UNIVERSITAT AUTÒNOMA DE BARCELONA

QUANTITATIVE MACROECONOMICS

FINAL PROJECT

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An Attempt to Model Private Healthcare Through Donations

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Introduction

In this project, I attempt to set-up and estimate a macroeconomic model where agents within the economy face risks on their future health condition and there is no public healthcare provider, but rather a private one which operates according to some pre-set notion of a good enough aggregate well-being. To this end, I assume that each agent cares about their own health status, and in addition, cares implicitly about others' well-being through two incentive channels which will be discussed below. The private healthcare fund is subsidized solely from agents' contributions/donations, and the fund manager seeks to counterweight the negative effects of deteriorating health shocks via social security disability/illness insurance (SSDI) streams. Agents receive the latter through healthcare provision that improves their current well-being. The model will be parameterized according to some key findings in past economic literature on the topic of health inequality, as well as on some relevant Bulgarian data. To conclude, I make a quantitative exercise to evaluate and compare different scenarios for initial/target overall well-being and the respective behaviour strategies of the fund manager.

Motivation

This idea of a model came up to me following a recent notorious media scandal in my home country regarding its biggest privately-operated donation fund. In the beginning of November, this year, one of the most viewed Bulgarian television channels, bTV, published and broadcast a series of interviews and findings from their investigation on the abuse of donations from the public benefit foundation (PDF)[1] of HelpKarma. The media found out that HelpKarma, despite proclaiming itself to be the most transparent fundraising platform, has committed multiple breaches of their goals stated online, as well as a number of outrageously immoral and illegal practises. Being founded in 2017, in Bulgaria, the foundation has been operating since in multiple European countries, including Spain. Ever since, it has been collecting people's donations for more than 2,600 causes, 90% of which on medical/healthcare grounds. The total donations fundraised by this foundation amounted to more than 21 mln. BGN[2] in November, 2020; 7.5 mln. BGN of them were either not yet distributed to any of the beneficiaries, or spent for activities[3] outside HelpKarma's legally-/morally- designated ones.[6, 7]

Meanwhile, Bulgaria has been suffering from an increasing insufficiency and imbalances in the distribution of healthcare across regions. Furthermore, the age distribution of medical practitioners and how it compares to the EU averages indicates the great necessity of immediate policy interventions in order to mitigate the upcoming widening deficit of healthcare provision. For example, the average fraction of medical practitioners aged 35 or less in EU countries is 16.7%, while the respective value in Bulgaria amounts to only 10.6%.[11] While this supply of new specialists in the field is decreasing, most recent studies show that more than half of the healthcare workers in the country will have reached the age of retirement within the next 15 years. In addition, most Bulgarian hospitals are lack modern

[1] Фондация в обществена полза in Bulgarian

[2] Approximately 11 mln. EUR

[3] These including the issue of a mortgage loan for one of the fund managers from the foundation's current assets, as well as giving out a monthly salary bonus to some of the employees amounting to 80,000[4] BGN (per person), which is more than 57 times higher than the average monthly salary in Bulgaria [14]

medical equipment for nowadays common procedures. This process has been further exacerbated by the ongoing COVID-19 crisis, and many of the 28 provinces in Bulgaria are currently left with no communicable disease specialists[5] after many of them sadly succumbed to the virus themselves after an unequal fight and months of never-stopping patient care.[16]

The growing concerns and dissatisfaction from the public healthcare system have forced many Bulgarians to resort to raising money from online platforms such as HelpKarma to fund the otherwise unbearable costs of seeking health provision elsewhere.[6] Not only has there been a high level of demand for such funds due to the faulty public provision of healthcare, but as evident from the media investigation, Bulgarians have often showed great compassion for their less fortunate compatriots by donating large amounts to online campaigns. Thus, the resulting scandal had coverage second to none regarding donation and healthcare provision issues, and people started to raise more and more questions about the lack of proper policy intervention from the government, as well as the imperfections of the current legislation towards similar issues.[8, 9]

Despite the major necessity for the government to properly allocate public funds and thus crowd out the creation and operation of privately-conducted institutions such as HelpKarma, many people are now concerned about those who are currently in desperate need for resources, and cannot wait for the slow and tedious process of changing Bulgarian legislation and policy measures. As the online platform was one of the last resorts for such people, and since it has been publicly defamed and questioned, Bulgarian prosecution was pressured to conduct an official investigation towards carrying a lawsuit against HelpKarma's management and owners. Following the outrage, the foundation has changed their online website and legal structure, and claims to keep 0% of the money raised. However, this is still dubious, since before the investigation of bTV, the money spent for matters outside causes was more than 11% - much higher than the officially announced cap of 5%.

