Fatalist long-term health behaviour: A prospect theory approach

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Abstract: Many young adults have an over pessimist view of old age because their fail to predict correctly their ability to adapt cognitively to the bad consequences of aging. This may lead them to adopt either long-term healthy practises or, on the contrary risky and unhealthy practises in which case we can speak of fatalist behaviour. This paper investigates the conditions under which such fatalist behaviour occurs by integrating prospect theory assumptions in a standard two-period utility model (young/old). The basic idea is that before adaptation, any health investment when young is viewed as a reduction of a loss whereas any marginal improvement of health when old, that is after adaptation, is viewed as a gain. Because of the convexity of the value function in the domain of loss, the failure to predict adaptation when old implies a misprediction of the future marginal value of health. We show that as long as loss aversion is not too strong, the individual underestimates the marginal value of health and so underinvests in his health. From a normative point of view, it means that in general, people should fear aging enough (but not too much) in order to avoid that their over pessimist view of aging transforms into a self-fulfilling prophecy.

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1. INTRODUCTION

Many people have an over pessimist view of old age. They tend to associate it too systematically with frailty, illnesses, dependence, asexuality, lack of vitality or loneliness. Though these traits are more common in old age, ageism surveys indicate that they are far from being as frequent as people believe in general (see in particular Palmore, 1998). There are also not so awful because people adapt at least partially to the adverse consequences of aging. Both adaptation to old age and its misprediction have been now well documented. On the first point, it is a classical result of psychology that people tend to adapt at least partially for example to a declining health or beauty, illnesses, handicap or even the death of a close relative. Other cognitive processes also take place. Carstensen et al. (1999) showed for instance that in old age, the frequency of feeling sad or angry declines and when negative emotions occur, they do not last as long. Old people are also inclined to

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1 Adaptation is a very general phenomenon. To a certain extent, people adapt to old age as well as to most events good or bad that affect their life, probably because adaptation has been favoured in our genes by natural selection. See in particular Brickman et al (1978) and Gilbert et al (1998) for two classical studies, Schulz & Decker (1985) on middle-aged and elderly paraplegics and quadriplegics; Oswald & Powdthavee (2008) for a recent one on disability, Lykken & Tellegen (1996) for the strong version of adaptation and Diener, Lucas & Collon (2006) for a revised and nuanced version of adaptation.
focus their attention, sometimes unconsciously, to positive information. More generally, they tend, because of their shorter time horizon, to reassess their priorities in favour of immediate satisfying activities rather than pursing long-term goals. These mechanisms help to explain, besides the increase in financial satisfaction and leisure time for retired the “old age paradox”, that is the fact that old people are happier than expected, and even often happier than younger people. But, and it is the second point, young people are not fully aware of their future ability to adapt. They typically tend to underestimate it. By comparing self-reported happiness of younger and older adults with their estimates of happiness at different ages, Lacey H. P. et al. (2006) showed that despite that older adults display the highest happiness in their survey, younger adults believe that happiness decreases with age, from 30 to 70, though less when they think about themselves.

The idea that people have about old age should affect their present health behaviour. It could push them to make all their possible in order to attenuate or delay these effects by adopting a healthy lifestyle, doing sports, buying health goods, cosmetic creams or surgery depending on the dimensions in which old age is the more prejudicial for themselves. On the contrary, it could lead them to reduce anything that could be seen as a present sacrifice and to enjoy life at maximum before getting old. This second behaviour can be viewed as a fatalist behaviour in the sense that he tends to transform people’s over negative view of aging into a self-fulfilling prophecy. The problem is that we cannot easily explain fatalist behaviours in the standard utility framework which assumes decreasing marginal utility of health. On the contrary, the incapacity of individuals to predict correctly adaptation to old age should rather lead them to overinvest in their health. The mechanism is the following: Because it is reasonable to assume that the marginal utility of health will be lower after adaptation, as soon as the individual underestimates future adaptation, he overestimates the future marginal utility of health and so tends to invest in his health more than he should. After all, why spending so much time and money in cosmetic creams and surgery, always paying attention to the healthy contents of foods and sweating in sports club if at the end of the day, things are not that bad, thanks to adaptation?

