Referee report on "Economic reasoning on the correlation between life expectancy and economic development."

The starting point of the paper is the observation that life expectancy goes up as GDP goes up, and, moreover, that beyond certain levels of GDP the positive relationship between GDP and life expectancy weakens.

The novel point of the paper, this is what the abstract says, is that it takes a holistic approach towards modelling the market for health services in order to explain the fading relationship between GDP and life expectancy.

Assessment.

I have read the paper three times and I still find it quite a struggle. With respect to the introduction, it is not until page 4 it is stated explicitly what this paper is achieving. In addition, even here it is not transparent what this paper add. In fact, it is not until page 9 that the author sets out four hypothesis/characteristics that a model should ideally explain. I find this quite confusing. In addition, I think that there is a string need for making precise in what way the proposed model/set-up gives an answer to the four questions. As it stands it is not clear, at least to me, what the model actually delivers on these four questions.

With respect to the formal analysis there are also some lack of clarity. There are two products, a consumption good called Z and a health good called M. It is not explained if these two goods are sold in markets characterised by perfect or imperfect competition (my guess is perfect competition). The representative consumer's maximisation problem is set out in equation (6). This problem produces demand functions (I think). But how does the demand function for, say, good Z interact with the supply side that is given in equation (10)? Also, in the maximisation problem in (6) good M enters into the utility function since we have H(M,E). In the budget restriction, the price of good M is only a function of H. This is maybe all right (in fact, I think it is all right under certain conditions) but it is not explained. Incidentally, when we speak about consumers, in the motivation it is mentioned that inequality of distribution can explain why the positive relationship between GDP and life expectancy weakens beyond certain GDP thresholds. But the model has a representative consumer. So there is no room for distributional matters. I am sorry to say that I find these examples characteristic of the paper and it really confuses the work.

One of the topics that stand out in the introduction is a discussion about the level of health. There can be a socially optimal level of health. On the other hand, when medical goods (good M in the paper) are provided by private firms it is quite likely that the level of health that maximises private firms' profit differs from the socially optimal level of health. This makes me speculate about the determination of health (called H in the paper). The variable H is determined by consumers' use of medical goods (called M) and some initial health (called E in the paper). As I understand the paper E is exogenous and does not really have any role. It is

unclear how M is determined (but I guess it is determined in a competitive market, see page 14) and it is thus not clear if and how the level of actual health differs from the socially optimal level of health. This is a serious shortcoming given the attention devoted to discussing the possibly socially inefficient supply of health. Also, but maybe not that important, why does health not enter the profit functions of the Z-good producing firms as $Z(H, d(H))$ but as $Z(d(H))$. I would have thought that more healthy persons are more productive. Along this line of reasoning, how precisely does health affects the wage rate?

I have one more final worry about the analysis. It is entirely based on the use of specific functional forms. I am not by principle against the use of specific functional forms. However, it makes it difficult to find out to which extent the findings can claim broad validity. I am particularly worried about the price and cost functions in equation (11). Take the price of good M. If this price can be determined this way, it must be because there are some restrictions on demand (i.e., the utility function) and supply (i.e., cost functions). Or have I missed something?

One can clearly argue that the theme of this paper is important. But overall my assessment is negative. This is in part because the paper is unfinished as I see it. But as detailed above, I also have some reservations about the scope of the modelling. Thus it is not clear to me that the paper accomplishes what it sets out to do: to explain a fading positive relationship between GDP and life expectancy.