

# **RECORD, Volume 28, No. 2\***

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San Francisco Spring Meeting

June 24–26, 2002

## **Session 330F**

### **The Impact of Economic and External Trends on Disability Insurance**

**Track:** Health Disability Income

**Moderator:** RICHARD CARLSON LEAVITT

**Panelists:** JAMES DOMPKOWSKI†  
FOON WEI LEW  
ALLEN D. LIVINGOOD

*Summary: This session explores the potential impacts of the changing economy and other external trends on the world of disability insurance. Will higher unemployment lead to high levels of disability claims? Will lower interest rates erode profit margins? Will new types of disability claims emerge in the wake of a war on terrorism? Participants in this open forum are encouraged to contribute their own thoughts on these subjects.*

**MR. RICHARD CARLSON LEAVITT:** I'm going to give a little bit of an overview. The people here will do the bulk of this presentation. Al Livingood and Jim Dompkowski of UnumProvident are going to talk about an interesting study that they've done correlating macroeconomic statistics with LTD incidence. Foon Wei Lew of CNA Companies is going to talk about similar work. It's a little different in the sense that he drills down and takes a look at regional variations and also looks at some case-specific considerations.

I'm going to give an overview of this subject. A couple of years ago, I talked in some detail about this particular subject. I'm certainly not going to rehash a lot of that, but I do want to take a step back and think a little bit about the mechanism

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† Mr. James Dompkowski, not a member of the sponsoring organizations, is managing actuarial analyst at UnumProvident in Portland, Maine.

**Note:** The chart(s) referred to in the text can be found at the end of the manuscript.

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for these external influences. They've done statistical correlations, which are very good, but they don't establish cause and effect. Statistical correlations don't tell you the details of what's going on, so I want to put that work into context by at least giving you my point of view on what's going on.

I think that disability is particularly susceptible to external influences because of the fact that it's a personal decision. Becoming impaired is often not a personal decision, but making the decision not to go to work, to stay home and file a claim often is a decision that's made. There are a lot of factors that influence this decision, and I've listed the top six that I could think of here: workplace stress, job satisfaction, job security/fear of layoffs, social attitudes/work ethic, work-home balance and personal health/medical environment. Those of you who have worked in the field for a while probably have a similar list. Certainly, we cannot do the study that details exactly the effect that each of these has, so it's all speculative at this point.

I would put workplace stress at the top of the list, and that comprises a lot of different things. But there's no doubt that there's a connection between stress that you feel in your job and your health. That's a well-established connection. There's also a connection between stress and whether you like or are fulfilled by your job. Changes in the levels of workplace stress and job satisfaction to me are probably, in general, the leading factors that impact disability experience.

Now, that manifests itself through the economy, and that's largely what the panelists are going to talk about. The reason that we study the economy is because there are macro-variables that are collected and are standard over a period of time, and they're essentially objective variables that we can take a look at. But I really think of these underlying causes going beyond the economy, the job security, fear of layoff, social attitudes and work ethics and so forth—those also change over time and those also affect disability experience—but it's really the ones that affect how you feel about your job that, I think, are most strongly correlated with disability experience.

I bring this up because, as actuaries, we don't really deal with these very often, and we don't deal with because we don't have an objective way of measuring them. These are the kinds of things that the underwriters are going to be looking at, and if the underwriter is a good underwriter, the underwriter is going to be thinking about all of these considerations. I want to talk a little bit about the difference between how an actuary has traditionally viewed pricing the product and how an underwriter might view pricing the product.

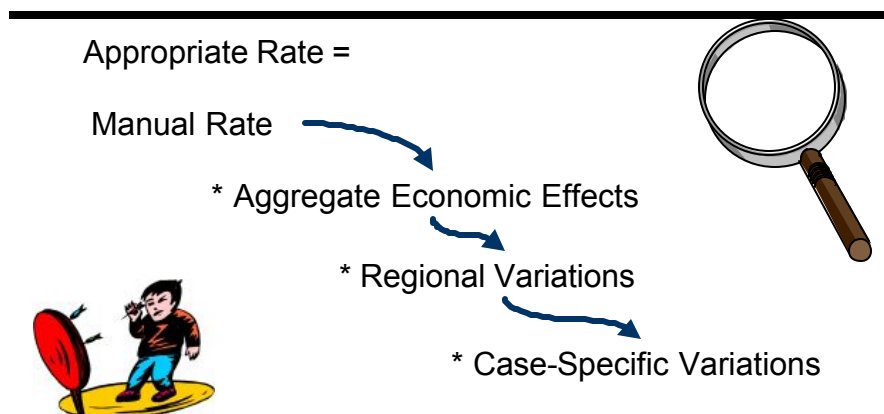
The actuary is in the back room constructing a formula rate that's based upon generic variables—age, gender, salary, occupation and so forth. We're going to add a layer of aggregate economic data. Some of you who do disability pricing may incorporate this type of information or you may not; you may be thinking about incorporating it, but not doing it. But anyway, that tends to be the sum total of what we have to look at.

Well, if you compare that to what the underwriter has to look at on a specific case, the underwriter has a wealth information about that case. I've talked to enough underwriters at enough different companies to realize that there's a ton of information and it varies from underwriter to underwriter within a company; it certainly varies from company to company. There's a lot of information that they gather to help them assess risk. There's been a little bit of a separation historically between the actuary calculating the manual rates and the underwriter guessing at how changes in these things will affect disability experience and making a judgment based upon that. I really view it as an opportunity to extend the role of an actuary. We should really be venturing into this other realm. In other words, we should be helping the underwriters gather this information in an objective way and helping them come to some sort of decision about how they might use that information. That's just my personal philosophy about how actuaries should be pushing their skills outside of this realm here.

What do we know? We start with levels of different information (Table 1). The appropriate rate is certainly going to be a product of all of these different things; the manual rate, that's your formula constructed over a period of time; true in aggregate, but not necessarily pertaining to the particular economic situation we find ourselves in and not necessarily pertaining to the specifics of the case. You can then apply the information from the economy, take a look at regional variations, so that if you're experiencing a boom in the Southwest and you're experiencing economic hard times in the Northeast, that might affect how you price the case.

Table 1

## What do We Know?



What Is the Range of Value for Each Factor?

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And finally, you really get down to the case-specific variations—information about this particular case that makes you think that the risk is going to be better or worse for that case. And, clearly, there's a range. If you're looking at under 100 lives, it's probably not worth the effort to spend a lot of time gathering this case-specific information, but if you're looking at a larger case, it is.

What is the range of these factors? In other words, this is just intuitive. Are aggregate economic effects plus or minus 10 percent on disability risk? Are they plus or minus 20 percent, plus or minus five percent? What do you think? And then, finally, you get down to case-specific variations—how the management treats the employees, how the employees feel about their jobs, whether that company is going through hard times or not. What's the range of the variations of that? I believe it can be a fair amount greater than the broad aggregate economic factors, but it's harder to get a handle on it because we don't have the objective measures.

That's my brief philosophy on the external effects on LTD. At this point, I'm going to stop and turn it over to Al and Jim, and they'll talk about the specific study that they've done regarding macroeconomic effects.

**MR. ALLEN D. LIVINGOOD:** Let me take just a minute or two to give you an overview of what we're going to go over. I'm going to talk a little about the economic review we've done in terms of how it impacts the incidence, at least in our company, and then I'll try to give you some perspective of how our block of business can be representative of the economy so that when we talk about the aggregate economic indicators, we feel that they have an impact upon our block. Then we'll get down to some more specific breakdowns, looking at breaking up claims into groups and looking at whether there are economic indices or correlations that are stronger at a smaller level than when looking at the total block. Then I'm going to hand off to Jim Dompkowski, and he's going to look at some of the work we've done to try to understand it and model the insights we've gained.

You can see from the Chart 1 that the pink line is the block incidence experience over a four-and-a-half-year period through the second quarter of 2000, and the solid line represents some standard industrial classifications (SICs) that are grouped together to represent some industry sectors up to the same point in time. I'll be referring to a couple of comments from the National Bureau of Economic Research (NBER). According to their definition, the most recent recession started in March of 2001. What are some expectations about what may have happened in the incidence experience subsequent to this point?

