainly the 30-40% range seems reasonably consistent if you take the other estimates that the National Academy of Sciences came up with, there are approximately 3/4 of a million IV drug users in the United States and about 2-3 million male homosexuals. You can take 1/10 of that number and have the situation in Canada, and another maybe 2-3 million bisexuals, although that number is not well established. If you take about 30% of those numbers, you have an estimate of infection within the general population.

SLIDE 4


Epidemiological Model of HIV Spread
% of at risk population infected
100%
80%
60%
40%
20%
0%
1980
1985
1990
1995
2000
Theoretical
Modeled
Spread stops 1997

QUANTIFYING THE C-2 RISK

Slide 5 shows the breakdown of the critical age groups that I mentioned of the actual population in the United States in 1987. This slide also shows some estimated HIV infection rates consistent with what I just described. The specific levels came from the California Department of Health based on the CDC data. Referring again to Slide 5, if you apply these to the population, you can see the number of infected broken down into estimates of how many are homosexuals, bisexuals plus an estimation of about 80,000 women IV drug users, and prostitutes. If you add all this together you get about a million and a quarter. These do represent approximately 30% of those estimates of those populations and it is reasonably consistent.

Let me just give you a couple of other checks that I have made. Taking the infection from the point that I assume they came in from 1975 to date, and the progression for HIV infection to AIDS, I produced Slide 6 which is a model of the number of AIDS cases shown by the line carrying diamond-shaped figures. You can barely see this curve because it is almost completely overlaid by the little line which is the CDC high estimate until recently when they revised it slightly. I think the specific number here is 305,000 -- our model is 311,000 -- the CDC just revised that to 325,000. The important thing you have learned here is that it is not the number at any given time but the shape of the curve that is important. I suspect the CDC is probably revising its mid and low estimates but that's the number of cases. Then applying the mortality I described earlier we translated cases to deaths and again the model is the curve carying the diamond-shaped figures. Highest is the curve carrying the box figures -- CDC only projects to 1991. I started feeling quite comfortable given the closeness with which I was reproducing actual cases and actual deaths, so I projected all the way to the year 2000, which I felt was necessary in order to make the financial impact estimates. It's not out of line with some of the things you hear, but CDC is not prepared to go beyond 1991. This suggests that a about a million and a half people have died by the year 2000.

I want to make an important qualification here. All this assumes current medical technology. We are not factoring in any major breakthrough in a vaccine or a cure. We are all aware that there are drugs on the market and some on the black market that are available and that are being used by AIDS patients with varying degrees of success. Most of them are stretching out the length of life