In one way or another, we must then introduce a convexity in the utility function if we want to understand why the idea that young people have about old age affects their present behaviour in a way that tends in some cases to favour the occurrence of their anticipations and in some others on the contrary to infirm them. But it cannot be made arbitrarily. Here, we start from the presentation of Frederick and Loewenstein (1999) who showed how prospect theory could be used to throw light on individual’s decisions when they adapt. The objective of this paper is to explain an individual’s fatalist behaviour regarding one’s health in a standard two-period utility model (young/old) by integrating the main assumptions of prospect theory developed by Kahneman and Tversky (1979). The basic idea is that before adaptation, any health investment when young is viewed as a reduction of a loss whereas any marginal improvement of health when old, that is after adaptation is viewed as a gain. Because of the convexity of the value function in the domain of loss, the failure to predict adaptation when old implies a misprediction of the future marginal value of health.

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3 Hence the label “theory of socio-emotional selectivity”. Interestingly, the observed showed that this behaviour is not a quality of aging per se, but of time horizons.
4 Among recent studies, Afsa and Marcus (2008) showed that, after ruling out the possibility of a pure cohort effect, happiness of French is U-shape with a minimum in midlife and a peak after 65. Blanchflower and Oswald (2007) also found this U-curve of happiness through the life cycle for Americans and Europeans, but only after controlling for income. Controlling for more factors like marital status, children, work status in particular, and excluding simple cohort effect again, Yang Yang (2008) found an increasing path this time for Americans.
5 This cognitive process is extremely general once again. Gilbert et al. (1998) showed for instance that individuals underestimate their capacity to adapt to an electoral defeat, the failure to get a tenure at university and even a romantic breakup. See also Eastwick, Finkel, Krishnamurti and Loewenstein (2007) on this last point. It also affects medical decisions (Ubel et al. (2005), Lacey et al. (2006b), Walsh & Ayton (2009).
6 See also Thaler (1980, 1985) for the extension of the theory to riskless choices, likes the ones considered here.
In the following, we present first the consequences of underestimating adaptation to old age under prospect theory. Then, we incorporate these consequences in a simplified way in a two-period model where the individual allocates his first period income between ordinary goods and health goods in order to improve his health state at the second period. We show that when the individual underestimates adaptation to a deteriorated health status, he underinvests in his health, favouring the occurrence of the anticipated low level of satisfaction with health but only if loss aversion is not too strong. Empirical evidence about the long-term effect of negative stereotypes of aging gives support to this conclusion.

2. UNDERESTIMATING ADAPTATION TO OLD AGE IN PROSPECT THEORY

To stay as general as possible, let us note \( h_t \), the amount of “youth capital” of the individual at time \( t \). \( h_t \) is defined as a synthetic indicator of cognitive and physical aptitudes, beauty and health that are sooner or later inversely related to the biological age. It could be viewed as a health capital in an extensive sense (both terms will be considered as synonymous in the following). When individuals are young, they possess more of this youth capital in the sense that they are generally on average in better health, they have more physical aptitudes, they are prettier or thinner, and this brings them by itself more satisfaction. With this definition, and because the reasoning is made with a typical individual, whatever the efforts he makes to preserve his health/youth to stay “young”, he will end up with less health when old. Reasoning with two periods only, we thus have \( h_1 < h_0 \). The health capital deteriorates between the two periods at a rate which depends on the efforts to preserve it. For the sake of simplicity, we assume the following constant marginal productivity specification:

\[
    h_i = \bar{h}_i + bi
\]

\( b \) is the amount of the first period income \((y_0)\) used by the individual to buy health goods (medical services, cosmetic products or surgery, healthy foods, etc.) in order to maintain partially his second-period health capital\(^7\). \( b > 0 \) is a parameter of productivity of health investment. \( \bar{h}_i > 0 \) is the minimum level of health attained by the individual without explicitly allocating resources in the first period for the second one \((i=0)\). It is not equal to zero since it can be viewed as a side-product of the efforts of the individual to stay alive and to enjoy life at the first period. With these notations, \( h_0 - \bar{h}_1 \) represents the maximum loss of health capital between the two periods and \( b \).i the increase in health capital from the minimum level.