**FROM THE FLOOR:** (Inaudible.)

**MR. LIVINGOOD:** That's a good point. I should point out that predominantly all the analysis we've done is on submitted claims, basically claims coming in to the company. I'm not necessarily looking at those claims that had a decision to accept liability.

Chart 2 shows the experience through the first quarter of 2002 on those same blocks. The overall block started to see some upward incidence in basically the fourth quarter of 2000 and, certainly, in the first quarter of 2001. But what's interesting in this is the industry groupings that we have exhibited some up-ticks in incidence starting in, I would say, the third quarter of 2000. What's interesting is the NBER, which is a group of economists, a lot of academics, tends to look at four key elements in determining or defining a recession: employment versus unemployment; industrial production; wholesale and retail trade and real income. One of the things they pointed out is that when they studied the six recessions in the past, in their dataset, they found that certain portions of the industrial-production sector of the economy, along with the wholesale-retail trade sectors of the economy, tend to experience the recession upwards of four to six to nine months before the rest of the economy. It may not be unexpected that certain industries would see a bit of a rise in incidence before the whole block of business that we have.

Jim Dompkowski and I have been reviewing some of this work. We really started looking at doing this work in February of 2001, not that we realized the recession was going to start in March of 2001, but basically because we saw some incidence differences in our block that we hadn't seen before. We were trying to see if they were correlated with some of the impacts of the economy. That's what led us to look at this material.

We next started looking at some economic variables, and I'll get into those that we've looked at in a little more detail. Consumer confidence was one that we found that really helped our understanding and had a pretty strong correlation with the submitted claims.

One of the observations, at least from the graphic perspective in Chart 3, is that when consumer confidence is more around its normal level of 100, or when it's coming down, we see in this time period a bit of an increase in the incidence rate.

I had a Ph.D. psychologist who works in our medical division send me a comment about some of this material that we've shared. She had been reviewing some work regarding what Rick was talking about. Is it workplace stress that leads to some of the increased filing of disability claims? One of the things that she has come across in some of the literature on the medical side is it's not necessarily the actual stress, but more the perceived stress that the person feels. That could be partially why an indicator of consumer confidence, which is more of a subjective indicator, might correlate better with the incidence.

We did some looking at our block to make sure that it had some correlations with the overall economy, because we were using overall economy indicators. One of the things we looked at was our representation of the industries in our block versus those in the economy as a whole. For most of the SICs, we only differed by a small

amount from their representation in the economy, and what we've done here is provide some perspective.

The left-hand side of Table 2 shows the industries in which our block weighting is less than the economy sector weighting by more than one percent. The right-hand side is the same thing, but represents where our block weighting is slightly more than the economy weighting by one percent. Really, that's just there to remind you that you need to know your data. Another aspect we think you should look at is whether you are regionally represented similar to the economy if you're going to use nationwide economic indicators to look at results.

Table 2

**Industry Mix versus Economy**

- The block industry distribution and the Economy industry distribution differ by less than 1% for 54 of the 2-digit SIC category breakdowns.
- The block industry mix in our analysis differs by more than 1% from the US economy industry sector mix for these industry sectors.

Block Weighting <i>less</i> than Economy Sector Weighting by 1%	Block Weighting <i>more</i> than Economy Sector Weighting by 1%
<ul style="list-style-type: none"> <li>• Eating and Drinking Places</li> <li>• Government (OES designation)</li> <li>• Construction Special Trade Contractors</li> <li>• General Merchandise Stores</li> <li>• Food Stores</li> <li>• Miscellaneous Retail</li> <li>• Automotive Dealers &amp; Gasoline Service Stations</li> </ul>	<ul style="list-style-type: none"> <li>• Security &amp; Commodity Brokers, Dealers, Exchanges, and Services</li> <li>• Legal Services</li> <li>• Electric, Gas, and Sanitary Services</li> <li>• Industrial &amp; Commercial Machinery &amp; Computer Equipment</li> <li>• Membership Organizations</li> <li>• Depository Institutions</li> <li>• Engineering, Accounting, Research, Management, and Related Services</li> <li>• Health Services</li> </ul>

- **An additional block characteristic to consider, in regard to the economy, might be the regional distribution.**

Table 3 is not an exhaustive list, but it's pretty comprehensive for the elements that we have looked at in terms of economic indicators. We certainly have not spent a lot of time with every one of these. We just put them into a universe to consider where there may be relationships. I've highlighted four in red. Those were the ones from NBER that they look at for defining a recession. I've also highlighted two in blue—consumer confidence, (I've already given some examples of where there's a reasonably strong correlation), and then urban consumer medical care, which is one that Jim will get into and will discuss some of the modeling we've done. It's a component of the CPI from the U.S. Bureau of Labor to reflect the past expenditures from households for either premiums or for out-of-pocket expenses but does not represent any cost that comes out of the employer cost.

Table 3

**External Variables Reviewed**

	<b>Employment</b>	<b>Industrial Production</b>
<b>Economic</b>	GDP ECRI Unemployment (UE) Initial Jobless Claims Coincident Indicators Inventory to Sales Labor Cost per Unit NAPM	<b>Personal Income</b> Consumer Confidence Unemployment Duration Leading Economic Indicators Lagging Economic Indicators New Consumer Goods Orders Average Manufacturing Week <b>Manufacturing Trade Sales</b>
<b>Other External Indicators</b>	Urban consumer - medical care	
<b>Financial Markets</b>	Treasury Fed spread Ten Year Treasury Fed Funds Rate AAA rate BAA rate	M2 S&P 500 Prime Rate BAA/AAA Spread
<b>Additional Economic Measures</b>	CPI Service Inflation Housing Starts Credit as % Income Percentage Change in Personal Income	New Nondefense Capital Goods Commercial & Industrial Loans Consumer Credit

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Here we're trying to give you a flavor of some of the aspects of the things we've looked at. If any of you were at session 11L, "Data Mining Techniques in Actuarial Modeling," we've tried to look at a few of those techniques to narrow this list down to those aspects that were more applicable.

Chart 4 shows some examples of the observations we found. When you look at the correlations between the submitted claims coming in to the company and those that get approved for payment, the correlations, at least in the 1995 to 2001 period, are much stronger with the submitted claims. The other thing, which was true to my management and has probably been true to some other comments I've seen in the literature in the past, is that there's often a perception that unemployment correlates pretty well with what you see for your claim incidence. We found that unemployment isn't nearly as strongly correlated as consumer confidence, which is one that we have focused on. I've just listed some others, not that we put a lot of study into each one of them, but the National Association Production Managers Index (NAPMI) is pretty strongly correlated with our block incidence.

I also wanted to point out that paid incidence is only around .43 correlation with our submitted incidence rate. We also did a study that went back to 1990, and we saw similar results going back further in time. There's not a lot of correlation necessarily, at least in our block, between submitted claim incidence and paid claim incidence.

I'll add one other thing. The same group that defined the recession, NBER, has indicated that one of the reasons that they don't use unemployment as an indicator for their own work is that it tends to be subjective, and it can be restated because it's a household survey. They also feel it's a lagging indicator of the economy, which is why they use employment instead.

There is some other work that we started to do early on. We were trying to figure out whether, if we broke down the block of claims that we see into certain diagnostic groups of claims, the experience of incidence was stronger or weaker than it was for the full block. I think what stands out pretty clearly is that the correlations for some of these groupings of claims are much stronger than they are for the full block. It can really help in terms of modeling to break it down in some of these groups and think about whether to group some groups of claims with other groups of claims.

I have groups one, two and three. Group 1 consists of maternity, heart, physical nervous and AIDS. Group 2 includes back, mental/nervous, general sickness, arthritis/respiratory and cancer. Group 3 includes general accident, digestive, occupational-related sickness, circulatory and MS.