SLIDE 5

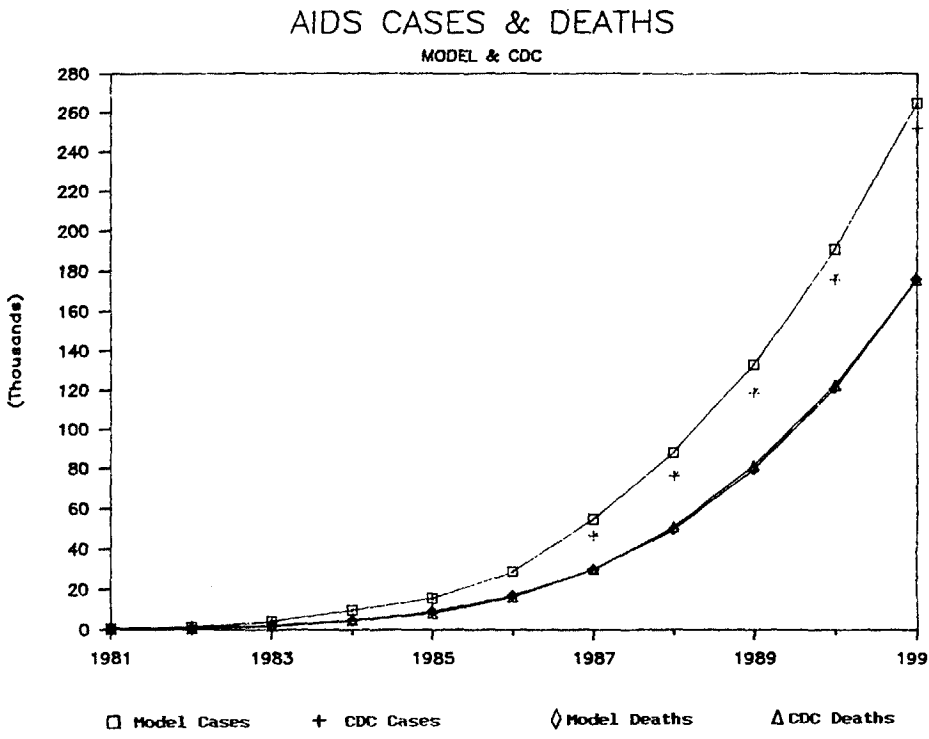
U.S. MALES

Ages	Population 1/1/1987 (millions)	Estimated % HIV Infected	Estimated Number Infected Total Males	Homosexuals & bisexuals	IV Drug abusers
20-29	20.6	1.00%	200,000	100,000	100,000
30-39	19.3	2.50	475,000	350,000	125,000
40-49	14.0	2.00	275,000	275,000	
50-59	10.8	0.50	50,000	50,000	
TOTAL	64.7	1.55%	1,000,000	775,000	225,000

INSURED MALES

Ages	Total In force 1/1/1987 Individual	Group	Estimated HIV Infected Individual	Group
20-29	$ 658 B	$ 209 B	$ 2.6 B	$ 1.0 B
30-39	675	504	10.0	6.3
40-49	505	436	6.6	4.7
50-59	277	301	1.5	1.2
TOTAL	$2,115 B	$1,450 B	$21± B	$13± B

SLIDE 6


AIDS CASES & DEATHS
MODEL & CDC
(Thousands)
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
1981
1983
1985
1987
1989
1991
Model Cases
CDC Cases
Model Deaths
CDC Deaths

slightly, extending maybe the date of which the life insurance claim has to be paid, but maybe incurred a lot more medical expense in the meantime.

Going back to our other chart, if you set these breakdowns of total deaths, then I am saying that in our in-force business based on distributions of in-force policies of individual and group life at the beginning of this year, about $31 billion of the individual life and $24 billion of the group life was on people who are HIV infected who are currently in force. These are the ones generating the claims you see. My projections through the end of the century are that something in the order in magnitude of $20 billion of this $31 billion of individual life, and $15 billion of this $24 billion of group life will emerge as death claims before the end of the century. How does that relate to current levels of individual claims in the United States? At about $10 billion doubling about every seven years, by the mid-1990s say $20 billion, I am estimating that we will be having $2-3 billion claims per year. We might be talking a 20-30% increase on the upside on the individual side, and comparable numbers on the group side to keep it conservative, a potential for 20% increase in claim processing.

I had some preliminary data from the ACLI study and the data has been submitted to Massachusetts which is how I got involved in this process in the first place. I have data from eight companies including the largest six mutuals in the United States, which account for 1/3 of the individual life in force by number of policies, and about 1/4 by amount of insurance. I looked at the 1986 claims and if my assumptions to HIV infection are correct then I would expect about 4,000 claims in the insured population and it looks as though I am going to come up with about 2,000 which is some good news.

It suggests that perhaps my assumptions as to infectivity in the general population being repeated in the insured population are twice as bad and that's the good news. The bad news is that the average claim is running 4-5 times the average of all claims. Some say this is a result of the duration of AIDS claims. In other words the AIDS claims are a lot more recent than claims are in the aggregate. In any event if you take these two factors together, it suggests that the levels I just described to you are probably reasonable in terms of estimating the aggregate impact on the industry. I might be a little bit high on my estimates of infection but I think I am probably a little on the low side in terms of the effects of anti-selection. I am predicting $20 billion of increased

claims as the individual side and $15 billion increased claims on the group side before the end of the century.

