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Mortality in the 21st Century

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Summary: In this session, the panel provides information on pensioner mortality, both current and projected, including a presentation of the Pension Plan Mortality Study. This study involved more than 14 million life years of exposure from 1990 to 1994, and included extensive analysis of the effects of demographic variables on mortality rates. The discussion of projected mortality includes various opinions about future mortality improvements, including the factors considered and methods used for projecting mortality changes.

Mr. Thomas P. Edwalds: I'm the Society of Actuaries research actuary for health and pensions. The actuarial profession was built around the study of mortality and the mathematics of life contingencies. The SOA is proud of its role as the preeminent source of practical information on mortality for financial security systems.

As we approach the 21st century, pension actuaries are concerned about the implications of our current trends in mortality. If these trends are extrapolated in combination with the demographic bulge of the baby boomers, the potential future financial burden on retirement income plans becomes quite heavy. In order to provide pension actuaries with the best possible information on mortality, the SOA Committee on Retirement Systems Research is currently sponsoring three projects on mortality. The panel are the chairpersons of those three projects.

Our first speaker is Ed Husted who chairs the Retirement Plans Experience Committee. The Retirement Plans Experience Committee is currently working on the Pension Plan Mortality Study. The purpose of this study is to carefully examine the contributed experience of uninsured pension plans during the early 1990s and produce mortality tables as appropriate. Mr. Husted is an FSA, a Fellow of the Conference of Consulting Actuaries (FCCA), an Enrolled Actuary (EA), and a member of the AAA. He's the senior vice president in charge of the benefits division of the Hay Group in Washington. He was formerly the chief actuary of the Office of Personnel Management of the Federal Government. As an SOA volunteer, he also participated in the development of the 1994 Uninsured Pensioner (UP) and the 1994 Group Annuity Reserving (GAR) mortality tables.

Mr. Edwin C. Husted: Mortality in the 21st century is my topic. As Tom says, we're producing a new mortality table. We hope to have an exposure draft next year. This is a good time to bring everybody up-to-date on what we have gathered and what we are going to do with it, and think about what the exposure draft might show when it comes out next year.

You have the Group Annuity Mortality (GAM), the GAR, and the 1994 UP tables. Many of who were involved in that project, like Mike Virga and Lindsey Malkiewich who headed up those two committees, figured our job was done for this millennium. Somebody passed something called the General Agreement on Tariffs and Trade (GATT), which has to do with trade amendments, and included it in the Retirement Protection Act (RPA), a requirement from the Secretary of the Treasury for an official table. Among other things, it means we have to now look at the tables we have and possibly gather some new tables and recommend or make some opinion as to whether one of these tables or this experience should form the basis for the RPA amendment mortality that must be made in the year 2000. We need to make that very clear. I hope you've read all the minutes we've been putting in the *Pension Section News* and have been following the relationship between what we're doing and the Secretary of the Treasury's decision. At one point, the draft legislation said the Academy or the Society would develop mortality tables to be promulgated as standard tables. That provision was taken out of the final law, so the final law simply says the Secretary of the Treasury shall promulgate tables. We are keeping the people from the various federal agencies informed about what we are doing. We're trying to keep this a very open process as we go along, but at the end of the day, all we're going to do is provide a study, a set of tables, and an opinion as to what we think is appropriate for various purposes. The Secretary of the Treasury is certainly free to take it or leave it. We trust and hope that he'll give our views the best consideration, but it is not, by any means, going to be the official table without a lot of additional action.

We have decided on a date for the table. We're going to call it 2000, but we haven't quite settled on what the initials in front of that date will be. We figured that date kind of jumps out at you. It is the last one of this millennium or the first of the next depending on how you count.

The GAR 94 table was developed from private sector insured plans. There had been a history of a set of studies and a set of tables for insured plans and uninsured plans. Since the 1984 UP table, in particular, there has been this distinction between the two bodies of data and the two analyses. These private sector insured pension plans come from the base period 1986–90. The table includes 8 million retired life years. It starts with a basic table called GAM 94, and that table includes a 7% margin. As I'm sure you all know, when you put a 7% margin on an annuitant table, you reduce the rates by 7%. GAR 94 includes a new concept called generational projection of mortality, and many of us who don't have to do generational projections are really trying to figure out what to do about it.

