COMPREHENSIVE PERSONAL RISK MANAGEMENT “ON THE GROUND” -- HOW TO DO IT, PART ONE

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If we were to judge by the weight of literature, we would think that the issues/perils of living a really long life are all about whether you're going to run out of your money. The buzz phrase used in this connection in the literature is "longevity risk".

But if you have spent much time close to relatives who have lived really long lives, they will have taught you from their experiences and their expressed thoughts that the issues associated with living a very long life include some important non-financial ones. These involve such items as social isolation, the disappearance of one's support network, and of course in many cases progressive decline of functional capacity.

These remarks imply that the management of risks associated with life-course transitions and life events in the "senior years", also known as "the Third Age", has a lot to do with things that are non-financial. One needs to address an array of risks across a highly diverse domain.

A positive sense of control and confidence in the face of life's potential contingencies depend upon the belief that one has a good strategy for allocating one's limited resources across that highly varied domain.

Reaching for that good strategy should involve the kind of "global" or holistic thinking about later life risks that is known as "comprehensive risk management". (In talking about individual lives this may be a strange concept; but organizations do this a lot and treat it as a part of their survival strategy. Individuals need it too.)

Doing this kind of global thinking is mentally challenging; but then why did God give us a brain? Relevant experts believe that it is reasonably evident that perhaps 1% of humanity even begins to seriously tap the awesome power in our brains. Facing the issues of dealing with the risks of later-life transitions, we come face to face with the necessity to draw upon our brainpower.

But there's no need to despair; because various kinds of help are available. One kind of help takes the form of a decision support tool (computer program) which calls upon you to provide initially certain informational inputs concerning your attributes or those of a hypothetical person. It then carries out a significant part of the difficult anticipatory thinking that comprehensive risk management requires, and it delivers to you sets of probabilities for various *important combinations* of possible future life events.

The probabilities for these combinations of life events are computed by integrating information embedded in a set of reasonable estimated conditional probability distributions that are provided to the program by the developer (who needs either to be a suitably broadly trained social scientist, or to have such persons in her or his development team). This integration process is done by the computer program as it executes. (The process is parallel to what Boeing does when it does its risk management thinking about the capability of a newly designed aircraft to safely handle a variety of atmospheric conditions and get back to earth in one piece. If this reference to manufacturing new airplanes seems far-fetched, you can come closer to home by thinking about disability-free life expectancy for people that have reached a certain age, something that is widely calculated these days. This is concerned with the joint probability of surviving to some other age and at the same time being free of consequential disability. Practically everyone now understands that this is perhaps as important as the simpler probability of merely surviving to that particular future age.)

Let us use the phrase "output probabilities" to refer to what the decision support tool produces for your use in connection with some important life contingencies involving certain "convergences" of life events -- e.g., loss of spouse, breakdown of your social support network and sharp deterioration in functional capacity. You would merge these output probabilities (for some important combinations of life events) with your own estimates of their consequences and your own assignment of priority to them, in order to get to your decisions concerning how to allocate your scarce resources as a risk manager.

If you have serious trouble interpreting and making use of these probabilities, there should be professional experts available to help you to interpret them. How the computer program does what it does may be "Greek" (Greek-speakers call it a microsimulation model); but what it produces at the end are numbers that a lot of people can interpret without much trouble. An illustration of pertinent interpretive ideas is given below.

Such a tool is now under development, with the support of colleagues and students at the University of Montréal. The field of variables to be covered by this tool when it is fully developed (if God is friendly, that should be in late 2013) is as follows: arrival of caring responsibilities, loss of spouse or partner (via death or family breakdown), getting a moderately high or very high score on an index of incapacity in basic and instrumental activities of daily living (ADLs and IADLs), getting moderately low or very low score on an index of the strength of the available social support network, decline of access to earnings-based income (including both voluntary and involuntary job loss/quit), as well as some some income- or capital-related events. Age, sex, marital status, cultural background, education, immigrant status, and employment history, are “background attributes” that enter into the list of “conditions” that determine what distributions will govern a particular Monte Carlo assignment of a value for a simulated event. Of course, some of these variables change as a result of a simulated life event. Others change in already know ways, as time passes.