Now what are the implications for company solvency? There are two components, and I just described the in force business which is one of them. The additional risk of course is new business that you are putting on the books. The figures in the model I described assume the HIV infection peaks at just over 3% of the adult male population by the mid-90s, allowing for some incidence of further growth of infection. Thus, the additional risks of writing new business at current levels, assuming we were not doing any testing at all, is about the same in magnitude -- meaning another 20 billion of individual claims. I have not been able to come up with a method for estimating the additional cost of new group insurance issues. Just allowing for what I think is a reasonable, maybe a conservative estimate based on current projections by CDC, I'm talking about 20 billion individual, $15 billion of group, plus perhaps $20 billion of claims on new business with the last $20 billion of course being technically avoidable if we were screening all new business.

That in summary is what I have done to date. I am putting all this together in an article which I am hoping to get published in a couple of months and I am optimistic it will get wide sponsorship by a number of the sections of the Society. AIDS is clearly the most serious epidemic that has faced us in years. Its impact is very serious but can be less catastrophic if we act quickly and responsibly in managing our insurance business. I will be glad to answer any questions.

MR. ARDIAN C. GILL: Mike was kind enough to share his results with me a while back. We were working on an AIDS catastrophe insurance program with some people in London and a domestic reinsurer and these figures were most timely. We used Mike's data and applied it to some individual companies, I thought that would be of some interest. Mike's death rate from the rate of people now infected who have insurance is 1.7-1.9% individual and group. So that's 17-19 deaths per thousand.

We looked at individual companies and found out what their normal mortality was each year, we got a range on 1.8-2.7 per thousand. So we're talking eight or ten times extra deaths and eight or ten times one year's normal deaths in extra

deaths over the next fifteen years. In other words, if you are experiencing 100 million death claims in 1985, which was the data we used, you may well have 1 billion extra deaths spread over the next fifteen years. I think the figures have some socioeconomic factor built in, but even if you cut them in half you're still talking about four or five times the normal mortality over this period. It's a much more serious matter than I think any of us ever envisioned. We then took a more pragmatic approach and we called up some companies and asked what their AIDS deaths to date were, if they knew them. What we said was that there are 19,000 deaths so far, through March 1987. There are 1.5 million infected, so the total deaths we'll expect from the infected group is eighty times what we've had so far. We didn't come out too differently from applying the other rates and cutting them in half.

MR. COWELL: As I mentioned earlier, Ardian Gill and several others have been doing parallel research and our work has been distributed to a limited extent within the Society. I am anxiously awaiting someone to challenge the general approach and not the details, because I have had a lot of comments on the details, which we greatly welcomed. We've made a lot of changes, but to date, nobody I know has been researching this including the United States, Canada, and the United Kingdom. Just the other day I got my first inquiry from Australia challenging the overall direction. It may not be $20 billion. It may be only $15 billion. I hope it's only $10 billion. But it's a lot of deaths. The industry is going to be able to withstand the mortality from the in-force block. There may be some individual companies -- though, thinly capitalized, especially if they have been writing a lot of business, a lot of term business, recently in areas of high-risk concentration -- that may have some serious financial difficulties because of their AIDS risk, their AIDS deaths. This is the in-force issue; I think we can handle it if we act responsibly. The reason that I got into this project in the first place, is the position that I find totally unbelievable. I mean I have a hard time understanding the position that some of our state regulators, in particular the Commissioner of my own home state of Massachusetts, have taken. They would like to ban us from testing. We have never been banned from testing for any other disease, we don't see that we should be banned from testing for AIDS which is potentially more catastrophic in terms of its impact on us financially. I've been working mostly with member companies in Massachusetts through the life insurance association there, to try to convince our insurance department. The battle isn't over, and I'm hoping in

the long run that we prevail. I just do not understand how a regulator charged with solvency, can disallow companies from protecting their surplus in this way. This is the area we've got to be careful with the new business.

MR. JOSEPH F. KOLODNEY*: Does your study take into consideration the high probability of more aggressive anti-selection, because the statistics that have been developed so far probably were more inadvertent than intentional? The whole issue has manifested itself publicly in the last year and a half. We know that there are publications in the gay community that have been specifically targeting their membership to go out and get life insurance on a nonmedical basis, specifically highlighting companies whose nonmedical limits are high with guaranteed issue programs, etc. Could you elaborate on that?