In prospect theory, people reason in terms of losses and gains and the question of the reference state is crucial. When old and so after adaptation to health deterioration, the natural reference state to which they measure health gains and losses will be lower than the reference state used today if people do not anticipate their adaptation. There is no general theory of how people choose their reference state but suppose for simplicity that people use their present health level \( \bar{h}_0 \) as a reference state. Compared to the minimum level \( \bar{h}_1 \), any health improvement is coded as a gain after adaptation when old, but as a loss reduction from a “young” perspective as long as the individual

\(^7\) This is a shortcut to present the trade-off between present satisfaction and long-term health. We could alternatively consider a time-allocation model where the individual allocates his time between the labour market to buy ordinary or health goods and health activities like sports or leisure to the extent that it favours long-term health. If the relative prices of ordinary goods and health goods are constant, it does not change the conclusions of the model. No more than if we consider that part of the present activities (sports, leisure or consumption) serves two objectives simultaneously: present satisfaction and long-term ones through health investment, as long as there is always a marginal trade-off between present and future satisfaction.
underestimates adaptation (since $\bar{h}_0 - \bar{h}_1 + b \cdot i < 0$ even with $i = y_0$). Using the standard formalism introduced by Kahneman and Tversky, the value function can be written:

$$V(b \cdot i) = -\lambda v\left(-\left(\bar{h}_0 - \bar{h}_1 + b \cdot i\right)\right)$$

before adaptation (in the domain of loss)

and

$$V(b \cdot i) = v(bi)$$

after adaptation (in the domain of gain)

with $v'(\cdot) > 0$, $v''(\cdot) < 0$, and $\lambda > 1$ to capture loss aversion. This formalism allows a decreasing marginal value of health after adaptation ($V'(bi) > 0, V''(bi) < 0$) but an increasing marginal value of health before adaptation ($V'(bi) = -\lambda \partial v\left(\bar{h}_0 - \bar{h}_1 - bi\right) / \partial bi > 0$ and $V''(bi) = -\lambda \partial^2 v\left(\bar{h}_0 - \bar{h}_1 - bi\right) / \partial bi^2 > 0$). The difference between marginal changes in health values before and after adaptation is a function, let us call it $\alpha(\cdot)$, of $bi$ and of two parameters: $\lambda$ and $\bar{h}_0 - \bar{h}_1$. If we derive this function with respect to $bi$, we obtain the difference between marginal values calculated before and after adaptation:

$$v'(bi) + \lambda v'(\bar{h}_0 - \bar{h}_1 - bi) = \alpha(bi; \lambda, \bar{h}_0 - \bar{h}_1)$$

Its value entirely determines the conclusions of the next model. Three things must be noted:

1) Given the convexity in the domain of loss, $\alpha$ can be positive for $\lambda = 1$ if the before-health-investment deterioration of health $(\bar{h}_0 - \bar{h}_1)$ is large enough. In that case, the marginal value of health is lower before than after adaptation. This inequality still holds for low degree of loss aversion, ($\lambda > 1$ but not “too large”) and moderate health improvement (see the graphical representation below).

Figure 1: Value of an increase in health before and after adaptation

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8 This is one way of modelling adaptation which refers to what Frederic and Loewenstein (1999) called “shifting adaptation” levels to oppose to the diminishing subjective intensity of the stimulus or “desensitization”.

9 Kahneman and Tversky showed that $v(x) = x^\alpha$ fits well with experimental data for monetary gambles but it is useful to start to stay as general as possible to model preferences regarding old age.
2) In presence of strong loss aversion and/or low before-investment health deterioration however, this result is not guaranteed any longer since \( \partial \alpha / \partial (\tilde{h}_t - \tilde{h}_t) > 0 \) and \( \partial \alpha / \partial \lambda < 0 \). If an individual is very loss averse regarding his health, he is not as much indifferent, even in the domain of loss, to the same change in health.

3) As soon as \( \lambda > 1 \), and given that \( \partial \alpha / \partial \lambda < 0 \), it is not certain either that \( \alpha < 0 \) for large health investments. If bi is an endogenous variable, this raises the possibility of multiple equilibria if the model is not restricted in one way or another.

These considerations show that prospect theory assumptions may potentially explain the underestimation of marginal productivity of health investment by young people if they fail to predict adaptation to old age. They also give a clue about the conditions under which this conclusion is possible. To derive clear results when \( i \) becomes an endogenous variable, the previous assumptions are now incorporated in a standard two-period utility model.