We did some work to look at claims that tend to move together, and I'll get to that later. We grouped those claims together not based upon their economic correlations, but based upon their correlations with themselves. I would say that the results are not necessarily always intuitive here. When you look at the back claims, they tend to have a pretty strong correlation with unemployment. In the time frame that we studied it's 0.6. Over the time period that we're looking at, unemployment was generally decreasing from 1995 to 2001. The incidence on this particular set of claims was generally increasing, and that is true for some of the other claims in group two as well. The correlation for mental/nervous with unemployment is a positive 0.5. My point here is even though these two groups of claims—mental/nervous and back—along with the other groupings in group two, tend to move together. They don't necessarily tend to have the same economic correlations.

What we've generally found is that the grouping of group one claims has been decreasing pretty much in the 1990s; the group two claims have generally been increasing during the 1990s. Some of this you'll see in the graphs that we get to in the modeling section. The group three claims tend to not have any sort of pattern to them at all in terms of incidence.

When we first started looking at this work we were trying to figure out a way to break down the claim block and get more of a sense of where there were economic patterns that we could group together, and this is a way to summarize it. If you just take maternity claims as an example, we looked at how they were correlated with other groups of claims. In this first box in the upper left, you see that they were pretty strongly correlated with each other. In some of our analysis now we've been grouping these claims together and looking at them.



On the flip side though, when you look at maternity and you look at some of the other claims that were in group two (back, mental nervous, non-occupational sickness, arthritis, respiratory or cancer), they're pretty much oppositely and pretty strongly correlated (Table 4). The third group had claims that didn't really correlate at all with maternity claims and they also had relatively low correlations with maternity or with each other. From that, we took a lot of this work and tried to piece it into models so we could increase our understanding of how some of the economic relationships were impacting our block. I'll turn it over to Jim to go through some of that.

Table 4

**How the Claim Groupings Were Determined**

Maternity with...	
<u>Diagnosis Group</u>	<u>Correlation Coefficient</u>
Heart	0.74
HIV/AIDS	0.87
Physical Nervous	0.59
These three (plus maternity) generally moved together in the period 1990-2001.	

Maternity with...	
<u>Diagnosis Group</u>	<u>Correlation Coefficient</u>
Back	-0.68
Mental Nervous	-0.61
Non-Occ Sickness	-0.92
Arthritis/Respiratory	-0.68
Cancer	-0.80
These five generally moved together in the period 1990-2001, and opposite to the claims in Group One.	

Maternity with...	
<u>Diagnosis Group</u>	<u>Correlation Coefficient</u>
Non-Occ Accident	0.19
Digestive	0.17
Occ Accident	0.31
Circulatory	0.16
Multiple Sclerosis	-0.23
These remaining five claim types appear unrelated, both to the other two groupings, as well as to each other.	

**MR. JAMES DOMPKOWSKI:** As mentioned the reason that we looked at submitted versus paid was because the correlations were stronger. I have a couple of hypotheses for why that might also be the case. Theoretically, paid claims could be subject to changes in management or experience in claims handlers. If you have handlers that are more experienced, they might handle claims differently than ones that are less experienced. Ultimately, with this examination of submitted claims, we hope to provide input to our planning process in that the claims organization has to build a staffing model based on the number of claims they expect to have. To the extent that we have faith in the models that we build, we might be able to provide good input to them and also to put some bounds around management expectations on our claim experience.

I'd like to say a couple of words on tools and methodology. I don't know how many of you went to Session 11L on data mining, but Excel and SAS do a lot of the

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heavy lifting that you will see as we go through this. It's not like you need to go out and spend \$150,000 on Enterprise Miner or whatever to do the kind of work that we've been doing. Some of the tools that we all have on our desktops work remarkably well. The one tool that we did make a lot of use of is called MARS. It's a product by a company called Salford Systems in San Diego. MARS is basically regression model software, but instead of using particular variables to plug into a regression equation, it will express an answer in terms of a function. It's a neat product, and I'm quite fond of it.

The economic statistics that we used were basically things that we found for free off the Internet. There's a remarkable quantity of stuff out there. Bloomberg is also a good resource for some of the stuff that we've done. We looked at a whole range of different time periods to try to gauge whether the models would work under different kinds of scenarios, and the time period we settled on ultimately was 1995 through the present.

The models that we're going to see in a minute are what I would call "perfect knowledge models." What I mean by that is knowing whether you can come up with a model that would give you a submitted incidence number for that quarter, once you get to the end of a quarter and you know what happened in that quarter. We're doing that at the start to see the extent to which relationships might exist, and we found that they do. Of course, the next step in the process could very well be what I would call the "predictive model." This would involve taking what you know today and freezing that. Then you would say, "Well, can I come up with a model that will say we'll have an incidence next quarter, two quarters from now, four quarters from now." That work is more ongoing.

Al talked a little bit about the three different groups of claims that we have; group one is maternity, heart, AIDS and physical nervous.

Chart 5 demonstrates taking a simple time series plot in Excel and seeing if you can fit a linear regression line to it. For group one, the only trend is, as Al said, downward over the study period, but you see that there are periods of what I call wobble going on—a little bit above the line, below the line and off it goes. Group two includes the claims that have been generally increasing in the study period. You can see there's a wobble going on there too. If you try to fit a linear line in group three you find, in Al's words, zero. There doesn't appear to be any time relationship going on with that at all. But as it turns out, there might very well be a relationship, as we will see in a minute.

I took the difference between the linear fit and what actually happened and graphed that out separately. You can see for both nature group one and nature group two, you have a downward trend to a point and then a general upward trend (Chart 6). The question we asked largely of MARS was: Can we find some models that would work to come up with a model to map that out? The answer turns out to be yes. Using two variables—the urban consumer medical care and consumer confidence—

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we came up with two models that worked remarkably well with what we actually saw happen over the six-plus-year study period.

Remember group three that didn't really have anything going on clearly? Well, when you use those same two variables, you come up with a model that has an R-squared of 76 percent. When you put the summation of the three models together, you come up with that dashed line, which is a pretty good model.

Sometimes the simple methods work best. Before you go to the more complex, you should always try looking at the simple and the correlation and coefficients and some of the linear models that were just in simple Excel. Just because the model works now doesn't necessarily mean that next year you'll come up with the same model—you may come up with a different model. So you have to keep continuously looking at these variables and seeing what happens over time. Sometimes you might find a model that works in certain time periods versus other time periods, and then you'd come up with some revision.

We talked about the similarity of your block to the overall economy. It's possible that if you are looking at a different industry mix, you might come up with different variables that would predict what's going on with the model.

Will your management support the time and effort that you spend in this? Fortunately, our management has been very supportive to this point, and I think we've found some things that might very well help the company going forward.

The final point would be just to know your data. You need to plot it out. You need to do some summary statistics on it, which SAS is very good at, and you have to understand how the data would work with respect to the certain modeling software that you're using. If you're using MARS, MARS is very sensitive to certain kinds of data. And if you just plug it in, you might very well come up with a result that looks great, but is really kind of spurious. I made that mistake early on in some of the work I did. I managed to right myself before too much time went on.

**MR. FOON WEI LEW:** I'm going to speak on what Jim and Al talked about and bring it down to a regional level and talk about how we go about selecting different variables that impact incidence rates, present the results that we found, and talk about what we call micro factors. Just by a show of hands how many of you look at external economic variables when looking at incidence? That's about 10-15 percent of the audience. I think as actuaries we tend to look at historical experience in forecasting future risks and look at factors like demographics, industry, different regional and plan designs. For the most part, these factors address the baseline risk.