MR. COWELL: As I indicated earlier, my initial assumption was that the HIV infection level in the insured community was the same as it was in the general community and also that the average amount of insurance in the HIV infected community was the same as the average amount in the general community. So I assume no anti-selection. As a result of this last phase of the tests of my model, which is taking actual claims, and I am going to break them down by year of issue. I am seeing a very severe degree of anti-selection to the tune of maybe 3-4 times, the average AIDS claim being 3-4 times the average non-AIDS claim. I'm going to break that down by year of issue to see if I can get a more precise measure according to year of issue. Once I've done that I will probably reproject. Using a lower infection rate and a higher average claim, I think they'll approximate the impact of cancelling each other out. If anything, they might lead me to make slightly higher estimates.

MR. KOLODNEY: So the dilemma that the industry is in right now is that we have to do some more aggressive testing, and it's likely that whatever level at which we go down to for testing, there's going to be an increasing amount of antiselection below that level.

MR. COWELL: That seems likely. Having looked at some analysis, and done some work on measuring the cost benefit of testing at lower levels in our own company, (we are currently testing at the half a million level) I came quickly to

* Mr. Kolodney, not a member of the Society, is President of the Presidential Life Insurance Company in Nyack, New York.

the general observation that there was no level below which we could go that we couldn't justify on a cost effective basis. Virtually no level, even at $40 per test can you test right down to the lowest level, because people who think or even suspect that they may be infected (high-risk groups) will purchase below that level. In those states where we are not permitted to test, they are buying insurance today at those levels and higher without getting tested.

MR. KOLODNEY: We've all been saying for the last several years that the price of life insurance has gotten too low, but this is an unfortunate way to bring it up.

MR. COWELL: Yes. I think it would be very unfortunate if the general public -- the 99% of the general public that isn't infected -- has to pay for increased cost of coronary artery disease among those who are determined to be impaired at issue of hypertensive, similar people with diabetes, and so on. I think it would be extremely unfortunate if HIV infection turns out to be the first disease that was politically protected from the insurance underwriting and pricing process. Because I think it would be difficult for the general public to accept the level of price increase that would be necessary if this were to be spread among the general population.

FROM THE FLOOR: I have one question on the way in which the statistics in respect of the AIDS claims have been compiled. Now for the insurance companies, the cause of death will have to be reported on the death certificate. Now I know at least in some provinces in Canada in order to settle a claim, the insurance companies do not require the provincial death certificate to state the cause of death. All they have to say is the person died. Because of the social stigma associated with AIDS it is possible that even though the cause of death is noted on the death certificate, it may be the secondary cause not the primary cause and, in many cases the cause of death may not be reported at all. So is it not possible that the statistics that you just presented will be grossly understated, and the impact of AIDS will be a lot more than what we think it would be?

MR. COWELL: Yes. It is more than possible. I would say it's almost a certainty. In the United States, it's estimated that the number of AIDS cases is underreported by about 20%. The number of AIDS deaths is slightly under-

reported. It's not by as much but we certainly read newspapers about famous persons who died and their relatives or friends have attempted to coverup the cause of death. So there is no question that the mortality rate from this disease is being underreported.

The *Metropolitan Statistical Bulletin*'s most recent issue reports on an increase in the number of deaths from influenza and pneumonia after many decades of secular decline in mortality from those two causes of death. My reading of that, I haven't had anyone confirm this, is that some of that is true influenza and pneumonia arising from the early stages of HIV infection, and perhaps conveniently covers up the stigma of AIDS mortality. So I guess it's like any underreporting, you need to do a closer followup in order to establish it. I think as we learn more about the disease and get more information from other cultures where the stigma isn't as serious, we might get some better measures on the degree of it.

FROM THE FLOOR: Does the data which is submitted, which is shown now, relate to the information collected from the insurance statistics or have you tried to apply the general population statistics to the life insurance industry?

MR. COWELL: My basic model depended on the general population data; we didn't have insurance population statistics in a classical sense. I included certain rates into the insurance population, and now I'm in the process of testing whether or not those assumptions reproduce themselves in terms of deaths within the insured population.