Currently, a group of highly-skilled programmers and social workers are in the middle of building a truly transparent, 0-commission blockchain-based fundraising platform to fill the gap for people in need, until the government takes proper action and improves both the healthcare and its accessibility to disabled/ill Bulgarians.[10] Nonetheless, the establishment of such platform could result in the government not improving its policies in the long run and continuing to avoid involvement with people's healthcare problems. In fact, some Bulgarian MPs have signalled towards adopting such malicious behaviour - there has been an official suggestion for the creation of a public substitute: a fundraising platform, initially subsidized with government money, and operating within the Bulgarian Ministry of Labour and Social Policy (MLSP). The latter subject is being discussed in Bulgarian Parliament and a final decision towards this is yet to be made.[17]

The above-described alarming situation in Bulgarian healthcare and donation practises has lead me to the idea of trying to model a borderline case where a country's public healthcare is non-existent, and the only way people can insure themselves against adverse health shocks is through private funds. Unfortunately, and as already explained, this borderline case is not far from true in the case of Bulgaria - currently it completely holds for some specific diseases like cystic fibrosis, e.g.[1]; and the prospects show that such a setting could be the main source of de-facto healthcare provision in the near future, at least for some time. To the best of my knowledge, my work will be mostly related to the set-up introduced by Hosseini et al.'s 2020 paper on health status differences and their importance for lifetime earnings inequality.[5] That is, I will be considering a model which is in some parts a simplified version, and in others - extended forms of their research. These have been done for the sake of exploring the exact question at hand, namely: can we find a (constrained) optimal sequence of transfers to beneficiaries from a privately-fund in order to achieve some pre-set goal, and if so - how do these sequences differ for a different choice of initial conditions/chances to face worsening health.

[5]Official data shows that these were scarce even in the beginning of 2020, when the COVID crisis was yet to happen: 10 of the 28 administrative *provinces* in Bulgaria had 3 or less epidemiologists working in health establishments [15]

Disclaimer: I will do my best to establish my model and set parameters according to related literature, mainly relying on Roozbeh Hosseini and Karen Kopecky's recent work (as kindly advised by Prof. Santaeulalia). However, I have only been reading articles on healthcare economics for the past month, whenever I find the time to, and am far from well-acquainted to the existing vast theory and research. That, and the fact that this is my first attempt to model a macroeconomic issue without the support of an already existing similar setting that I am aware of, is the reason why I might have some flaws in my project. I will do my best to adhere to all the findings and techniques which I found, and to explain all potential issues and future improvements that I think of.

Model Suggestion and Its Relation to Literature

Time is assumed to be discrete and to go on until forever: $t = 0, 1, 2, 3, \cdots$. The economy is inhabited by a large number, N, of infinitely-lived agents who are homogeneous apart from their initial health condition, h_0^i, which is drawn from the exogenous overall initial health distribution of H_0. Different choices on H_0 could serve to imitate different countries - e.g. based on the frequency of various diseases, etc. This will be discussed in more specifics in the sections to follow. No population growth is assumed.

The Evolution of Health

Individual i's health status at time t is summarized by h_t^i in this model. That could be interpreted as the 'opposite' of the *frailty index* introduced by Mitnitski et al. (2001) and Mitnitski et al. (2002), where the authors provide an index value to give measure of the overall health condition of a person on the [0,1] scale. In its essence, f shows the fraction of deficits/diseases a person has out of all possible deficits/diseases considered in the economy.[12, 13] In their consecutive research on the topic, Hosseini et al. (2019) show that the frailty index is indeed a consistent measure of health across three different major data sets, and more importantly, the frailty index f is a better predictor of mortality, institutionalization and other health-related outcomes, than the self-reported health status (SRHS).[4] In this sense, constructing h_t^i as $h_t^i = 1 - f_t^i$ would give a good enough measure of a person's overall well-being, and conveniently, we would ensure $h_t^i \in (0, 1]$. Notice that this interval is open on the left since the current setting involves infinitely-lived agents and I interpret a health level of zero as death.