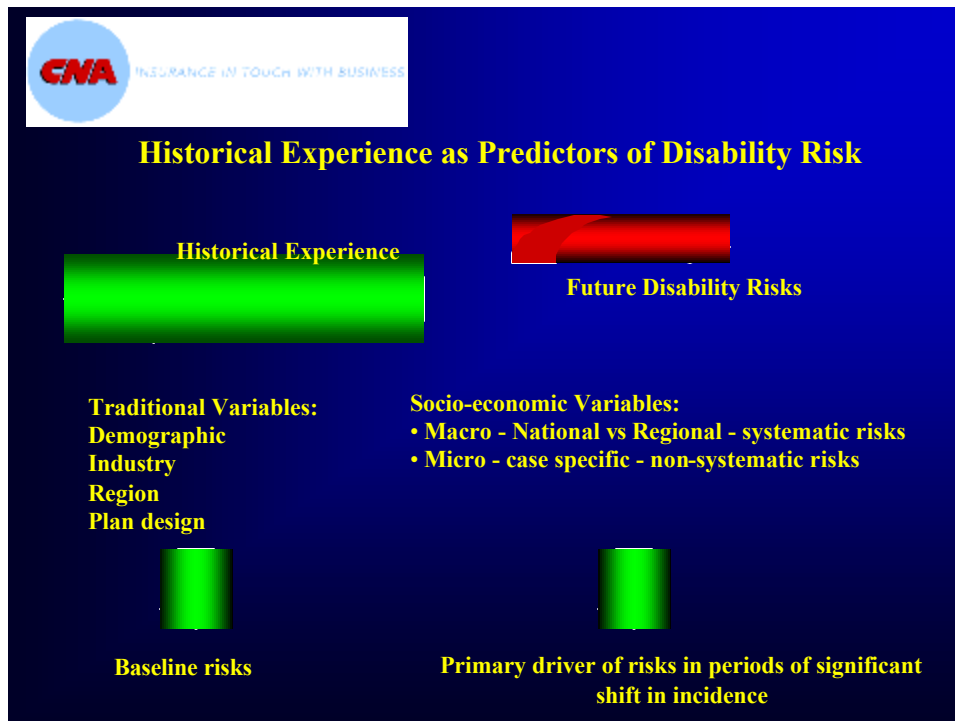
I made a case that by looking at these variables, you are evaluating at the employee health and also the long-term underlying occupational risk within the industries. In addition to these traditional variables, I recommend looking at some of what I call socio-economic variables that impact the propensity of someone

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filing a disability claim. There are two types of socio-economic factors impacting incidence; one is the macro risk, these are risks that are more systematic that impact everybody such as economic impact on a national level and also on the regional level. The other is the micro risk, these are risks that are case specific such as increased incidence risks driven by the work environment etc.

I also made the case that in times when incidence makes a drastic shift, these incidence movements are more driven by the socio-economic variables rather than the traditional variables. There are a couple of categories of socio-economic variables on the macro level (Table 5). The first category is the income and labor market factors, which includes variables like unemployment rate, personal income growth, employment cost index, mass layoff and first-time filing for unemployment insurance rate.

Table 5



The second category is the consumer factor—variables that more or less measure how optimistic the consumer is about the economy variables like consumer confidence index, retail sales index, existing home sales index, etc. The third category is the economy factor—variables like GDP growth, consumer price index growth, manufacturing index, etc. The fourth category is the financial factors—variables like interest rate, business bankruptcy rate and growth in mortgage applications. The fifth category relates to demographics—variables such as population growth, age distribution, etc. As you can see, there are a lot of variables

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that we can look at externally and link them to disability incidence risk. Given that, we want a filter to narrow down on a couple of variables to focus on.

One criterion is that the variable must be readily available. It should be a publicly available variable, not any proprietary indicator that may or may not be reported in the future. In terms of frequency basis, you want the variable to be available at least on a quarterly basis, if not on a monthly basis so that you can use them as an early warning indicator of any possible down trend in incidence rates. We also want to have the ability to segment the variable by different regions so we can price actions by region, and it also must not be too focused on one industry, such as the service or manufacturing index. And also, it has to be not volatile or seasonal. Lastly, most important of all, it must make intuitive sense in terms of the impact on disability risk. There are a lot of things that correlate to disability risk, but that does not mean that there's a cause-and-effect relationship there. We found the consumer confidence index to meet our criteria. We like it because we're able to segment them out by these nine different regions here and take focused action based on different regions.

What's behind the consumer confidence index is a weighting of 60 percent based on what the consumers' expectations are going forward and 40 percent based on how the consumers feel about the current economic situation. So it takes into consideration what is going on right now in the economy and future expectations. It also meets our other criterion of having it on a monthly basis too, and it's one of the indicators that is not going to be revised when looking back prospectively. We found that to be a good indicator.

Then we drill down to how it relates to our internal data (Chart 7). The green line is the consumer confidence for region one and the red lines are our internal claim incidences.

These are the approved claim incidences as opposed to the submitted ones. And if you look at late 1999, you can see an increase in consumer confidence and correspondingly we see a significant decline in our incidence rate. Two years later, we see a drop in consumer confidence that correlates very well with our approved incidence rate. The single trend that we see in this region carries over to the next region; when consumer confidence is increasing, we see a downtick in new claims incidence. When we see consumer confidence ticking down, we see an uptick in new claims incidence.

Not all the regions correlate so well with our hypothesis. We have a region three, where consumer confidence is increasing and, at the same time, we see our incidence increasing too. Similarly, when consumer confidence goes down, we see a decrease in incidence, not consistent with our expectations. We used approved incidence as opposed to submitted incidence mainly because we want to tie it to our financials. When we do our analysis we find that submitted incidence actually correlates better with the economy rather than approved incidence, but submitted incidence has an added complexity because you need to calculate or estimate an

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approval rate to relate to your financials. It is not entirely clear if the approval rate correlates well with the economy.

In terms of study period, our results are based on the recent three years of experience. We segment the results by different diagnosis, but we didn't find that it improved our regression results significantly; it improved a little bit, but not enough that we want to use given the complexity in the model. We prefer a simple regression because when we use a non-linear regression model on different regions, we came up with different non-linear models and we wanted to keep it consistent between the nine regions. We didn't get more than 80 or 90 percent R-squared there in our regional regression model. We were looking for variables that will give us at least a 20 or 30 percent R-squared. Disability risk is a complex risk, and for a variable to be able to explain 80-90 percent of the fluctuation incidence is pretty amazing—so we are looking at something that starts at 20 percent and then improve the model with additional variables.

When we look at the results of the analysis for consumer confidence index variable, the coefficient is negative in seven out of nine regions. This means that every time the confidence goes down, incidence goes up, and vice versa for seven of the nine regions. In terms of statistics value, the P-value is 15 percent, which means it is of 85 percent significance in six out of nine regions, and the R-squared for all these nine regions ranges from about zero to 80 percent, and the average is about 32 percent.

The second variable we look at is the change in first-time filing for unemployment insurance. The coefficient is positive, meaning that every time the filings for unemployment insurance increase, we can expect to see an increase in incidence, too, and this is positive in eight of nine regions. P-value is less than 15 percent in five of the nine regions and the R-squared ranges from zero to 61 percent with the average of 27 percent. When we put those two variables together, we found that R-squared in the nine regions ranged from about 18 percent to 81 percent. We had an average R-squared of 59 percent. We are very comfortable with this model because it can explain about 60 percent of fluctuation incidence rate, which is pretty good given the underlying volatility of disability incidence risks.

I think what we have found here has a lower R-squared than what Jim and Al have found because we broke the analysis into different regions and, hence, there's more fluctuation in those regional incidence rates and results.

We next segmented our regions out by two cohorts: the regions with favorable consumer confidence change and the regions with unfavorable change. The regions with unfavorable change are the regions with consumer confidence worse than the national average drop. We found that regions with unfavorable consumer confidence index change have a four times greater increase in incidence compared to the favorable regions. Not only is the consumer confidence negatively correlated with incidence risk, the magnitude of consumer confidence drop is also inversely

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proportional to the increase in incidence. The more the consumer confidence drops in each region, the greater the increase in incidence in that region.

We also segmented the regions out two-dimensionally by looking at consumer confidence and also initial claims or unemployment insurance. We also benchmark the regions with favorable consumer confidence and initial claims for unemployment insurance as having  $x$  increase in incidence. What we found was that the regions with unfavorable consumer confidence but a favorable unemployment claims filing have a 2.4x increase in incidence. Whereas the region with both unfavorable consumer confidence and initial filings for unemployment insurance has about 3.6x increase in claims incidence (Chart 8).