Why does the GAR 94 table include the 7% margin and a generational table as part of the table? Generational briefly means that instead of looking at a table and a projection scale, you're going to actually produce a table for each year in the future reflecting improved mortality as it occurs. The main reason it is a generational table is because it will be and now is part of the NAIC recommended standard legislation. This table, with its generational projection, will be enacted into law on a state-by-state basis. Therefore, as long as mortality projections are reasonably close, you won't have to go back and revise all these laws every five or ten years, so that's why it has the generational factor in it. That is the GAR 94 that was developed and promulgated last year.

As for the UP 94, we start off with experience 1985–89 (it is just about the same period as GAR), for private sector uninsured plans. The GAR applies to insured plans and the UP 94 applies to uninsured plans. We examined that mortality to determine whether there should be a UP 94 table since we had a GAR 94. We were under firm guidelines from the Society that said if this table was similar to the GAM 94 table before loading, why don't we just use the same table? We examined and compared the uninsured and the insured mortality and the committee was comfortable that there was no significant and consistent difference between the two sets of data. Therefore, the UP 94 table is really the GAM 94 table without the 7% loading. Since it is not mandated by any law, it's just a table that you all might use; it has a projection scale recommended for use with it, but it is not a generational table.

Before I get into the RPA, are there any questions about UP 94 and GAR 94 and what they are and how they differ?

From The Floor: What does the 7% margin on the GAM 94 mean?

Mr. Husted: GAM 94 is the 1994 version of GAR 94. GAR 94 includes the generational table, so the starting period of the GAM 94 table itself, which reflects mortality in 1994, already has the 7% loading. The idea is that since this is a reserving basis for insurance companies, it needs a loading for conservatism and things like that.

From The Floor: Is there a difference between the actual underlying mortality for insured and uninsured plans?

Mr. Husted: No, we found no difference in mortality. The reason the 7% is used is because the main purpose of the GAR 94 is for a conservative reserving basis. So there is the state regulation, and this is what has been done in the GAM tables in the past. That way it is a solid reserving basis taking into account variation. The UP 94 just like the UP 84, is presented to pension actuaries of uninsured plans as a basic table to start from. If you want to add some loading because of your group having low mortality, you do it yourself, but it's not built in.

From The Floor: Does the projection scale in the GAR 94 add an additional understatement of mortality?

Mr. Husted: The committee felt that the 7% was sufficient conservatism. The generational projection table, by specifying the mortality in the given year that you're projecting to, is actually supposed to be a very close estimate of projected conservative mortality if you accept that projection basis. Marilyn will talk a lot about projection.

From The Floor: You mentioned 8 million retired life years in GAR 94. How many are there in the UP 94?

Mr. Husted: It's a difficult question to answer. There are really segments of experience in the UP 94 work. There's the underlying civil service retirement system mortality that we have going back to the 1940s as a consistent kind of background information. I don't think there's a number similar to the 8 million. If there is, I don't have it.

From The Floor: Is white-collar and blue-collar in the UP 94?

Mr. Husted: Actually there was a small subset of data that had white- and blue-collar differences, but it was not big enough to say what the difference was. It's a mix of white- and blue-collar.

Let me go on to the RPA, which was incorporated in GATT in 1994. It is one of those bills around Washington that you kind of slip in, although with the line-item veto there won't be so much "slipping in" anymore. The GATT Treaty was passed in Congress and the PBGC in particular wanted this basis and so they kind of tacked it onto this bill. It says that there will be a standard table for determination of current liability purposes in pension plans. It says that the first table will be the GAM 83 table for nondisabled experience and separate tables may be promulgated for disabled experience, both those disableds who are covered by social security and those who are not. This will get the whole system going since there was no study at that point.

It says the Secretary of the Treasury may prescribe new tables in 2000, which I think would apply to start-up years of 2000. The Secretary is certainly free to either say the GAM 83 is working very nicely or wait a few years to do it. The Secretary has the authority to do that. And with that authority, as I said earlier, we've now come to the question of what should we do as the SOA as far as giving the Secretary of the Treasury some information on which to make an informed decision. We decided that it was probably worthwhile to take on the task of gathering as much data as we could on the relevant body of information and analyze that data to produce some new mortality tables. That is what I'm going to spend the rest of the time discussing.

The table will be called the 2000 table. The initials are up in the air. I wanted to talk about these four aspects. First, I'll discuss the data we gathered. Second, we have the basic tables that we have agreed we'll produce. Third is the graduation method, and fourth is the projection method. This is very much an evolving process, so if you want to question or comment on some things that I say or that you read in the minutes, please do so because none of these decisions are set in stone yet. This is the time to do it.