MR. MCCARTHY: For example, Mike, isn't it right that you took account of the fact that the percentage of intravenous drug users who were likely to have insurance was really quite low? You adjusted for that.

MR. COWELL: I adjusted downward. I assumed that the HIV infected population that was insured essentially is homosexual and bisexual males. I had no allowance, for example, for heterosexual males or any females at all. So I'm a little conservative in that regard. I don't think, as I mentioned earlier, that I am off by an order in magnitude. I might be off by 10, 15, 20%. I'm constantly refining my model as I get more data, but as I indicated at the very outset, the data are very thin. You have to really work to get whatever you can and try

to make some sense of it. I tried to rely on what I considered supportable data, using as little from hearsay articles, and sensationalized stories as possible, and relied on available data which were supportable.

MR. MICHAEL E. MATEJA: This observation relates to the general subject of risk analysis and quantification of risk, that I have devoted quite a bit of attention to in the last few years. You know what you know, but you are more concerned about what you don't know. AIDS is a classic example of that. It's not what we know about that is the potential cause of insolvency. In the long run, companies act in their own selfish best interest and protect themselves.

Now that we are getting to know something about AIDS, we'll do what we need to do to survive. The risk of the unknown, on the other hand, is probably the most significant risk that we have to deal with in the practical world. I think this is a good example of it.

The question relates to looking forward in the view of AIDS. I haven't been that close to some of the work that's been done within the Aetna on this subject. One of the big unknowns associated with it is the idea of changes in behavior within the population, that would somehow radically change the rate at which the disease is spread among the population. I wondered whether you have any comments on that.

MR. COWELL: I totally agree and cannot emphasize too much that what we don't know about this is infinitely greater than what we do know at this stage. The learning curve is high, but starting from a very low base. Almost anything I say this afternoon has to be interpreted with that in mind.

As far as the specific question about infection rates, I have models, for example, that show the simple case of what happens if the infection continues. Assume that infectivity drops to zero at some point and this curve flattens out. There have been a number of suggestions that maybe as the population gets smarter and as the higher-risk groups realize the seriousness of this, all of a sudden this thing will stop and will level off at some point. I have done some tests, but I didn't show that because I didn't want to overcomplicate this issue. Yes, I have heard reports on those lines and I think some of this represents

questions that we'll get into. I imagine we'll be making further refinements and projections of the more optimistic and the more pessimistic projections' bases.

MR. MARTIN SNOW: In regards to anti-selection and state regulation. We also developed a model at Metropolitan to project the financial impact, and in order to account for anti-selection, for the personal lines of business, we split into two parts. One part was for old business, and the other part was for new business. This was done to reflect the fact that on old business, there probably wouldn't be significant amounts of anti-selection, while on new business there could be varying amounts of anti-selection depending upon state regulation and depending upon the testing levels that are used.

MR. COWELL: Yes, I think this is a sort of refinement that is going to come from the data. Once we've analyzed the results of the ACLI survey, I think we'll have a large enough database where we can break claims out by year of issue and determine at what point serious anti-selection crept in. I'm anticipating that on business issued before the early eighties, there was no anti-selection at all. It was purely random. As you come to more recent years, you will find higher levels of anti-selection. That's my expectation. I haven't examined the data far enough along to determine that. If that's the case then you're right. You'd model that into your further projections. The thing that concerns me most is that such a huge volume of the insurance in force today in the United States has been written in recent years, which happen to have coincided with this epidemic.

MR. SNOW: With regard to these new drugs that are prolonging life by about a few months, two potential things are not so good. One is that the health insurance costs could be increased, but in addition, for life insurance policies which would have ended up if the patient had died in the contestable period, the patient -- with new drugs -- could end up dying outside of the contestable period.

MR. COWELL: Yes. I think that the aggregate impact of life-prolonging drugs is going to be a higher expense for the life and health insurance business taken together. The drug known as AZT is the only drug that has been tentatively approved by the Food and Drug Administration. It does extend the length of life, but hardly the quality of life for the AIDS patients. It has very severe

side effects. It does something to the bone marrow. It all sounds very horrible. We know that the cost of this drug is very high, like $10,000 a year. We're all optimistic that there's going to be a sudden breakthrough. But short term, I think we should assume that the liability side of our balance sheet is going to get worse before it gets better. I'm sorry to say this, but I can't see any other conclusion that we can take that is responsible.