One strange thing we found was that the regions with favorable consumer confidence but unfavorable filings for unemployment insurance have a decrease in incidence. When we dug deeper into what makes up that segment, we found that that region consists of higher levels of service industry and non-profit industries. This is not surprising, as the nonprofit industries are less sensitive to socio-economic variables. If you use consumer confidence to relate to your incidence rate, try to look at regions where there is more manufacturing-based and more service-based industry as opposed to nonprofit industries, as they are less likely to be impacted by socio-economic factors.

Next, I'll talk about considerations and applications. We like to use simple regressions because they are simple. It's easy to explain when management asks us, "Well, what's driving our incidence rates here?" We can use a simple model to project any sensitivity testing as opposed to using a complex exponential or lognormal model that cannot be so easily explained. The other thing that you have to be careful of is multi-collinearity. This means that some of the indicators that you are using might be correlated with one another. And, hence, when you add one more variable to the multi-variable regression, it might show that that variable might not have too much of an impact on incidence, but, in reality, it does have a big impact on incidence.

I think the goal here is to find a robust model to catch the turning points in incidence trends and not to try to fit every fluctuation. Also, most importantly, I think you need to consider whether the results make intuitive sense. A good example is if we look at the stock market between 1964 and 1981, it basically went nowhere at zero percent growth. If you look at the next 17 years, that's about 900 percent growth from the Dow Jones from about 875 to about 9000. If we do a study on the stock market and relate that to the economy, we would expect a strong correlation. However, from 1964 to 1981, the economy grew by about 373 percent, but from 1981 to 1998, it grew by only 177 percent. If we just look at the results, they would suggest that you shouldn't invest in the stock market when there's a high growth in the economy. Of course, we cannot draw that conclusion from the results. Every time you see something wrong, something in the results that does not make intuitive sense, there are other factors driving those results (Chart 9).

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In terms of the applications, we can use this for planning and staffing purposes. In addition to that, you can use this to focus your target markets and resources.

We also took a look at a national result besides our internal CNA results (Chart 10).

The green line is the national consumer confidence index. The red line is the Social Security approval rate on a nationwide basis. We have seasonalized the data since the Social Security approval incidence demonstrated seasonal trends. The blue line is initial claims for unemployment insurance. And we found the Social Security experience correlates very well with our internal results. For 2000, that's the highest point of the consumer confidence index, and that is also the lowest point of the Social Security approval rate. It is also the lowest filing for unemployment insurance. Thus, the model not only works well in terms of our internal results, but it works well in terms of external data too.

Next I'll talk about the micro socio-economic factor impact on disability incidence. Looking at the corporate America landscape, I think we can all agree that corporate America has become a more and more stressful place to work if you look at how many hours Americans are working. If you compare America to every other industrialized country, the United States is the only industrialized country in which the number of hours that workers work increased between 1990 and 2000. I think in the year 2000, for the first time, we beat out Japan in terms of hours worked.

In addition to that, the number of layoffs have been increasing lately. The number of companies announcing layoffs in 2001 increased 36 percent compared to the year 2000. The number of companies announcing layoffs this year increased 10 percent compared to last year. It's a smaller increase compared to 2001, but, nevertheless, it's still an increase in the number of companies announcing the layoffs.

Besides that, the average unemployed person is unemployed for about 13 weeks in year 2000, and in 2001 on average weeks on unemployment increased to 15 weeks. This year alone the figure increased again to 16 weeks. So we see a longer duration in terms of getting back to work and finding a job. This will detrimentally impact both incidence and termination rates.

The next piece is the individual earnings potential. On an average, personal earnings grew by about four percent in the late 1990s, and last year it came down to two percent. This is a big impact on disability insurance risk as earnings potential impacts the propensity of filing for disability claims. If you look back to the mid-1990s and look at a medical market in which the compensation for doctors and health care industry workers took a tumble because of pressures on HMO cost control, we see a big spike of incidence. Although macro socio-economic factors impact the incidence, I'll make a case that the micro factors have a bigger impact on disability incidence.



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And how do we go about measuring micro-economic variables? I propose that there are three different micro socio-economic factors.

The first factor is the measure of profitability of financial strength of the employer. The more profitable the company, the better the working conditions and higher individual earnings potential, hence lower risk of disability.

The second micro socio-economic factor is employee demographics, variables like employee growth, salary growth and turnover. Is this company hiring a lot more people than it was historically or are they laying off employees? The third micro socio economic factor is the company culture. As a matter of fact, this factor is more qualitative. It's not so easy to measure the company culture in terms of whether it has a positive working environment, history of layoffs or how paternalistic the company is. But today I want to focus on profitability and financial strength as the key measure of micro socio-economic factor.

We took a look at the big national cases that we insure, i.e. cases above 2000 lives. And out of all those companies that we insure, their stock price varies between negative 75 percent last year and some have all the way up to a 100 percent increase in stock price. We took all those last cases and segmented them by companies that have a favorable increase in incidence rate, meaning a lower increase in incidence rate and an unfavorable increase in incidence rate. We segmented them up by different quartile. and found that companies that have a bigger increase in incidence rate, i.e. highest quartile in incidence rate increase has an average stock return of negative 26 percent, and companies that have a low increase in incidence rate, have an average stock return of one percent. On the surface, this seemed to indicate that stronger performing companies, or at least more stable companies, have a better incidence rate.

We also looked at other measures of financial strength in terms of revenue growth (Chart 11). The distribution of the revenue growth varied between negative 15 percent, all the way up to 80 percent and here, again, the story is pretty similar. The companies that have a high increase in incidence rate have a lower revenue growth of five percent, and companies that have good incidence rate have a revenue growth of 13 percent. When you look at net margins, it's negative two percent for those unfavorable companies and five percent for those companies that have good incidence rate change. It's also similar for change in long-term debt and capital. Here the variable might not make so much intuitive sense in the first place, but when you consider companies that are in trouble, those are the companies that will increase their debt level in the downturn. Hence change in long-term debt and capital is an indication of financial strength. In conclusion, you can use all these variables to approximate the financial stability of the company and hence the inherent disability risk of a case.

We looked at a couple of variables and, again, we segmented them by a two-dimensional factor. We looked at companies that are favorable index compared to the benchmark variable. We looked at those companies that are unfavorable in

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terms of variable one, but favorable statistics in variable two—these companies have 9.5x the incidence rate increase compared to companies that have favorable statistics on both the two variables. Looking at the next quadrant, companies that are unfavorable on both the variables have about a 20.5 times increase in incidence compared with companies that are favorable on both the variables.

Chart 12 is an example of one of the companies that we insure. The stock price dropped by about 60 percent at the same time the stock index dropped only by 20 percent. It is a chemical manufacturing company, not a high-tech company. It has about 4,000 thousand lives. When we looked at financials, the earnings decreased about six percent in the year 2000 and 13 percent in the year 2001. Operating margins decreased from 7.4 percent to 5.8 percent. The cash flow decreased by 74 percent. In early 2001, they announced a layoff impacting about six percent of the workforce. And given all the financial weakness of this particular client, it's no surprise we saw an increase in incidence of about 50 percent from year 2000 to 2001.

In closing, I will make a case that disability incidence is significantly impacted by both the macro- and micro-socioeconomic variables, and the impact is more significant in times when there's increased incidence volatility. Any major shifts in disability incidence are more impacted by macro and micro socio-economic factors than the traditional risk factors. We've found this tool and methodology to be very valuable in terms of analyzing our results and forecasting purposes.

**MR. CHARLES W. EDWARDS III:** The applications of this were listed, but I didn't specifically see pricing listed as an application. Do you intend, or do you think others intend, to adopt macro variables in their pricing?

**MR. LIVINGOOD:** We certainly work a lot with our pricing counterparts in terms of what they're looking at from manual rates. And a lot of the work we have done has been shared with them in terms of looking at what they're going to put in terms of manual rates going forward. So there's certainly a connect there. I'm not so sure that it's going to get to the point where it's an explicit aspect because, I think, depending upon how you price some aspects, what happens in certain industries, if that's a factor, that can also be used or compounded with what's happening in terms of the economic impact. You have to be able to separate the two, and that may not always be an easy thing to do.