3. A TWO-PERIOD MODEL OF HEALTH INVESTMENT WITH PROSPECT THEORY ASSUMPTIONS WHEN PEOPLE MISPREDICT ADAPTATION

Let’s now consider that the individual’s utility at period \( t \) (with \( t = 0, 1 \)), \( u_t \), is given by:

\[
u_t = u(c_t, h_t)\]

where \( c_t \) is the consumption at the period \( t \) and \( h_t \) the “health” capital of the individual for the same period. The utility function has standard properties of decreasing marginal utilities with respect to each good: \( \partial u / \partial c \), \( \partial u / \partial h > 0 \) and \( \partial^2 u / \partial c^2, \partial^2 u / \partial h^2 < 0 \). It is concave \( (u_{cc} \cdot u_{ch} \geq u_{hh}) \). At the first period, the individual allocates his exogenous income \( (y_0) \) between present consumption \( (c_0) \) and health goods \( (i) \) to preserve partially his health at the second period \( (h_1) \). There is no saving so that
the second period consumption is exogenous \( c_1 = \overline{c}_1 \). Given health production equation (1), the individual maximizes his predicted total utility over the two periods:\(^1\)

\[
\begin{align*}
\text{Max} & \, \overline{U}(c_0, i) = u_0(c_0, \overline{c}_0) + \overline{u}_1(\overline{c}_1, \overline{h}_1 + b \cdot i) \\
\text{subject to} & \quad c_0 + i = y_0, \quad c_0 \geq 0, \quad i \geq 0
\end{align*}
\]

All depends on the way the predicted utility of the second period is modelled. Building directly on prospect theory assumptions, we assume that when the individual does not anticipate adaptation at all, the predicted utility for the second period is given by:\(^1\):

\[
\overline{u}_1 = \lambda \left[ v(\overline{c}_1, \overline{h}_0 - \overline{h}_1) - v(\overline{c}_1, \overline{h}_0 - \overline{h}_1 - bi) \right]
\]

whereas the actual utility after adaptation corresponds to

\[
u_i = u(\overline{c}_1, \overline{h}_1 + bi) + k\]

The term k is a constant and captures the fact the individual draws more utility from any positive given level of health after than before adaptation. It just adds to realism and does not change the qualitative results below. Note also that the gains associated with health investment are calculated starting from \( \overline{h}_1 \) and not from 0. To allow for a partial prediction of adaptation, we assume finally that the predicted utility for the second period \( \tilde{u}_1 \) is a weighted average of both expressions:

\[
\tilde{u}_1 = (1 - m) u_i + m \cdot \overline{u}_i
\]

where the parameter \( m \in [0,1] \) measures the degree of misprediction of adaptation. When \( m > 0 \), the predicted marginal utility equals the actual marginal utility after adaptation \( \tilde{u}_1 = u_i \), which means that the individual correctly predict his reference state. \( m = 1 \) corresponds to the naïve case where the individual does not predict at all at the first period the evolution of his preferences. Any deterioration of health is perceived as a loss. In the intermediate case, \( 0 < m < 1 \), the individual predicts the direction of the change involved by adaptation but underestimates its intensity. In the spirit of Loewenstein, O’Donoghue and Rabin (2003), it corresponds to a projection bias in the sense that young’s people predictions about their future preferences are biased by present ones. The derivative of (5) with respect to i given by:

\[
\tilde{u}_i ' (i; m, \lambda, b) = (1 - m) u_i ' (i; b) + m \cdot \overline{u}_i (i; \lambda, b)
\]

This equation can interestingly be written \( \tilde{u}_i ' (i) = u_i ' (i) - m \cdot [u_i ' (i) - \overline{u}_i ' ] \) where the term in the bracket is very close to equation (2) of the previous model\(^12\). All the consequences of the

\(^1\) To simplify, we do not explicitly introduce the discount rate for utility flows of the second period given that our assumptions endogenize to a certain extent one important determinant of it.