Let's discuss data. We went out in 1995 to the actuaries who are mainly in consulting firms and to many of the large companies, and said, "We have this new requirement. Why don't you send us your data, and we'll try to figure out if we have enough of a basis for a new mortality table and decide what we should do with it." We had a very good response—113 plans responded. We asked them to break it down by age and sex, and we also asked them to break it down by employee, disabled, survivor, and healthy retired. We also asked them to break it down by standard industrial classification (SIC) code, amount, and white- and blue-collar. We asked for this type of a differentiation and for exposures and deaths by number and by amount of the pension or the salary.

All of that information was collected by Tom and run through his computer and we had a contract with Kathy Elder, an actuary who is a professor at Frostburg State University in Maryland. Kathy and Tom spent a good deal of time analyzing the data, and going back and asking questions. I think they did an excellent job.

There was a good deal of concern by the auto industry about how their data would be used and about masking the data. This goes back to some concerns the auto industry had about what the PBGC did with the data. There was a good deal of concern about the confidentiality. The industry didn't want to just send you the data. It wanted the data to be masked. As you all know, there are three firms, so each of them is fairly large. They went through this arcane setup where the three actuaries of the three companies separated all the data into bunches and sent it to Tom. Tom unaggregated it, and tested it, and then put it all together and sent it on to Kathy Elder. In the case of the rest of the data, we, as well as the researcher, were able to identify and go back to the actual people. We had questions on this particular set of data. We were operating at a more distant level. We are comfortable that it's good, solid data, but there is that factor that people will have to think about as they're reviewing this.

As far as the data itself, we have data on 5.2 million active employees, 5.6 million healthy retirees, 400,000 disableds, and 700,000 beneficiaries, so it is a good block of data. There are 8 million retirees in GAR, so there are fewer retirees, but more total experience.

One of the first questions we dealt with was how do we split these data up? Do we have one overall table like UP 94 or do we present different tables and different sets of experience? We decided to provide basic tables for the employee experience, for the healthy retired experience, for the disabled experience, and for all healthy lives. All healthy lives would then be the combination of the employee and the healthy retirees. The primary focus should be on the first three sets of data. But we are putting in all healthy lives so that you have a direct comparison for the UP 94.

We do not plan to have separate mortality tables for the subgroups—the SIC code, the amount, and the blue and the white collar. We will present relative mortality factors for these subgroups. We will have 11 SIC codes. We're going to look at the major SIC codes. We're going to look at the three amount ranges for retired only because we just asked for retired only. We're also going to look at blue- and white-collar. Now the experience, as far as amount and as far as blue and white collar, is very much as you might all expect it to be. There are very large differences when you look at blue- and white-collar separately or when you look at high, medium, and low-paid retirees.

The SIC codes were kind of interesting because they demonstrated to us that you can't guess by looking at the industry what the mortality experience is going to be. You would think some would have very high mortality or some would have very low mortality. So it illustrates, if nothing else, that any particular group could be substantially different than the norm, even after you've controlled for everything else.

As far as graduation, some of you might remember Whittaker-Henderson, and if you do, you remember that there is a choice between how many differences you have, and what the "h" factor will be. Depending on those 4 tables, we're using different selections from second to fourth difference and "h" factors from 100,000 to 10 million. If anyone asks me to explain that, I'll refer you to the document.

This last one is what I call the Husted effect: there is no terminal age. The one contribution I made to the GAR and the UP 94 was we don't need a 1.0 factor anywhere anymore, and there's no demonstration that mortality ever gets anywhere higher than 0.3 or 0.4, so we shouldn't have a 1.0 terminal age anyway. This table won't have one either. For those who want it, we do suggest various methods that you can use if your computer still needs the 1.0 to do that.

As far as projection I won't say too much about it because Marilyn's going to talk. There are two periods of projection to think about. One starts with the study data, which covers 1989 to 1995, so that has a midpoint of 1992. In order to produce a table as we've done in the past, you need to take that data and bring it up to the year 2000. The question is, what will we recommend after the year 2000? Should this be recommended as a generational table or not?