FROM THE FLOOR: Even though the primary problem will be in future sales, do you see us sitting on a potential pool of claims that we already issued, without knowing of the AIDS problem, and if so, how large a pool of claims from the in-force business?

MR. COWELL: Those were the numbers that I was mentioning earlier. In other words, the potential of $30 billion of individual and $24 billion of group, is my estimate of the pool of claims that we're sitting on. As the pool of infectivity that is going to result in claims between now and the year 2000, I said $20 billion of individual and $15 billion of group, there's about a $35 billion hit that is there. Now some of this business may lapse, but I have a hunch that the persistency of business on infected people people is going to be quite good. That's not good news.

FROM THE FLOOR: Also, in your study, did you notice any real targeting by the high-risk group of specific companies as easy to acquire insurance from?

MR. COWELL: My list of companies which is up-to-date is only the top six in size, all of which issue through standard general agency distribution systems. I don't have any other data yet. We will eventually collect data from companies operating in other markets where there is little or no underwriting. My data to date has strictly been from general agency companies where, presumably there is some field underwriting.

FROM THE FLOOR: You mentioned 1.5 million deaths for the $35 billion. There are only 20,000 death claims. Is that right?

MR. COWELL: That's the million and a half deaths of the total U.S. population. An estimate of a million and a half deaths is the total of U.S. population AIDS

deaths, not insured deaths. That was before I scaled it down to insured deaths. We would probably be talking about 1/3 that number.

The population source for the Frankfurt study was general population, high-risk groups who had come to the Frankfurt Center for Internal Medicine for treatment of the disease. They went out into the population somewhat the way the San Francisco Clinic did. They identified 500 high-risk groups, principally, male homosexuals and studied them for three years. All the sources of our model data are general population.

MR. JAMES W. PILGRIM: I have one observation and one response to the gentleman who asked about the prevalence of the high-risk groups getting insurance. The observation is: In a recent issue of the *New England Journal of Medicine*, there's a very good article about a new strain of HIV which is transmitted in the heterosexual community, which could present some very serious problems to our industry, even much more so, Mike, than you've already demonstrated in your statistics. The results of that article are frightening. In response to that gentleman, as a reinsurer we do business with a number of companies and already we've found from the high-risk groups that there are instruction manuals as to how to deal with insurance companies, just exactly how much to apply for within nonmedical limits, so they don't have any blood tests, and how to go through the whole process. They are very organized. They name companies. They know exactly what they're up to and they will do everything in their power to obtain the coverage they think they're entitled to.

MR. COWELL: You're right, Jim. There is no question that the insurance industry in total is being targeted for anti-selection. I think this relates to the earlier question about getting a lot of business just under your testing limits. As to new strains, you're absolutely right. I address only HIV, which is going to be renamed HIV1, because it is the only strain that has been detected in North America. There are three other strains that have been determined and located in equatorial Africa and Latin America, and there is some question as to whether our existing testing procedures, the Beta test and the Western block are even effective against them. I just don't know about this. I guess it is mentioned in the *New England Journal of Medicine* report, that they are not believed to be effective. There is no good news. Every bit of additional news is generally bad.

MR. MCCARTHY: Let me summarize this part with just four comments and then I want to allude to another topic we were going to talk about and will not. I want to sketch for you some of the information the task force now has in preliminary draft and will be circulating later this year, so that if any of you have a special interest in it, then drop me a note, I'll make sure that you get it.

I have four concluding comments on the AIDS discussion. First, I have a credit card with a New York City bank, and that means that every six months, I get a mailer concerning life insurance that I can buy. I save these, since I'm interested in this kind of thing and I see what's happening. For several years the rates, charged by the particular carrier that has this endorsement, have in effect not changed at all. I got one two weeks ago and did a little comparing and was interested to find that particularly at ages under 40, the rates have rather significantly moved upward. I think somebody started paying attention to the kind of risks that can come about from selling small amounts of life insurance with limited underwriting.