I am pleased to present in this article evidence of our initial progress. The specifications and data you see below deal with a small part of the wide domain which I just indicated, and if all goes well I will provide future progress reports as new modules are successfully brought into the program. (A small “techie detour” here: Microsimulation is very old in demography; but it is usually deployed to model changes in selected aspects of composition and of demographic rates for a whole population. Our program, focusing on risk management, deals with the evolution of the life course of a designated virtual person. However, the outcome probabilities can be interpreted the same way that people interpret the results of computing disability-free life expectancy: “if a cohort lived for N years under a designated regime of certain probabilities, then its expectation of X will be the number K”.)

Here are some results that illustrate our progress so far.

<u>Risk Dimensions in this Illustration</u>

A == "caring" = arrival of caring responsibilities
B == "spouse loss" = loss of spouse or partner (via death or family breakdown)
C == "weak ADL" = getting a moderately high or very high score on an index of incapacity in basic activities of daily living (ADL)
D == "low social support" = getting moderately low or very low score on an index of the strength of the available social support network
E == "earnings decline" = decline in access to earnings-based income (including both voluntary and involuntary job loss/quit)

We use these dimensions to construct a *hierarchy* of "risk converge". At the top of the hierarchy, all pitfalls are encountered. At the bottom, at least one of them is encountered.

<u>Hierarchy of Risk Convergence - Logical Structure</u>

Highest level: (A) AND (B) AND (C) AND (D) AND (E)
Second highest level: (A) AND (B) AND [(C) OR (D)] AND (E)
Middle level: [(A) OR (B)] AND [(C) OR (D)] AND (E)
Second lowest level: [(A) OR (B)] AND [(C) OR (D)] OR (E)
Lowest level: (A) OR (B) OR (C) OR (D) OR (E)

Here is the structure with useful detail.

<u>Hierarchy of Risk Convergence - Substantive Details</u>

<u>Highest level:</u> "onset of caring" AND "spouse loss" AND "onset of weak ADL" AND "low social support" AND "earnings decline"
<u>Second highest level:</u> "onset of caring" AND "spouse loss" AND ["onset of weak ADL" OR "low social support"] AND "earnings decline"
<u>Middle level:</u> ["onset of caring" OR "spouse loss"] AND ["onset of weak ADL" OR "low social support"] AND "earnings decline"

Second lowest level: ["onset of caring" OR "spouse loss"] AND ["onset of weak ADL" OR "low social support"] OR "earnings decline"
Lowest level: "onset of caring" OR "spouse loss" OR "onset of weak ADL" OR "low social support" OR "earnings decline"

"Boostrapped" probabilities for these levels of the hierarchy were computed for the following virtual person. Shown below are her attributes at "time zero".

The Virtual Person to which the Table of Numerical Results Applies

• Sex = female
• Age = varies as shown (starting at 55)
• Marital status = married or partnered at time 0
• Loss of spouse/partner (simulated event)
• Arrival of caring responsibility (simulated event)
• Employment events B   (moves out of employment - to unemployment or to outside the labour force (incl. retiring)), a simulated event
• Basic Activities of Daily Living competence (simulated level in each time period)
• Social support network strength(simulated level in each time period)

For now, we are assuming that marital status will change only as a result of spouse/partner loss. However, when we model a virtual person that starts off being unmarried, we will put in a module (with the appropriate "governing conditional distributions") to allow the person to become married or partnered as time goes on.

Age, sex, marital status, and recent changes in other variables (including simulated values) are factors that determine which distributions to use when a given assignment is being made. Additionally, some Monte Carlo assignments are overridden by our own built-in rules, or forced to be redone, because substantively the outcome is not plausible.

At this point I have twice referred to "Monte Carlo assignment" -- a staple of computer simulations. In broad outline, here is the strategy. To generate the data, I ran at least 1,000 trial assignments within each time interval, relying upon having achieved non-cycling fractional random numbers that have a flat distribution between 0 and 1. Each time you draw a random number, you compare it with the cumulative probabilities for levels in the relevant distribution, and use the result to decide the level that will be assigned to the virtual person -- e.g. will a caring responsibility arrive or not?