Our committee, the Retirement Plans Experience Committee, reports to the Committee on Retirement Systems Research. At this point, we're planning to move rapidly to get the mortality tables and study to that committee by the fall of 1998. We were, at one point, going to have an interim report, but we've decided that would just hold us up, so we'll just speed through the process. That committee would then report to the Retirement Systems Practice Advancement Committee in the winter of 1998, presumably after some back and forth with our committee regarding the changes in the drafts. If that happens as scheduled, there should be an action by the Society Board in the spring of 1999, and that action will be, if they agree with everything we've done, to put an exposure draft before all of you in the summer or fall of 1999. Optimistically speaking, there might be an official report in the winter of 1999. In keeping with the Secretary of the Treasury's deadline of the year 2000, we should be on time and give the Secretary and the other agencies that are particularly interested in this ample opportunity to not only think about the

process in the winter of 1999, but to examine the exposure draft and our information quite closely.

From The Floor: Will that final draft be available either on paper or through the Web site this fall?

Mr. Husted: I'm sure it will be. As soon as the action by the Society Board is taken in the spring of 1999, that's when it will be there.

From The Floor: What about the timing for a draft?

Mr. Husted: I don't think that would be circulated. I think that anybody interested could certainly see drafts and talk to the committee about it, but there won't be any official paper.

From The Floor: Are there any differences in the definition of disability that you have to worry about in the time frame that's in the data?

Mr. Husted: Yes, the question is about differences in disability definition across the plans. We asked the actuary to indicate whether they were disabled or nondisabled, which, among other things, means you make that designation at the time of retirement. That means that disability designation carries with you throughout the retirement years. We collected information on differences in disability. We examined them and didn't think that they were significant. I think what we'll report on in the exposure draft is this disabled table, and we'll tell you what the submitter said as far as what their disability basis was. We will look at that. By the way, on all those differences, such as the SIC, or disabled, et cetera, the mortality differences disappear as you move into the 70s and the 80s, which you would expect, and so things come together around 85 or 90, or something like that.

From The Floor: Are these all unisex tables?

Mr. Husted: No, they're sex-based tables, because UP 84 had been presented as a unisex table, but that was before the Norris decision. The question at that point was the possibility that the Supreme Court would say that actuaries could not use sex-based tables. The decision was that you could not use sex-based tables for optional settlements, but everybody can and most large plans still do use sex-based tables, so we do it on that basis.

From The Floor: What kinds of distinctions are made to separate white-collar workers from blue-collar workers?

Mr. Husted: We asked the actuaries where they could break down the data into blue and white collar so as to present different sets of data for the group. We left it up to the actuary to do it. I think for the blue- and white-collar as well as for the amount, there's a real question of designation. Is this purely blue and white collar? Are these amounts in the right amount category? We'll provide the tables and a detailed explanation as to what we asked and what they meant. Then, if you have a pure blue-collar group, you can judge whether you should use that particular set of data or not.

Mr. Edwalds: Let me just add to that Ed. With regard to the data that we collected, we asked for hourly versus salaried, and we asked for collectively bargained versus not collectively bargained. Any plan that was hourly or collectively bargained was classified as blue-collar, and any plan that was salaried and not collectively bargained was classified as white-collar. If there was anything else, we went back to the data contributor and asked the actuary to classify it one way or the another. Some were classified as mixed, meaning it didn't go either way, so we do have a class that's mixed collar in addition, to blue- and white-collar.

Our next speaker is Marilyn Oliver who chairs the Mortality Projections Committee. The Mortality Projections Committee is charged with the task of investigating the implications of mortality improvement for pension plans. Ms. Oliver is an FSA, an Enrolled Actuary, and an AAA. Since 1993 she has headed her own firm, Oliver Consulting, specializing in public plans. She has 25 years of experience in pension consulting for both public and private plans. As an SOA volunteer, she also chairs the Committee on Retirement Systems Professional Education and Development, and she also participated in the development of the UP 94 Mortality Table.

Ms. Marilyn Miller Oliver: The subcommittee was started after the construction of the 94 Basic Mortality (BM) and the UP 94 tables because the Research Committee felt that further research was necessary in the projection scale area for retirement plans. The purpose of the committee is to provide information for practitioners in the retirement systems area or in the postretirement medical area regarding the use and derivation of projection scales.

We have some specific goals to evaluate what has been done in this area, what can reasonably be done, and what can reasonably be implemented by practitioners, and what practical implementation issues are. To date, we've worked with other groups to support the work of the Mortality Committee, such as the mortality study of social insurance systems that Mike Sze is going to talk about later. That study has been very helpful in providing us with an overview of what has been done in the projection area. We're sure it will continue to be helpful.