Similraly to the frailty index f in Hosseini et al. (2020), the evolution of individual i's health, h^i, over time is stochastic here. However, in their paper, the authors consider frailty to be a function of a person's age, education level and some stochastic component, while here, I consider a slightly more different version. Since in the model all agents are born at time $t = 0$ and are homogeneous in everything except for their initial health status, the current stochastic process will be simplified to the extent that no education and age factors will be considered. However, I will assume that apart from the stochastic component, health will also be determined by the SSDI streams allocated by the public healthcare fund manager. That is, should the fund manager decide to allocate some money to an individual with deteriorated health, these resources will be transformed to healthcare which will result in a positive shift in the period to come.

Formulating the above arguments in a mathematical manner,

$$
\begin{aligned}
& h_0^1, \cdots, h_0^N \overset{\text{i.i.d.}}{\sim} H_0 \\
& h_t^i \in (0, 1] \quad \forall\, i \in \{1, \cdots, N\}, \forall t = 0, 1, \ldots \\
& h_t^i = \psi(h_{t-1}^i, p_t^i D_{t-1}) \,,
\end{aligned}
$$

where $p_t^i D_{t-1}$ represents the proportion of the healthcare fund allocated to individual i by the fund manager. The function of $\psi(\cdot)$ thus depends on this SSDI transfer (which is exogenous to the agent), and on the individual's previous period health condition. In particular, the process on h_t over time is a time-homogeneous Markov chain in one of its components, where h_t will 'result' in a value of h_{t+1} with a probability of $\pi(h_{t+1}|h_t)$. This determinant of the agents' well-being can be summarized by a

transition matrix P which is well-known to everyone in the economy and remains the same over time. That is, agents have rational expectations and make their decisions for the future accordingly. Notice further that the function $\psi(\cdot)$ will be chosen appropriately in order to ensure the condition that health status is bounded on $(0, 1]$.

Agents

Agents herewith are assumed to obtain utility from consuming the only consumption good; from their health status, which is to a great extent stochastically determined; as well as from donating to others; and have disutility over working when unhealthy. That is, I assume that agents face a per-period utility of

$$\begin{aligned} u_t(c_t, d_t; h_t) &= \frac{[c_t^{\mu}(1 - v(f_t))^{1-\mu}]^{1-\gamma}}{1-\gamma} + \nu(h_t) + \varrho(d_t) \\ &= \frac{[c_t^{\mu}(1 - v(1-h_t))^{1-\mu}]^{1-\gamma}}{1-\gamma} + \nu(h_t) + \varrho(d_t)\,, \end{aligned}$$

where the first term is taken from Hosseini et al. (2020) with the assumption that agents will work regardless of their health condition: $f_t = 1 - h_t$ is the frailty index as already discussed and individual's utility is of the CRRA form over consumption and there is a constant-Frisch-elasticity disutility over hours worked. [5] Similarly to the paper,

$$v(f_t) = \phi_0(1 + \phi_1 f_t^{\phi_2}) \equiv \phi_0(1 + \phi_1(1 - h_t)^{\phi_2})\,,$$

where $\phi_0, \phi_1, \phi_2 \geq 0$, ensuring that lower levels of well-being increase the disutility from working. In addition, I will assume that $v(f_t)$ is convex in f_t, i.e. that $\phi_2 > 1$ - this would make sense as the marginal effect of deteriorating health would be higher for more frail individuals. For example, catching a cold if you are perfectly healthy should not have as an adverse effect as catching a cold while dealing with a chronic disease of some sort, and hence the choice of ϕ_2 for the speficic impact of frailty on disutility from working. Furthermore, labor supply is normalized to 1, i.e. the impact of leisure is not considered[6], and wages are non-elastic.

In addition to the first (and only) term of the utility function seen in Hosseini et al. (2020), I include two more terms. The first one, $\nu(h_t)$ captures the additional utility a person obtains from being healthy - there are number of studies to empirically prove and examine the two-way relationship between happiness and health. Multiple factors contribute to happiness, including innate personality and genetics, as well as socioeconomic status, stress exposure, time use and activities and social network among others. All of these are to some extent affected by a person's health condition and this justifies the inclusion of h_t in the utility function separately from the disutility from working component. [19]

The second additional term considered here concerns the person's donations towards the public fund - I will assume that individuals gain utility from contributing to the healthcare system through two channels: an altruistic one, and an egoistic one. The former is general altruism towards agents in the economy - that is, an agent is assumed to be happier when they live in an overall healthier environment and when they help others. Notice that this means it is not formulated as in the usual economic OLG models with altruism, where it is dynastic and its manifestation is solely among family members. [2, 3] The egoistic incentive towards donating money comes from agents increasing the fund's total value which could be of help in the case where their health deteriorates in the upcoming periods, i.e. this donation could be considered a contribution towards an insurance scheme for themselves, as described above. Furthermore, as later shown, the representative firm's overall productivity will depend on aggregated health, and hence, wages will be higher for healthier populations, hence the selfishness incentive is further supported.