\(^1\) Rewriting \( \overline{u}_1 = -\lambda v(\overline{c}_1, -(\overline{h}_0 - \overline{h}_1 + bi)) - (-\lambda v(\overline{c}_1, -(\overline{h}_0 - \overline{h}_1))) \) helps to see that except the second argument of the function \( \overline{c}_i \), it exactly corresponds graphically to the vertical segment in figure 1a.

\(^1\) Rearranging \( \tilde{u}_i (i) \) gives \( \tilde{u}_i (i) = u_i (i) - m [u_i (i) - \overline{u}_i (i)] \) where the term between brackets is equal to \( \partial u(\overline{c}_i, bi)/\partial i + \lambda \partial u(\overline{c}_i, \overline{h}_i - \overline{h}_1 - bi)/\partial i \). After substituting \( u(.) \) by \( v(.) \) and integrating the second argument \( \overline{c}_i \), we find
behavioural assumptions of the model are incorporated in the right-hand term: $m \cdot \tilde{u}_i'(i; \lambda, b)$: adaptation through the change in the reference point between young and old age, its misprediction, the convexity in the domain of loss ($\partial^2 \tilde{u}_i/i^2 > 0$) and loss aversion ($\lambda$). The individual will under or overestimate the marginal utility of his health investment depending on the sign of this term. Note that:

$$\frac{\partial \tilde{u}_i'}{\partial i} > 0; \quad \frac{\partial \tilde{u}_i'}{\partial \lambda} > 0; \quad \frac{\partial \tilde{u}_i'}{\partial b} > 0$$  \hspace{1cm} (7)

Given the convexity, the model in its general form allows too many possibilities. To restrict it, three assumptions are made:

**H$_1$:** \[ \frac{\partial^3 u}{\partial c^3} = \frac{\partial^3 u}{\partial h^3} = 0 \]

This technical hypothesis is not very strong is the sense that it preserves positive but post-adaptation decreasing marginal utilities assumption and prospect theory assumptions. It avoids however multiple equilibria. It is a standard hypothesis in rational expectations models of consumption (Hall, 1978). Furthermore, the before-investment deterioration of health ($h_0 - h_1$) is high enough so that in absence of loss aversion ($\lambda = 1$) and if the individual does not predict at all adaptation ($m = 1$), we have:

**H$_2$:** \[ u_0'(y_0) > \tilde{u}_i'(y_0) \]

**H$_3$:** \[ |\partial^2 u_0 / \partial c_0^2| > \partial^2 \tilde{u}_i / \partial i^2 \]

These two assumptions are “worst cases” assumptions and are made to help the presentation. They indicate that in the worst possible case (no loss aversion and no prediction of adaptation), we are far enough in the losses domain so that:

- The marginal utility of health before adaptation $\tilde{u}_i'(i)$ is lower than the post-adaptation marginal utility $u_0'(i)$ even if all the first-period income was allocated to health investment ($H_2$).
- The marginal utility of health increases more slowly than the marginal utility of consumption decreases ($H_3$).

Under the previous assumptions, at the equilibrium, the individual chooses $i^e$ and so $c_0^e = y_0 - i^e$ so as to equalize if it is possible$^{13}$ the present marginal utility of ordinary goods and the predicted future marginal utility of health goods$^{14}$:

$$u_0'(y_0 - i^e) = \tilde{u}_i'(i^e)$$  \hspace{1cm} (8)

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$^{13}$ This condition holds only for interior solution. Nothing prevents in this model a corner solution where the individual chooses to allocate all his income to present consumption if $u_0'(y_0) = \pi_i'(0)$ since $h_1 > 0$ and allows the individual to live at the second period.

$^{14}$ The second-order condition is $\partial^2 u_c / \partial c_0^2 + \partial^2 u_i (\pi_1, h_0 - h_1 - bi) / \partial i^2 < 0$ and is satisfied since $H_3$ imposes $|\partial^2 u_c / \partial c_0^2| > |\partial^2 u_i / \partial i^2|$. 