The other area that we're addressing is the practicality and materiality of the whole issue of using projection scales in retirement plan valuations. As a first step in explaining this, we are using forecast valuation techniques to compare the impact on contribution levels and accrued liabilities of using periodic table updates versus using a full projection scale. Our intent at this point was either do that study using ten-year updates using different actuarial methods, but primarily use the projected unit credit method.

Now I'll go on to the second part of my talk, which is about some of the issues in setting projection statistics. The derivation of projection scales is based on looking at past experience and trends for the future. There is quite a bit of judgment involved in terms of the experience today that you would pick and the trends that you see for the future.

If you look back at mortality rates over the century you'll notice that there has been a substantial decline in mortality rates. There have been cycles of higher and lower mortality improvement throughout the century. An example would be Social Security data for males of all ages for the 20-year period between 1934 and 1953. The declines averaged 1.5% per year. However, for the next 14 years, from 1954 through 1967, the decrease is only 0.2% per year. The same sort of trend was seen in Social Security data for ages 65 through 84, although it is at a reduced level. For females for the 14-year period from the late 1960s to the early 1980s, mortality improvement was in excess of 2% per year. However, more recent experience for 13 years would show that the decrease is only 0.6% per year. These figures applied both for all ages and for females aged 65 through 84.

You will see the impact of these cycles even more so if you look at projection scales. The projection scale H was used with the 1983 GAM table. The rates were for ages 52 and 62 to 100. The scale of improvement goes up by 0.5% per year increments. This scale was developed for the 1983 table. It was actually based on Scale G, which was the 1983 individual annuity table with some modifications at the older ages to lower the rates. That table was based on experience during the 1970s—primarily white U.S. experience, but also Medicare experience, so it wasn't particular to the insurance industry. During that period, there had been significant declines in mortality rates. One thing you seem to see in setting projections is that it's not necessarily true that there's a complete explanation for every change in mortality rates. Many studies attributed that change to declines in the mortality rates in heart disease, particularly among white females. The committee based its table on this information, but it evaluated that information and decided that the rates in the future would probably be lower. So if there would be improvements, there would probably be fewer. They used that basis to construct this table.

In the projection scale for the 1994 GAR table, the female mortality improvement rates that are assumed for the future are much lower. This is because the table is based on experience between 1977 and 1993. It's a blend of experience from Civil Service with experience from Social Security. Actually, the Social Security experience is through 1989, and it was projected forward on the basis. They were weighted 50/50, so there is a somewhat direct representation of that experience during the period, except that for females a floor of 0.5% per year improvement was added. There would be a dip at age 62: the real data were negative at that age for Civil Service. For Social Security, it went on to zero, which means there was quite a change.

Now I'd like to make a comparison to the Canadian Institute of Actuaries (CIA) for males. There's a bit of a shift in mortality improvement toward the younger ages. It is a little higher on scale AA at the younger ages and a little lower at the older ages, but it seems close. Let's discuss women. As you probably have already seen, there's quite a difference in the two scales. The actual experience that this is based on is the Civil Service data. The rates for females in mortality improvement rates from ages 55 through 72 are actually less than 0.5% per year. Between ages 59 and 65, they were negative.

Next I'd like to make some comparisons to more recent experience. These are data that were summarized for the GATT Study. I haven't included the GATT experience that Ed was talking about. It's similar in direction, but much more volatile because of the smaller size and the experience. This is a long-term comparison. We have the Civil Service (designated as OPM). There is also Scale AA and Social Security experience. The Social Security experience is actual experience from 1980 through 1991, and it's very close to scale AA. The Civil Service experience is somewhat different, but still in the ballpark. The Social Security data are fairly close to scale AA. This is the period from 1980 through 1996. The previous OPM data was 1977 through 1993. At the central age, 62, the rates of improvement for women are worse than they were before.

Six-year and seven-year populations of data are probably not that meaningful in the long run. Again, the male table is very close and the female mortality improvement rate is still low for OPM and a little bit higher for Social Security.

What do you do about these differences in the male and female improvement rate. Should we recognize them going forward as scale AA has done? It was staged on a particular period other than the 0.5% per year mortality improvement floor. You're really being governed by the mortality in that period, which was not favorable. You can do something more like Social Security where it's recognized on a temporary

basis and then graded into the long-term rate, or you can ignore it altogether. I guess that's another alternative.