**MR. EDWARDS:** Aren't the economists still predicting a bouncer or an end to the recession, or a beginning of a recovery in the third or fourth quarter of this year? And wouldn't that speak toward lower rates for January 1? I guess I'm hearing from the marketplace that there are still significant rate increases in the pipeline for some groups that have had bad experience. It seems to me that this information would indicate that for January 1 renewals, there might be a case for dampening those increases based on the expectation of economic recovery.

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**MR. LIVINGOOD:** I think your question has two parts. One being the aspect of wouldn't we see some impacts of the recession ending, and, two, how does that apply in terms of what you're looking at for rating actions going forward. I can certainly comment on the first one based upon this NBER. I went out there last night and looked at their latest postings of what they're seeing. And they have seen one of the indexes that I mentioned quickly in passing, the employment index that started to turn around. One of the things they pointed out, and I didn't really mention this specifically, was that personal income really never did change like it has historically. They're seeing that there's certainly some increasing economic activity and that should be pointing toward the recession coming to an end. They didn't give any timeframes. And from what I've seen in the past, they typically have to wait a long time before they declare a recession to be over.

When you need to look at the renewals, I think you can't specifically look at the macro-economic variables without considering some of the micro-economic aspects of the cases you're looking at. And I think those will have to be considered together.

**MR. HOWARD ROSEN:** I compliment you gentlemen on the extensive research. Have you done similar types of research on the other half of the equation, which would be the severity or the duration of claim? Because it doesn't seem intuitively obvious that increasing incidence would necessarily correlate with increasing duration if part of the increasing incidence is hit-and-run claims.

**MR. LIVINGOOD:** That's a great question and, unfortunately, we haven't done that research yet. I don't know if there's anybody else in the audience who's done this in the past. I know there's been some question about that in past times as well, I think, after the recession in the early 1990s. But it's something that is a curiosity and we'll definitely try to take a look at that in the future.

I'll let Foon speak about any perspective from CNA.

**MR. LEW:** We certainly have not begun to look at that simply because our claim block is relatively smaller and subject to more volatility. There's more fluctuation in termination rates than compared to incidence rates, and it's more prone to impact changes in claims management process. It's harder to benchmark as you need a static benchmark period. The other part is that we have to consider the impact from improved health or improved medical care on to termination rate. And that's a big impact and it's a bit more complex to separate out the changes in termination rates due to claims processing, medical improvement and socio-economic impact.

**MR. VINCENT DEMARCO:** I'm wondering if you've looked at the correlations for individual disability (ID) as well. Is this just group? Did you look at STD as well as group LTD?

**MR. LIVINGOOD:** We didn't specifically look at STD to start with. And we did do a very small amount of work in the beginning when we started doing some of this

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analysis, which was February of last year, looking at ID. We saw similar experiences, maybe slightly more.. What I mean by that is there's a little bit more correlation with submitted claims when we looked at it at that point.

**FROM THE FLOOR:** Do you look at variation by different industry segments?

**MR. LIVINGOOD:** We didn't specifically look at industry segments and whether they specifically are correlated with economic variables, if that's what you're trying to get at.

**MR. THOMAS R. CORCORAN:** I noticed there were no scales on the charts. Can you give us an idea of what sensitivity you're talking about? Is it 10 percent or 15 percent or ...?

**MR. LIVINGOOD:** I don't specifically want to get into incidence impact, but in terms of the one scale I did allude to, which is the consumer confidence, basically the central line on that scale for the consumer confidence was 100. In terms of when it gets closer to 100, you do see some of the impacts of incidence going up.

Let me ask a question now. Have any other people in the audience done some similar work and have they seen results similar to or different from what we presented either during Foon's presentation, or what we've seen from our UnumProvident perspective?

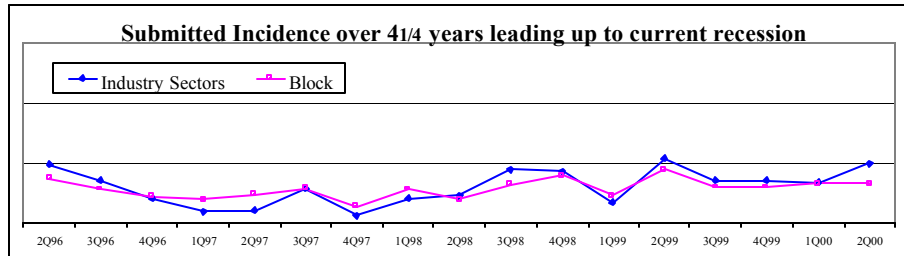
**MR. THOMAS R. CORCORAN:** In the studies I've seen in the past, there has been very little correlation to any indices. This is the first that I've seen that is shown a correlation to this extent.

**MR. MICHAEL JEFFERSON:** Is there any correlation or any kind of information that you would have to pull out of the data, for example, data from companies that are declaring bankruptcy, before you used it? Did you clean up the data before you used it?

**PANELIST:** That's a good question. I'll take a stab at some of the things we have considered anyway. We looked at our data and one of the reasons that we focused on the timeframe from 1995 forward is we had a similar contract series over that time period. We had a similar claims administration system during that time period. But we didn't do any specific normalization, if that's what you want to call it, for other aspects that may be in the data. Certainly that's something we're thinking about going forward. The one thing we tried to do a little bit of so-to-speak due diligence on was to make sure that our block had some representation of the economy since we were using macro-economic variables.

Chart 1

**LTD Submitted Incidence: Industry Sectors & Company Block  
Preceding Current Recession**

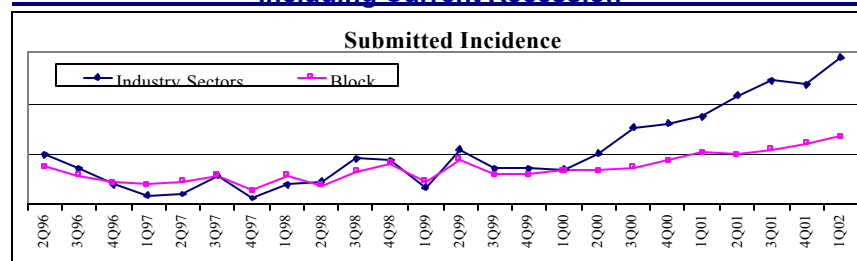


- The experience for these industries and the full block of business moved in tandem over the 4+ years leading up to the current recession.
- According to the National Bureau of Economic Research (NBER) the current recession began in March 2001, nine months after the last point shown on this chart.
- **What are your expectations regarding the incidence experienced over the seven quarter period 3Q00 - 1Q02, which includes three quarters leading up to the beginning of the recession and four quarters following?**

2

Chart 2

**LTD Submitted Incidence: Industry Sectors & Company Block  
Including Current Recession**



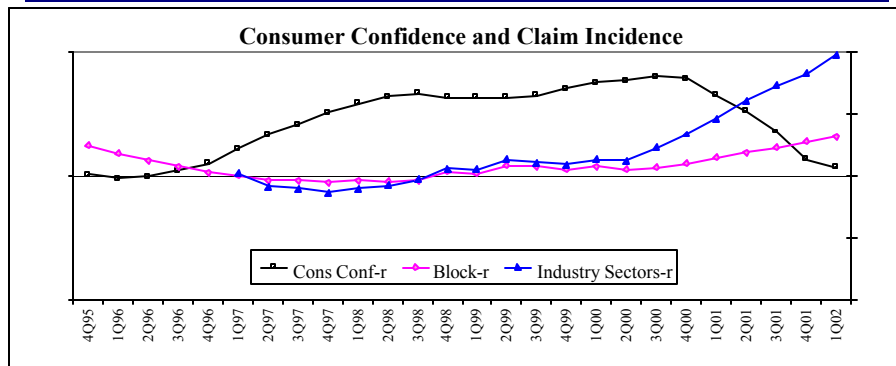
- Looking first at the full block, incidence did trend up after March 2001, indicating there could be some coincident relationship between the economy and the filing of disability claims... though it could also indicate a change in business mix or a change in disability claims experience unrelated to either.
- Next, looking at the experience for these same industries, we do see an upward trend in claim incidence beginning in 3Q00. It appears that experience on the industries did change beginning in 3Q00.
- **Did the recession affect some portion of the economy before others, and if so, does it affect the industries in these sectors? Do those economic changes affect the filing of disability claims?**