[6] This would complicate things further, since it is highly correlated with health in real life

Agents i's per-period budget constraint reads as:

$$c_t^i + d_t^i + k_{t+1}^i = w_t + (1 + r_t - \delta)k_t^i \,,$$

i.e. they allocate their resources of the consumption good towards three streams - consumption, insurance/donation, and saving/renting their capital to the representative firm. As usual, this is the equation which combines the law of motion of capital and the consumption/investment allocation chosen by agents, and the price of the consumption/investment good is normalized to 1; capital depreciation is constant over time at δ per period. The usual non-negativity (and no-borrowing) constraints also hold, including for the contribution to the healthcare/donation fund, at all times - i.e. $c_t^i, d_t^i, k_t^i \geq 0$ for all i, t.

Firms

I assume there is one representative firm in the economy which maximizes profits in competitive markets for capital, output and labor, taking prices as given. The firm produces the single consumption good and similarly to the paper, I will adopt a Cobb-Douglas production function. However, in my case, as already mentioned, the total factor productivity will also depend on the overall health of the agents/workers. (This overall health is exogenous to the firm.) That is, the representative firm faces the production function of:

$$Y = A(H_t)K^{\alpha}L^{1-\alpha} \,.$$

For simplicity, I will avoid the issue of taxation, but if time allows, I will do my best to add it in the picture. Solving the static problem of the firm, as usual, we obtain have that the wage per efficient unit of labour is given by:

$$w_t = (1-\alpha)A_t(H_t)\left(\frac{K_t}{L_t}\right)^{\alpha} \,.$$

Donation/Insurance Fund *D*

Agents' contributions of d_t^i go towards the privately-operated fund D_t, for all t. Since I assume that all agents of the economy are more likely to be born healthy following Hosseini et al. (2019), and are all born in period 0, I set $D_0 = 0$. [4] After the initial period, the fund money are determined via the following equation[7]:

$$D_t = D_{t-1} - \sum_{i=1}^{N} p_t^i D_{t-1} + \sum_{i=1}^{N} d_t^i \,,$$

i.e. the fund balance at the end of period t equals the fund balance at the beginning of $t-1$, net the transfers made towards ill persons at the end of $t-1$, plus the stream of agent contributions made at the beginning of t. Since no borrowing is assumed in the economy, the non-negativity condition of the fund at all times will be imposed. That is,:

$$p_t^i \geq 0 \,, \sum_{i=1}^{N} p_t^i \leq 1 \quad \forall\, i, t \,.$$

The streams of p_t^i are determined by the donation fund manager, based on a pre-set criteria/goal.

Donation Fund Management

The donation fund manager acts to distribute the resources obtained from agents' donations towards the less healthy individuals in the economy who had observed a deterioration in their h_t^i variable. These SSDI streams are then transformed into health improvement for the recipients via the $\psi(\cdot)$ function previously mentioned. The streams to the beneficiaries are chosen s.t. the balance of the donation fund

[7] Notice that there is a slight abuse of notation here, however, this is only standard and should not be an issue

is always non-negative. Depending on the initial health distribution of H_0, on the transition matrix of P, and on the function ψ which transform money into health, it is possible that the realizations of agents' health make it impossible for the fund manager to completely/partially heal everyone in the economy.[8] Thus, the decision of the manager on whether they should spend the complete amount present in the fund, or only a part of it; as well as on how many individuals to subsidize, and by what amounts exactly, would be impossible to make without some pre-set decision rule.

For example, a threshold on the value of h_t discerning unhealthy/disabled individuals from relatively healthy ones, could be combined with a decision rule where everyone unhealthy is given a fraction of D_{t-1} until its depletion. This procedure could be repeated every other period so that unhealthy individuals are helped move towards the threshold to be ideally considered healthy at some point of time. Such a setting is presented only as an example and is quite primitive - as it essentially discretizes health into two possible states: good vs. bad, making no prioritization for more ill people etc.