Let's discuss life expectancies using scale AA. We have life expectancies at 52, 62, 72, and 82. There is a change in the relative life expectancies due to the use of scale AA. At ages where the improvement rates are the lowest for females relative to men, the gap between the sexes narrows. There is a large narrowing of the gap at 52 and 62, some narrowing at 72, and then, at 82, there is not very much narrowing at all.

I guess the big question is what has caused this? Most studies seem to indicate that it's lifestyle differences. I don't think anybody has been totally conclusive in proving why this is occurring, but the predominant theory seems to be lifestyle changes, particularly smoking. There are, to a large degree, differences in smoking incidences. Men smoked earlier and in greater numbers. Women started smoking after World War II, though they did not reach the proportions of smoking that men did. Now men are quitting smoking more than women, so we have that operating. Many sources have indicated that was the explanation.

Just judging from present value factors, a full use of scale AA at age 62 for males would increase your present value by 2.5%; for females it would be increased by 1.2%. However, the deferred annuity shows an 11% increase in your males and a 4% increase for females. In the deferred annuity area, you'll see the major impact of the projection scales.

Mr. John M. Bragg: As some of you probably know, Bragg & Associates studies life insurance mortality. That's our main niche. It's just amazing that what you're saying is what we're seeing on the life insurance side. I just came out with a new study based on 1990–94 data and it shows, in general, the smoking female mortality is up quite a bit if you're comparing, say, 1982 with 1992, which are the midpoints of the experience period. Female smoking mortality is up. As you know, on the life insurance side, everything is divided by smoking, nonsmoking and male/female. In fact, there are even areas where the smoking females are now worse than the smoking males.

Nonsmoking males are way down. Your smoking males are about flat. This goes along with what you're saying about the males improving on average. Nonsmoking females are down; they are not down as much as the males are down, but your smoking females are way up.

Ms. Oliver: So the mortality improvement rates for nonsmoking females are actually declining?

Mr. Bragg: If I added my two smoking female groups together, I would have almost the same pattern you have. It does seem that it's going exactly the same as what you're seeing. Your comments about smoking being the culprit in this thing are probably right. We're also finding that it takes a long time to get over the effect of smoking, even after quitting. Even after five years, it still makes a big difference. I was quite amazed to learn that what you're finding here is exactly what we're finding.

Ms. Oliver: It's very amazing. I got involved in this because I was looking at experience studies for California counties, and I noticed the deterioration in the actual rates of mortality for females.

Mr. Bragg: It seems to be real for some reason and probably because females are not quitting as much as the males are and so on.

Mr. Eric Stallard: We published a paper earlier this spring in the *National Academy of Sciences Journal* where we showed that disability has declined significantly over the period 1982–94. The rate of decline was averaged out at about 1.3% per year, so it's very interesting that the period of stable mortality is one where the disability long-term care classification has actually declined. If you follow that, it predicts that there will be a new decline in mortality coming up probably over the next 10–15 years. I think what you have are ebbs and flows, so it's very important to look at the long-term trends. Lifestyle is obviously a factor, as is medical technology, better treatment, blood pressure control, cholesterol control, and so on.

We looked to see if there was any way that we could determine where this thing is going in the long run. Robert Fogel at the University of Chicago studied the disability patterns among Union Civil War veterans in 1910. He created comparisons that allowed us to determine that over the course of most of this century, there has been about a 0.6% decline in chronic disability among the age 65 and older population. That appears to be consistent with a minimum improvement of 0.6% to the 0.5% that you had built in. I think it's a very prudent thing to do, but I think you could actually argue that 0.6% would be a good lower limit. Then look at other factors. Fogel attributed the change primarily to the fact that today's population is bigger, stronger, and healthier. They have better prenatal and postnatal nutrition. He did calculations that indicated that the actual adult stature of today is 55–60% larger than it was 100 years ago. Now if you follow that through and you take his graphs, you can make an argument that with the prenatal and postnatal factor that gives you about 25 years of one generation, and about 85 years to a serious disability, you will see long-term mortality improvements for at least 110 years.