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## Chart 3

### LTD Submitted Incidence and an Economic Indicator

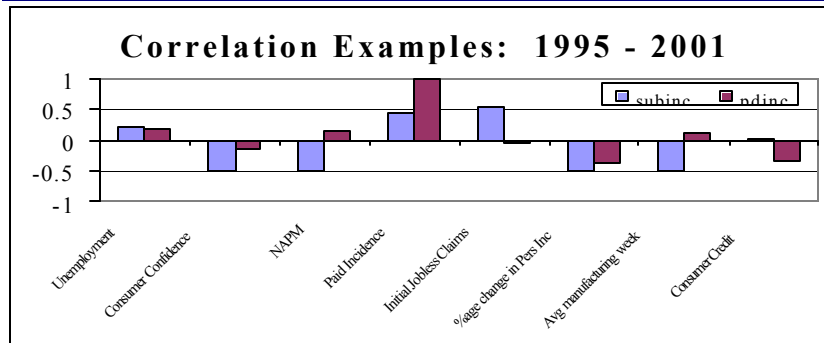


- The level or trend in consumer confidence appears to correlate with filing of disability claims. The correlation between consumer confidence and full block submit levels is -0.45 from 4Q95 to 1Q02.
- A potential conclusion from this chart is that incidence for this industry group is changing ahead of a change in consumer confidence levels.

4

## Chart 4

### Observations on Incidence Correlations



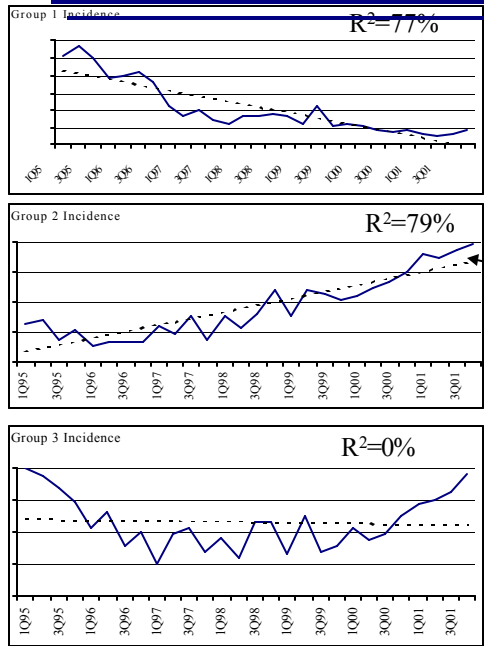
- Correlations are sensitive to time periods reviewed ( Impacts could be contract language, Business mix, Disability Industry maturity, Incurred vs. reported and Economy in observation period, to name a few).
- Over this time period, paid incidence correlations with economic variables were generally low ( in range -0.41 to 0.24 ) with the exception of paid incidence with Credit as percent of income exceeding -0.5 ( @ -0.64 )
- Over this time period, submitted incidence correlations with economic variables were generally stronger ( range of -0.52 to 0.55 ) with submitted incidence and economic variable correlations exceeds 0.5 with five economic variables.

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Chart 5

Some Considerations of Incidence



Generally falling throughout study period, with “wobble.”

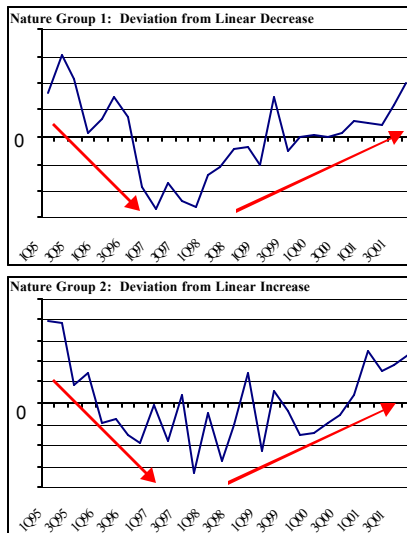
Generally rising throughout study period. BUT... note 2001 results...something is different. Can we explain the difference? And note the “wobble” in other periods, as well.

No relationship over time... or is there?

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Chart 6

Might Economic Variables Explain the Deviation from Linear Increase/Decrease?



There appears to be some similarity in the patterns here.

Is it possible that the same (or similar) variables might be used to model the deviation?