Herewith, I will introduce the notion of a goal/limiting health distribution h^*, which is exogenously given and is considered optimal[9] by the fund manager. In every period, $t-1$, the fund manager will seek to improve agents' health such that their expected health distribution in t, $\mathbb{E}[\boldsymbol{h_t}] \equiv \{\mathbb{E}[h_t^1], \mathbb{E}[h_t^2], \cdots \mathbb{E}[h_t^N]\}$ is shifted as close as possible to the distribution of $\boldsymbol{h^*} \equiv \{h_t^{1*}, h_t^{2*}, \cdots h_t^{N*}\}$, and there is a common lower bound of $\bar{D} \geq 0$ on the remaining money in the donation fund. In other words, in the beginning of every period t, the fund manager will look for the optimal sequence of streams to the beneficiaries,:

$$\left(\{p_t^i\}_{i=1}^N\right)^* \equiv \underset{\{p_t^i\}_{i=1}^N}{\arg\min} ||\mathbb{E}[\boldsymbol{h_t}|\boldsymbol{p_t}] - \boldsymbol{h^*}|| \ ,$$

given the realizations of agents' health in $t-1$, $\{h_{t-1}^1, h_{t-1}^2, \cdots h_{t-1}^N\}$, subject to the constraints of:

$$\begin{cases} D_t = D_{t-1} - \sum_{i=1}^N p_t^i D_{t-1} + \sum_{i=1}^N d_t^i \\ (1 - \sum_{i=1}^N p_t^i) D_{t-1} \geq \bar{D} \\ p_t^i \geq 0 \,, \quad \forall i \in \{1, \cdots, N\} \end{cases} .$$

Of course, a further attempt could be made so that the latter setting is generalized into the fund manager solving for the infinite series of future streams, by setting a notion of a convergence in distribution to some limiting continuous distribution, ξ^*, over time. For simplicity, I will avoid this here, however, as computation would become much more complex to do, and additional/different assumptions should be imposed.

Computational Exercise

Probably the hardest part of the coding exercise I present here accounts to the choice of a function $\psi(\cdot)$ - that is, how to explain/model the transformation of the consumption good to health. Intuitively, this could be related to the inverse function of $v(f_t)$, which transforms health into a quantity which is measurable w.r.t. the consumption good. However, this is quite complex and I could not find enough details on how ψ is calculated/calibrated within the Hosseini et al. (2019) paper. Some of my thoughts towards this include the fact that the relationship between money provided to the beneficiaries and their health improvement should be linear, at least after some point, until it reaches some moment of 'satiation', after which health will not be further affected by marginal increases of the subsidy, and ψ will become constant. Furthermore, the contribution towards an ill person's well-being via healthcare streams from the donation fund should not lead to the person having a health level higher than 1. I

[8] In fact, I consider such a choice of H_0, P and ψ to be more realistic, not only because of the usual lack of sufficient resources to ensure the complete well-being of everyone in an economy, but also because an environment, where all individuals are completely healthy is typically never observed

[9] i.e. its density is skewed more to the right on the $(0, 1]$ scale than the density of H_0

have spent a lot of time thinking about this, and have decided to leave this issue aside by fixing this function in quite an arbitrary manner for now, using the fact that the target of ψ is bounded by the interval of $(0, 1-h_t) \equiv (0, f_t)$.

I will be focusing on a partial equilibrium setting, where agents are perfectly informed for the donation fund's management scheme/goals, and there are rational expectations about the future. That is, I will be solving the household model, where agents choose how much of their consumption good they should consume, rent to the firm (invest) and donate, based on the usual constraints, with the additional information/modification about the donation fund operation and the underlying risks of deteriorating health conditions. My final goal is to compare how agents would act under different initial settings. For example, I am interested in performing and studying simulations to compare the dynamics of agents' choices when they are given different innate inclinations to donate (i.e. different $\nu(d_t)$·s), different initial health distributions (i.e. varying H_0), and whenever the goal/measure of improvement of the fund manager changes.

The formal analytical expression of agent i's problem in the recursive form reads as:

$$V_i(c,k,d) = \max_{c',k',d' \geq 0} \left\{ \frac{[c^{\mu}(1-v(1-h))^{1-\mu}]^{1-\gamma}}{1-\gamma} + \nu(h) + \varrho(d) \right\} + \beta\, \mathbb{E}_t[V_i(c',k',d')]\,,$$

subject to:

$$\begin{cases} c^i + d^i + k'^i = w + (1+r-\delta)k^i \\ h'^i = \psi(h^i, p'^i D) \\ p^i = \left\{ \arg\min_{\{p_t^i\}_{i=1}^N} ||\mathbb{E}[\boldsymbol{h_t}|\boldsymbol{p_t}] - \boldsymbol{h^*}|| \right\}_i \\ D' = D - \sum_{i=1}^N p'^i D + \sum_{i=1}^N d'^i \\ (1 - \sum_{i=1}^N p'^i) D_{t-1} \geq \bar{D} \\ p'^i \geq 0\,, \quad \forall i \in \{1, \cdots, N\} \\ h^i \in (0,1] \end{cases} .$$

Parameterization

There are seven key endogenous determinants[10] considered in the current setting. These factors alter the final outcomes of the above-stated partial equilibrium exercise. Since some of these 7 parameters are very difficult to measure, and due to the time constraints, I am using some empirical counterparts directly as model parameters, rather than calibrating/regressing everything properly.