The second comment I wanted to make is that in response to a question that John Montgomery asked last year, we did a little looking at the relationship between mortality rates including AIDS deaths but did not deal with anti-selection in the future in relation to the mortality rates of the 1980 CSO Table. Our estimates of the AIDS risk were much cruder than the work Mike has done, but he and I have done some comparison and find that the results aren't all that different in terms of the extra deaths assumed.

The question had originally arisen from a technical valuation point of view and unless you were to assume a company with a concentration of insured lives almost under age 50, you would find that on any kind of a reasonable model, which might represent in-force business, the issue in terms of adequacy of the 1980 CSO table in the aggregate turns out not to be an issue. That does not mean that this isn't a pricing issue or a solvency issue. People don't assume when they're pricing 1980 CSO mortality for paying claims. So it changes the focus and I think that John's question was very helpful in that it was more than a tabular mortality concern, in relation to a valuation table and got it into some of the framework that Mike has been talking about.

The third thing I wanted to mention was that I saw a preliminary report on 1986 U.S. Population Mortality Rates. The final report won't be out until summer 1987. What's been happening in recent years prior to 1986 is that except at young adult male ages where there's been an accident hazard, basically the trends have been down -- that is, continuing mortality improvement at all age ranges. For 1986, however, there was mortality improvement only in the first year of life and then at ages 60 and over. In between, there was no mortality improvement in 1986, in fact, there was some slight worsening. Numbers are not available in detail yet, but the people who circulated this thought enough to highlight it in the preliminary results. Presumably, that means that AIDS deaths and other kinds of related deaths that Mike talked about are beginning to have an effect on the population numbers in a way that won't be matched anymore by general mortality improvement.

Finally, there have been newspaper articles about this, but I wanted to mention it to you, particularly if you are associated with stock companies. There is already increasing interest among the investment banking community as to the significance of the AIDS risk on insurance companies in terms of trying to differentiate what kinds of companies may be more or less at risk. So that from a financial point of view the financial community is looking at this question, showing great interest in studies that are becoming available, and trying to draw inferences from a companies' distribution system and the nature of its block of business. This issue is going to be with us for a long time, and as Mike Cowell, Mike Mateja and others have observed, it's what we don't know, even more than what we know, that will be important.

As for the Group Insurance study that I was going to talk about, I would encourage you to let me know, at my *Yearbook* address if you have an interest and I'll be sure you get one. It arose originally because of a set of observations that went something like the following:

> Rating agencies and regulators have tended to look at companies with group insurance and have been using rules of thumb which translate to something like: You ought to have surplus equal to about 25% of your annual premium if you're in this business.

An article that was published just a couple of years ago by some Lincoln National Life actuaries used a considerably lower number; in fact, they are based on the Lincoln's business, its own characteristics, and the resulting estimate of surplus needed was down in single digits as a percentage of premium. On the other hand, you can find a couple of companies which had particular characteristics, perhaps management error, whatever, but you can find a couple of companies that at points in time had 25% in capital and very shortly thereafter went under perhaps as a result of mismanagement. So we got interested in trying to take a look at the characteristics of group business, and in particular, in looking at the characteristics and analyzing the ways by which management is able to respond by the pricing mechanisms, by built-in pooling, by the inherent profitability of the business to be able to respond to adverse cycles, and developed a kind of worksheet approach to being able to estimate the effects of the cycle on particular companies, being able to estimate response time and degree of effectiveness of response, and then putting that all back together for a company's entire business and developing a reasonable capital estimate.

In particular, we took into account, that you can't assume that the world -- be it the regulators, rating agencies or anybody else will let you exhaust your entire capital at the adverse point of a cycle. In short, the capital requirement is in effect two pieces: the piece you can gage by estimating the severity of the cycle and what it will take you to respond to it, and the piece that you, in effect, have got to have even at that point, because nobody is going to let you operate at zero. We've been constructing a kind of worksheet approach, which would enable people analyzing different kinds of business with different kinds of characteristics and different kinds of cycles that you could use it for the effect of AIDS, or for any other things to estimate surplus requirements for companies in that position. Are there any closing questions at this point?