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With a perfect prediction of adaptation however, he should invest the level $i^*$ such that

$$u_0'(y_0 - i^*) = u_1'(i^*)$$

Given $H_2$, it implies that $i^* < i^\ast$. Thus, in the worst case where we assume no loss aversion, the individual underinvests in his health because he does not predict at all adaptation to old age ($m=1$). The following graphical representation gives a direct intuition of the results and of the conditions under which there are obtained:

![Graphical representation](image)

The equilibrium condition in the general case for an interior solution is given by:

$$u_0'(y_0 - i^*) = (1 + m)u_1'(i^*; b) + m \cdot \tilde{u}_1'(i^*; \lambda, b)$$

The results of standard comparative statics if we assume interior equilibrium are straightforward given (7) and indicates that for $m > 0$:

$$\partial i^*/\partial \lambda > 0 \quad \text{for} \quad m > 0$$

The individual will invest all the more in his health that loss aversion is high. Given that $\lambda$ is an argument of $\tilde{u}_1$ only, this will reduce the gap between chosen and optimal health investment. $\lambda$ may also be high enough so that $i^\ast > i^*$ and in an extreme case so that the individual chooses to invest all his present income in future health ($i^\ast = y_0$). To avoid this corner solution, one may adds the reasonable assumption that the first marginal units of present consumption are high enough so that
For any realistic degree of loss aversion $\lambda$. The second-order condition is then automatically satisfied$^{15}$.

Actually, for $m = 1$, there exists a level of loss aversion $\lambda^e > 1$ which offsets exactly the consequences of the error of prediction, that is a level such that $u_t'(i^e) = u_t'(i^e; \lambda^e)$. Beyond $\lambda^e$, the individual fears aging sufficiently so that he overestimates now the marginal utility of health after adaptation, which leads him to invest too many resources in his future health. Note that since $b$ affects positively predicted and marginal utilities (and so $i^e$ and $i_i^e$) in the same way and independently of $m$, it does not change the extent to which the individual under or overinvests ($\partial_i^e/\partial b > 0$ and $\partial_i^e/\partial b > 0$ $\forall m \in [0,1]$). However, it reduces the likelihood of a corner solution where the individual chooses to allocate all his first-period income $y_0$ in consumption. The effects of $m$ on $i^e$ depends on the coefficient of loss aversion and so on whether the individual underinvests or overinvests initially in his health. Assuming again interior solution, we’ve got:

$$\partial i^e/\partial m < 0 \quad \text{if} \quad i^e < i^*$$

But

$$\partial i^e/\partial m > 0 \quad \text{if} \quad i^e > i^*$$

Underestimating adaptation to old age tends to amplify the gap between the chosen health investment and the optimal one, whether it is positive or negative. If the individual is not very averse to health loss for instance, he will reduce his health investment all the more than he underestimates adaptation. For him, and because of the convexity in the domain of loss, a bit more health when old does not loom large in terms of satisfaction. As a consequence, he prefers to cut his efforts at the first period. However, the fear of aging which is represented here by the degree of loss aversion may offset and even reverse this tendency. In that case, underestimating adaptation will lead him to overinvest in his health.

IV. DISCUSSION AND CONCLUSION

Many adults do not seem to pay a lot of attention to their long-term health. This weak interest in their future may be observed in their say or through their present behaviour (risky activities, unhealthy food, smoking, drinking, little or no sport activities). If we consider that this behaviour does not always strictly reflect their own long-term preference, the question is why people apparently overdiscount their long-term future? Standard behavioural explanations include feelings of invulnerability, myopia or preference for immediate gratification. This article focuses on another possible explanation: People who fail to predict correctly adaptation to old age may be led to underinvest in their long-term health if they are not very averse to health deterioration. This

$^{15}$To see why, assume that $m = 1$ and there exists $i^e < y_s$ such that $u_t'(i^e) = u_t'(\bar{y}_i; h_s - h_l - b_i)$. If the second-order condition is not satisfied, that is if $\partial^2 u_t(c^e_i)/\partial c^2 + \partial^2 u_t(\bar{c}_i, h_s - h_l - b_i)/\partial i^2$, it would imply that $u_t'(i) < \lambda u_t'(\bar{c}_i, h_s - h_l - b_i)$ for any $i > i^e$, which violates the new assumption. As a consequence, this new assumption restricts automatically assumption III by stating that $\partial^2 u_t/\partial c^2 > \lambda \partial^2 u_t(\bar{c}_i, h_s - h_l - b_i)/\partial i^2$ for any realistic value of $\lambda$. Finally, with $0 < m < 1$, the second order condition becomes:

$$\partial^2 u_t(c^e_i)/\partial c^2 + (1 + m) \partial^2 u_t(\bar{c}_i, b_i)/\partial i^2 + m \lambda \partial^2 u_t(\bar{c}_i, h_s - h_l - b_i)/\partial i^2 < 0$$

Given that $\partial^2 u_t(\bar{c}_i, b_i)/\partial i^2 < 0$, if the previous condition is satisfied for $m = 1$, it is also satisfied for $m < 1$. 