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Chart 7

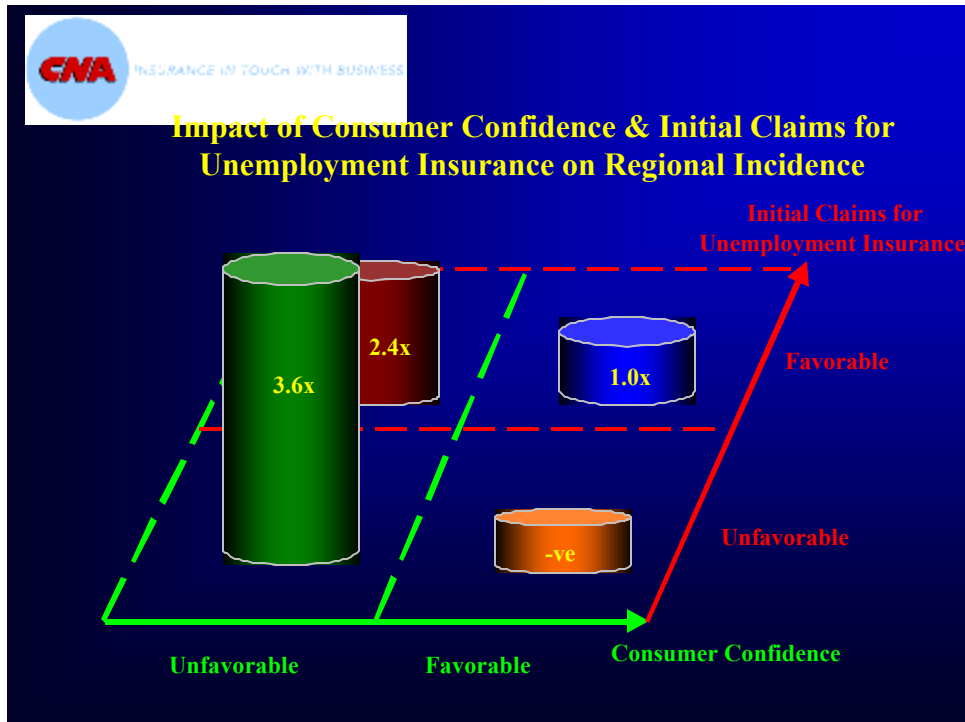


Chart 8

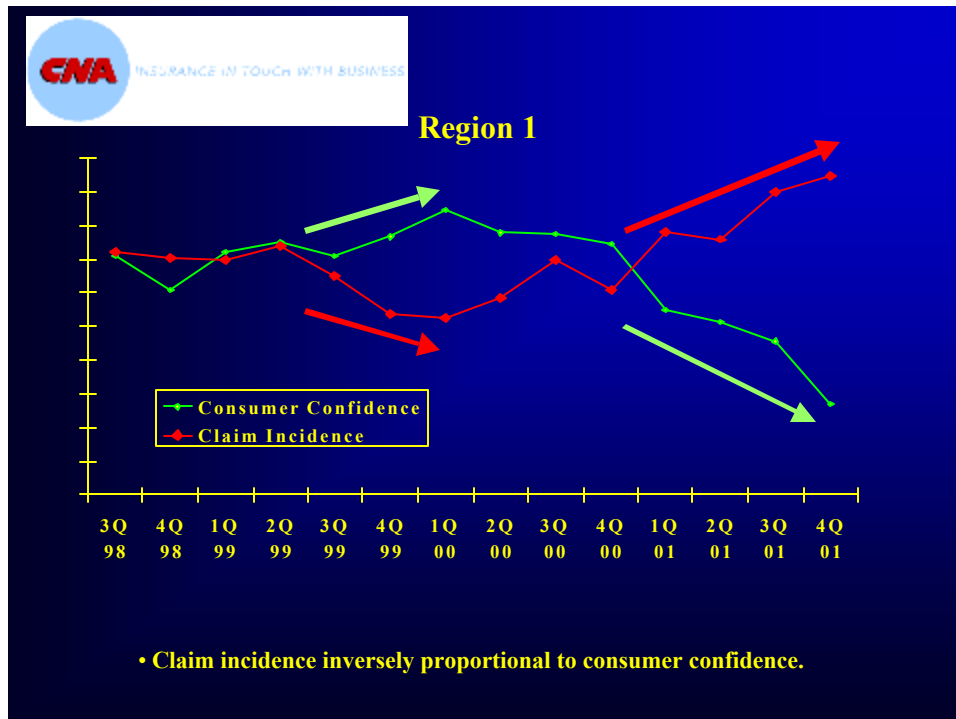




Chart 9

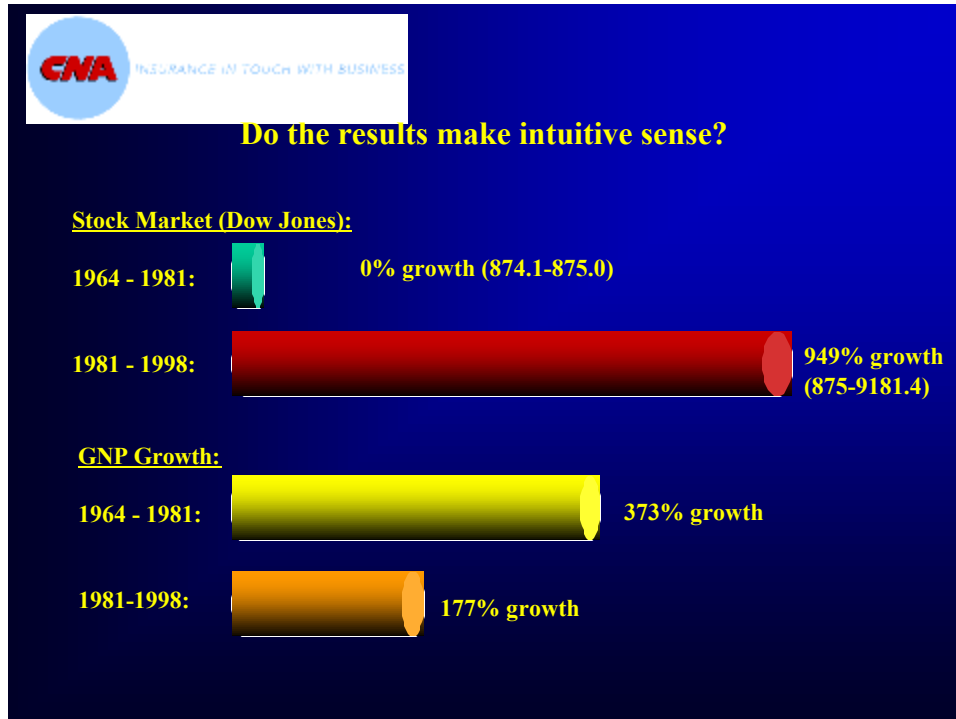


Chart 10

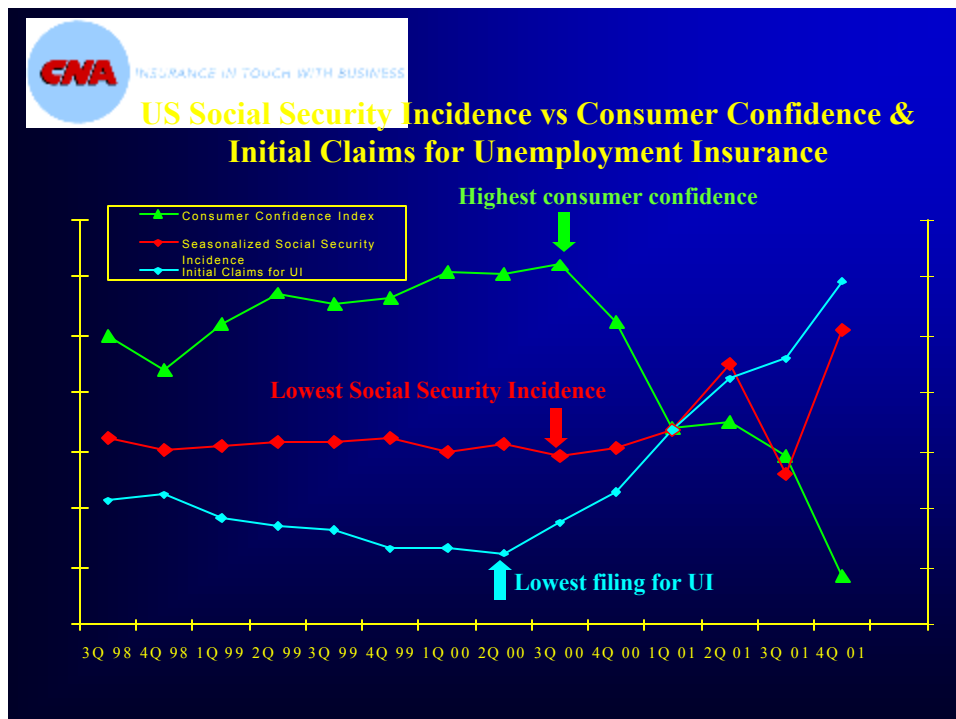


Chart 11

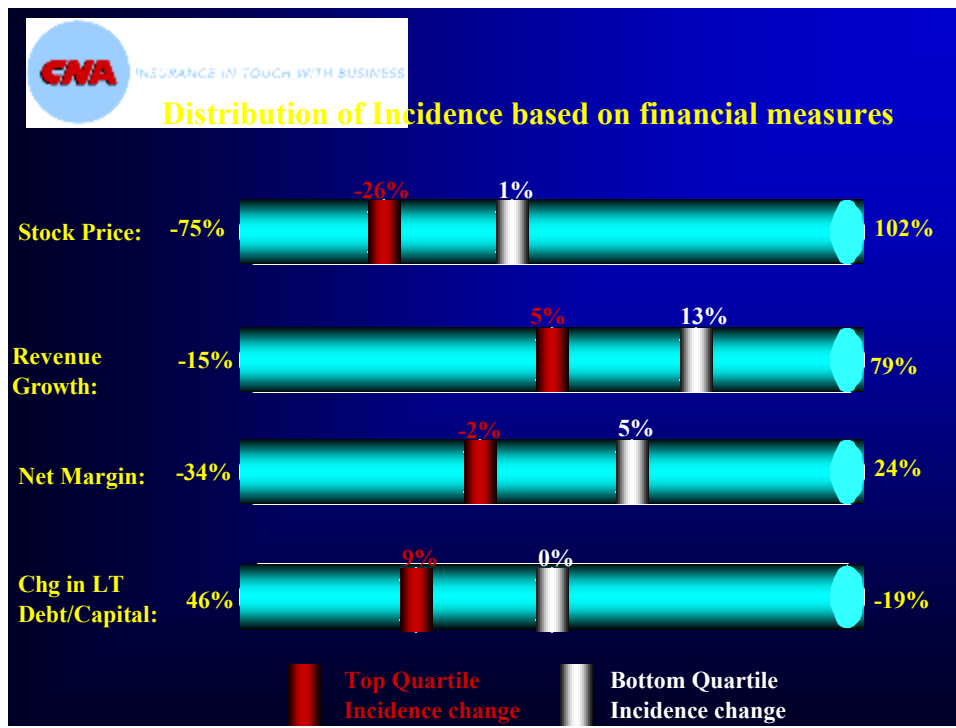


Chart 12