Mr. Edwalds: In his keynote speech, Robert Reich mentioned some of the factors related to Social Security, but one that he failed to mention was mortality. Our final speaker is Mike Sze who chairs the Impact of Mortality Improvement on Social Security in the U.S., Canada, and Mexico Project Oversight Group. Mr. Sze holds a Ph.D. in addition to being an FSA, a Fellow of the Canadian Institute of Actuaries (FCIA), an Enrolled Actuary, and a MAAA. He has recently taken a position with the University of Michigan as an adjunct professor.

Mr. Michael M. O. Sze: Which means they can fire me at any time.

Mr. Edwalds: He has extensive consulting experience in both the U.S. and Canada and served on the Technical Panel of the 1994–96 Advisory Council to the Social Security Administration (SSA). He's just completed a term on the SOA Board of Governors, including a year on the Executive Committee representing the Pension and Practice area, and he has just completed his term as Chairperson of the SOA Social Security Committee.

Mr. Sze: I'm just a researcher like most of you. There are several reasons that we are interested in doing this study of the impact of mortality improvement on Social Security in Canada, Mexico, and the U.S. First, in the past, most of the actuaries took a very passive attitude toward mortality studies. Once these tables are published, we have no choice. We are just people who will have to use these tables or else our products won't sell. But actually mortality really needs a lot of impact and research from all of us because we have done the studies all the time, so we know how it goes.

In the past, many actuaries have been standing on the sidelines as far as Social Security and mortality goes, and we are just waiting for other people to do it while the SSA actuaries have been very conscientious and done a very decent job on this. But that's just a small group.

The bulk of the mortality studies have been done at the universities by economists or demographers. It seems like there are separate interests. The two groups don't talk to each other enough. We actuaries really want to get out of the little cocoon and talk to the people. That is why we want to do this study. Third, we have always thought that the world is getting together.

Why is it that we actuaries in Canada, the U.S., and Mexico would study mortality on our own, despite the difficulty? The theories are quite similar. Why should we do our own studies and stay in our little corners? Why don't we do it all together?

I'm going to bring you up to date on what motivated our studies. What are the principal phases? Who are the sponsors who gave the money and who did the work? I'll give you a glimpse of some of the findings. We don't have all the findings because the study has just begun. We got funding consolidated by May of this year, and we are very ambitious. We will present the results in probably February of 1998. People said we're crazy to break our neck like that. We'll try that speed and see how it happens.

As we all know, mortality has a big impact on Social Security. There's considerable debate on whether the trend of the SSA is aggressive enough. Do the mortality projection improvements really reflect the population trend? Some people are contending that mortality improvements should be in the neighborhood of 1% per year; some people are saying even more. The SSA projects that, for some of the ages, mortality improvements are around 5.6%. Is it actually just loading the deck so that the Social Security funding can be lower? When we on the Social Security Technical Panel talk about these things, we realize that there is still some debate about magnitude; what's more important in this discussion is showing that there's quite a bit of uncertainty in the issue.

When you listen to Ed and Marilyn, you also sense that there's lots of uncertainty in this issue. How are we dealing with that? What if the mortality improvement is substantially higher than what we expect? Would the Social Security funding collapse? How do we deal with it? Furthermore, when you hear people talk about mortality trends improving 1%, 0.5%, or whatever, they are talking about the improvement of all the ages as a group. We, as actuaries, are trained to know that there is not the same effect for all ages. For the older ages, if you have mortality improvements, the payout period would be longer and that will be a strain on the funding because there will be more outflow each year. On the other hand, we could see substantial mortality improvements in the younger ages, especially in infants which we actually just gross over. We start our mortality study at the age of 15, 20, or 25. What about the younger ages? Think about it. Those ages would actually affect the population. The life expectancies have future impact. What's more important is they will affect the number of workers. If you have mortality improvement in those ages, the funding or the income for Social Security will be increased. Do we have a balancing? We have to study that.

As always, actuaries react to things, but it takes Irwin Vanderhoof to generate some ideas. Because Irwin is somewhat ahead of us, he asked, "Why shouldn't we actuaries talk about some of our expertise in front of the Research Committee?" The American Association for the Advancement of Sciences (AAAS) will be holding its 150th annual meeting in Philadelphia in February 1998. This organization has 160,000 members. Why shouldn't we actuaries stake our claim there and do

something? Irvin said we should do a big project that will affect not only the U.S. but other nations. Let's see if we can attract enough attention so that they will give us a time slot to make our presentation. That is why we thought about doing this.