What is important here is **not** the observation of these probabilities at one particular point of time. Rather it is watching the *pattern of change* in the probabilities as the virtual person ages -- in the present illustration, from age 55 to age 70.

Results

The next table shows the joint probabilities that fall out of running the model in annual time slots over the age range you see. (The phrase "earnings decline" refers to the employment event cited earlier. This simulation runs monthly within each annual time block, with the final outcome being the person's position at the end of the last 12 months.)

Bootstrapped probabilities of encounterin selected "risk convergences", for a virtual woman			
	Age group		
	55 to 64	65 to 69	70 to 74
Highest level: (A) AND (B) AND (C) AND (D) AND (E)	0.000	0.001	0.003
Second highest level: (A) AND (B) AND [(C) OR (D)] AND (E)	0.010	0.030	0.060
Middle level: [(A) OR (B)] AND [(C) OR (D)] AND (E)	0.010	0.140	0.190
Second lowest level: [(A) OR (B)] AND [(C) OR (D)] OR (E)	0.255	0.170	0.188
Lowest level: (A) OR (B) OR (C) OR (D) OR (E)	0.672	0.949	1.000
(A)="onset of caring", (B)="spouse loss", (C)="onset of weak ADL",			
(D)="low social support", (E)= "earnings decline"			

Where did we get the figures which estimate the "controlling" conditional probability distributions? They are based upon various survey and life-table sources (the life table is used to estimate death probabilities for spouses/partners, based on assumptions about spousal age differences), all of which will be described in detail in forthcoming technical papers. Ideally, all of the distributions would derive from one massive data source where we would have immediate coherence from using the same sample of persons; but no such data source exists. As a result, all microsimulation models do what we have done -- get data from various sources and assume that the "basic patterns of variation" among key population segments are well represented in the pertinent source used to derive a particular probability distribution.

What's they key take-away message in this table? We answer this question with the same framework of assumptions used to interpret the results from a life table, or a table of disability-free life expectancies. If the underling simulation-control conditional distributions (they control the Monte Carlo assignment process), estimated from real data, were to apply over a cohort of women aged 55 at the start, by the time they get to age 65, 30% should have engaged in some good measure of comprehensive risk management. By the time they get to age 70, close to 40% should've done so.

Being prescriptive in public is not “my cup of tea”; but let me spell out why . Consider the “Middle level” of risk convergence in the table above.

The data there say that if the underling simulation-control distributions, estimated from real data, were to apply over a cohort of women aged 55 at the start, by the time they got to age 65 to 69 14% would have the following risk convergence: either there has been a spouse loss (via death or family breakdown) or the onset of new caring responsibilities, along with either weakened ADL status or low social support, and all these along with substantial earnings decline.

Now the earnings decline would not be a big deal for a low income person who would now qualify for adequately offsetting government old-age income payments; but for all the other former earners it is a big deal, I think. (At least life-style adjustments are needed.) In effect, 14% could expect to have to deal with a meaningful three out of the five contingencies as convergent developments. Move forward to age 70 and over, we now have one in every five members of that hypothetical female cohort impacted by that convergence. (And there are many countries in which no such old-age income support would be forthcoming.)

From what I have seen within the extended family, these numbers look plausible. If they are, I argue that risk management in “stovepipe” mode will be much inferior in effectiveness to addressing the “risk convergences” (possible “concerts” of pitfalls) comprehensively.

Of course, there are no data to test that hypothesis, since to do that we need to follow a real cohort. (People working with disability free life expectancies have the same problem.) And, sadly, social surveys have not reached even the point of measuring how people go about risk management strategizing across an array of known potential pitfalls. Many surveys have asked what people have done about contingencies X, Y, and Z in sequence; but rarely have they asked how people strategize dealing with all of X, Y and Z together, and what thought they have given to another important contingency Q. One of colleagues, an international "heavyweight" on women's retirement, has remarked on her surprise that a low percentage of women approaching the Third Age have on the "radar screens" the chances that major care responsibilities may fall on to their shoulders, and how that might impact the rest of their lives.