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conclusion has been obtained by integrating in a two-period utility model prospect theory assumptions (reasoning in terms of losses and gain, concavity in gains, convexity in losses and loss aversion). To avoid multiple equilibria and undetermined conclusions for static comparative, we also assume the nullity of third derivatives, which restricts the generality of the results. Note however that not all functions that exhibit non-zero third derivative imply multiple equilibria. Within the previous framework, Cobb-Douglas preferences with identical elasticities $u(\bar{c}, h) = \bar{c}^\beta h^\delta (\beta < 0.5) $ that correspond for exogenous to the classical power function used in prospect theory give for instance unique equilibrium and so unequivocal conclusions for $m = 1$.

Psychological as well as economic mechanisms may thus explain in a coherent way why rational people who fail however to predict perfectly the evolution of their preferences regarding aging may adopt a fatalist behaviour that transforms their over negative view of aging into a self-fulfilling prophecy. Empirical evidence about the prevalence of this effect is more difficult to obtain since health and health practises must be followed decades after having measured people’s perceptions about aging. This has been done however for the first time by Levy et al.(2009). Using the Baltimore Longitudinal Study, they showed that people aged between 19 and 49 holding negative age stereotypes had a greater likelihood of experiencing cardiovascular events (like strokes, angina attacks, congestive heart failure, etc..) up to 38 years later than individuals with more positive age stereotypes after controlling for the main risks factors for cardiovascular events. As recognized by the authors, though this result could be obtain by different pathways, biological or psychological, part of the explanation surely lies in the fact that people who have positive perceptions of aging act in healthier way. Actually, there is much evidence that negative stereotypes of aging do affect people’s behaviour but those studies have been directed until now towards older people only.

Using longitudinal studies, Levy and co-authors (2004) showed that individuals with more positive self-perceptions of aging tended to have more preventive health behaviours like eating a balanced diet, exercising and following directions for taking prescribed medications, over the next two decades after controlling for age, education, functional health, gender, race, and self-rated health. Other studies gave some evidence that seniors with low expectations regarding aging are less likely to have physical activities (Sarkisian et al., 2005; Sanchez et al., 2008), to have a primary care provider or to receive vaccinations (Goodwin, Black and Satish , 1999, Sarkisian, Hays and Mangione, 2005) after adjusting again for sociodemographic characteristics, self-efficacy, and many indicators of health status. The outcome of these differential preventive behaviours is that people with more positive self-perception of aging report better health, when health is measured by functional abilities (Levy et al., 2002a) or by longevity (Levy et al., 2002b). These results fit also well with the conclusions of the previous model if the young period refers to the “old” and old refers to “the very old”.

REFERENCES

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16 A straightforward application of first-order equilibrium condition (8) gives after simplification $i^* = \frac{A(\bar{c}_0 - \bar{c})}{bA - 1}$ with $A = \left[ \lambda b \left( \frac{c - \bar{c}}{\bar{c}} \right) \right]^{1/\delta - 1}$. “Worst-case”assumptions H2 and H3 are then necessary to guarantee an interior solution.

17 Age, body mass index, depression, education, elevated blood pressure, family history of cardiovascular death, gender, marital status, number of chronic conditions, race, self-rated health, serum total cholesterol, and smoking history.

18 Maybe another indirect piece of empirical evidence for young people could be found however in the fact that Rock Stars, whose culture may favour the “enjoy life before getting old” approach tend to adopt unhealthy and risky lifestyles and so tend to die younger (Bellis et al., 2007).

19 Based again on the Baltimore longitudinal Study, the authors showed that people with positive self-perceptions live up to 7.5 years longer over a 23 years period than those with less positive self-perceptions of aging when age, gender, socioeconomic status, loneliness, and functional health are included as covariates.