The initial and target health distributions

For the initial health distribution, H_0, I consider the European Health Interview Survey (EHIS) data on Bulgaria for the year of 2019.[11] To this end, I discretize the process of overall health into four categories as seen in the SILC survey: Very Good, Good, Fair, and Bad health.

	2010		**2019**	
	Bulgaria	**EU28**	**Bulgaria**	**EU28**
Very Good	18.3	22.6	16.8	22
Good	48.9	45.4	50.3	47.2
Fair	20.6	22.5	23.6	22.4
Bad	9.8	7.6	7.7	6.8

Table 1: Self-perceived Health, Eurostat (SILC)

[10] Apart from ψ which has already been discussed
[11] Available at: https://ec.europa.eu/eurostat/web/microdata/european-health-interview-survey

Table 1 shows that Bulgarian overall self-reported health is worse than the EU average distribution, and is even worsening over time. While the values for the proportions of rather healthy persons are remaining the same or increasing by groups on average, Bulgaria's share of healthy population is decreasing. This corresponds well with the motivation provided in the beginning of the project.

Naturally, for H^* - the target distribution from which $\boldsymbol{h^*}$ is drawn, I will choose the average EU values reported above.

The lower bound on the donation fund

Ideally, in a general equilibrium setting of this model, the value of $\bar{D}$ should be endogenized. However, it would imply the inclusion of policies and the tendency towards a model with public healthcare instead. That is why, for now, I will simply set it to be at the respective value for being able to fund 50% of the expected ill people in the next period, at least to some extent.

The innate altruistic inclination

For the altruistic predisposition of agents which is exogenously given, I will adopt a simple measure. Based on official data [12], 18% of Bulgarian population has donated to some cause during 2011, while the respective EU average is at 40%. Therefore, I will adopt initially the linear set-up where:

$$\varrho(d_t) = \frac{0.18}{0.4} \cdot d_t = 0.45 \cdot d_t \,.$$

Relationship between happiness and health

For the determination of $\nu(h_t)$, I rely on the World Values Survey data from Wave 2005-2009. Bulgaria has only been included in the WVS in the waves of 1994-1998 and 2005-2009. The most recent data has been used for the joint distribution between self-perceived happiness and health. I present the key findings in the table below.

		Feeling of Happiness				
		Very happy	Quite happy	Not very happy	Not at all happy	Total
State of health (subjective)	Very good	26.5%	58.1%	11.6%	3.9%	100%
	Good	9.6%	59.7%	27.6%	3.1%	100%
	Fair	8.3%	34.1%	46.9%	10.7%	100%
	Poor	3.6%	25.2%	46.8%	24.5%	100%
	Very poor	11%	46.9%	33.6%	8.5%	100%

Table 2: State of Health (subjective) and Feeling of Happiness, joint distribution, WVS Wave 2005-2009, Bulgaria

[12] Own calculations based on the data from Charities Aid Foundation, https://www.cafonline.org/

Findings and Conclusion

Currently, in progress. Please, kindly refer to the `Python` codes of my submission folder for the up-to-date initial computational set-up/findings.

Suggestions for Future Improvements and Analysis

I realize that the current suggestion is far from a perfect/complete representation of reality and potentially needs to be re-structured in order to avoid possible drawbacks. Despite that, I believe it has some interesting/useful characteristics which mimic the current situation in Bulgaria, and probably in some other countries as well.

Further, an OLG setting could be introduced to the model, similarly to the setting suggested by Hosseini et al. (2019), and also borrowing and government/taxes could be added towards the solution in a General Competitive Equilibrium framework.[4] There is also the potential need to assume out-of-pocket healthcare expenditures in the future, among others.

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[20] 'The 77-year old doctor who recently lost the fight with COVID-19 had returned to work after the Department of Neurology in Vidin's hospital was left with no medical practitioners, prior to the pandemic'

[21] DPS (the Movements for Rights and Freedoms party) suggests that a non-existing public online platform should take HelpKarma's place for 1.1 mln. BGN