So what are we going to do? We will do this study in three phases. Phase one will look at the past. Phase two will be based on this past but we will see what we as actuaries can make out of it. We are not going to stay in our little cocoon, however. We are going to solicit replies from the "authorities" in this field. We will invite the big names in mortality, demography, economy, Social Security, and medical research to a second phase seminar in which we will formulate some assumptions to project forward. We cannot predict at this point in time how those assumptions will come out, but we are going to analyze their impact in a way that will be different from what the SSA actuaries have been doing to determine the cost impact. Because we want to be more international, we are going to start with Canada, Mexico, and the U.S. Who knows? One of these days we actuaries will venture out of this continent, too, but you have to take one step at a time.

Who are the sponsors? Such research, of course, will need a substantial amount of money, and we are very lucky that everybody that we approached said yes. We are obtaining major funding from the Life Research Committee of the SOA, the Retirement Systems Research Committee of the SOA, the SOA Foundation, and the Retirement Research Foundation, which is not an actuarial organization. Cosponsors include the Social Security administrations of the three countries. Not only are they providing the data, but they actually have staff now committed to doing much of the actual work and a great deal of the analysis of the past. Then, in phase three, we will actually project out the cost impact, so we owe a deep note of gratitude to them. We will also have the Pension Research Council of the Wharton School helping us out. Olivia Mitchell has been instrumental in formulating some ideas to help us, so we are very lucky there.

The original team consists of Bernard Dussault, who is the chief actuary of the Canada Pension Plan (CPP); Steve Goss, who is the deputy chief actuary of the SSA in the U.S.; Warren Luckner, who is the Research Director at the SOA; Irwin Vanderhoof, who is the clinical professor at New York University and motivates on many issues. I am also on the team. But that was only the beginning. Because the research is getting bigger and bigger, we have more than 10 experts, if not 20.

The project team consists of the deputy chief actuaries of the SSA of the North American Free Trade Agreement (NAFTA) countries. We also have Social Security experts and mortality experts from universities and insurance companies. There is much detailed computation and work that has been done by the SOA Research staff.

With all that research a lot of paper will be generated. We actuaries are very good at paper shuffling, so there will be three research reports from phase one, several papers and a seminar proceedings book from the seminar on phase two, and the projection reports from phase three. There will be a presentation and report made at the AAAS meeting in February 1998, and all of this will be published in the *North American Actuarial Journal* next year, so look for the results.

Our timing schedule is something that we'll probably break our neck on, but we'll try to accomplish it. We started planning this project at the beginning of 1997, and the funding came in April or May 1997. In the meantime, we started thinking about how to do phase one and a proposal went out. We got a proposal in April and all the data in May. However, phase one consists of looking at the past social security data of all the three countries. Then we will also look at the literature to see what the theories are behind mortality improvement by the various groups of people and what principal methodologies are used. We are lucky that results have been completed as of now.

Phase two actually started right after we were sure we'd have money for phase one, so we started on phase two. The seminar on mortality improvements is scheduled at the end of the SOA Annual Meeting. It will be held on October 30, 1997 and feature about 90 invited experts. We expect that the results will be compiled by the end of this year, which means we don't have that much time in terms of making mid-February presentations. We have started planning phase three already, and we will have some preliminary results that we are going to publish and talk about in February of next year. We hope the whole thing will be published in the fall of 1998.

A graph on the mortality improvement trends in the three countries, Canada, U.S., and Mexico, should show definite improvements. It would show death rates from the beginning of the century and then project into the future. It would not be a smooth downward sloping line; there would be bumps. In 1930 the death rate for the U.S. was about 0.015, Canada was about 0.018, and Mexico has much higher mortality trends at 0.025. All three countries are improving, with Mexico showing the greatest improvement in the last 60 years. By the end of the century, all three countries will have similar mortality.

There is one thing that the demographers are debating. These projections of the future are based on what the governments in the three countries are using. But what they are saying is if you look at the trend, the governments are curving it down. It's stabilizing, decreasing the rate projecting into the future. But if you just do a linear regression, the rate would be going straight down further.

The trends are quite different for the various ages, and this brings me back to the point that different ages would have different impacts on Social Security funding.

It is very important for us to know the three things that I mentioned. First of all, there are bumps along the way. We are not sure. Second, there is controversy between the different groups of people. What would be the average trend? Third, there will be different ages having different impacts. Of course, the study is still going on and we hope that we don't break our necks at the current speed, but we'll see what happens and look out for all the results that will be coming up.