FROM THE FLOOR: There are a lot of people out there, particularly some of the groups associated with the gay community and people who already have AIDS, who feel that it is almost a guaranteed right to be able to get health insurance whenever they want. Of course, that often means after they've got a real problem. But that attitude exists, and I think that in dealing with legislators that has to be recognized. I would also follow up with a question, and that is, even if we insurers are able to select out just those risks that we want in our selection process, it still leaves a fairly large number of people out

there who have AIDS who do not have insurance and someone has to put up the bill for that. Has anyone been looking at the indirect effects that might have on the insurance industry via affecting the medical care delivery system?

MR. MCCARTHY: Barbara Lautzenheiser will direct her comments to your question, since she has been very involved in some of the sociopolitical aspects of this whole question.

MS. BARBARA J. LAUTZENHEISER: The whole concept of entitlement, of health insurance, disability income, and life insurance is one of those pieces that is troublesome. As I say, we've done such a good job telling everyone that our product is so great, that now they all believe us and now we all have possible problems. One solution to that is to create riskpools. However, many of the companies feel that they have to have some general revenue funding or at least some tax offsets, to be able to be affordable, surely that has to move to including funds from the self-insured groups as well. Or what we end up with is no one wanting to buy insurance, everyone self-insuring, because the insured groups are carrying all of that assigned risk kind of burden that is there. But the uncompensated costs that are out there, particularly the health and disability income, are the pieces that are partially driving this political battle.

The other comment I wanted to make addresses Jim Pilgrim's comment having to do with the new strain of HIV that is transmitted heterosexually. The current strain of HIV is also transmitted heterosexually. We hear things like, only 4% of the AIDS population is female. Well you don't do actuarial studies that way, comparing 4% of the population against the whole population. You do an actuarial study by looking at the transmission rate. There are some six very small samples, but the transmission among the heterosexual population was from a low of 5% to a high of 80%. So if you companies or your companies say you don't write in "that market" you don't know what "that market" is. That's one of those unknowns and you need to test, test, test. You cannot use surrogates to determine whether or not you have an HIV positive person.

MR. JOHN O. MONTGOMERY: There are a number of bills pending in the California legislature. One of them would require random confidential testing of all the patients in the hospitals in California. Another would require in order to have a marriage license that couples be tested. They still haven't gotten around

to the insurance aspect. But those two things are being considered by the legislature. Also, there is a special advisory group to the legislature, which I happen to be on, on long-term care. What does the state do about AIDS patients and are they considering it with that? There may be some legislation there. I think originally, they had two testing centers in Los Angeles County, located in prominently homosexual areas. But there's been such a tremendous response that they've opened them up all over the county. Practically all of the people that are being tested are heterosexual and about 90% of them are females.

MR. MCCARTHY: That's been the case here in New York City, also.

MR. COWELL: I did not mention health insurance because most of my work has been done on the life insurance side, but certainly in response to the point that Barbara made, I think approximately 85% of the health insurance in the United States is provided through employer groups. The employer and the insurance company are bearing already a very huge share of the medical cost of AIDS claims in terms of group health insurance. Health insurance has been viewed as a right and I don't know what the solution is going to be for the 15% who are not insured under the group system and cannot get insurance. The absolute magnitude of claims we're talking about is enormous. We're talking about a million and a half people between now and the end of the century at an average cost of at least $100,000. We are talking about multibillions of dollars that will have to come from somewhere if not through the insurance mechanism then from general revenues.

MR. MCCARTHY: Health insurance availability doesn't always lead to a conclusion on the part of the insurers that they would like to test. There's an example of that here in New York City, in the case of Empire Blue Cross/Blue Shield. They are in effect, required politically to issue (and they do issue) a guaranteed issue community-rated major medical policy. It's got some preexisting periods and so forth, but nonetheless they are required to issue that. They can be pretty sure, therefore, that they are going to be providing coverage for a lot of that care. They would like to be in a situation, and in fact that is the situation in New York right now, where there is no testing for health insurance, because they would like, in effect, to attract as many other people into that pool as possible as well, to balance it with the infected people whom they can be sure they will be providing coverage for in any event.