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Summary of: "Mathematical model for determining the effect of government policies on Nigerians' standard of living and the achievement of economic comfort in Nigeria"

The authors' intent on performing this research is to determine the effects of government financial policies on the standard of living of Nigerians. They list several policies, with the fuel subsidy being the most mentioned. The authors also make it clear that they wish for the government of Nigeria to use this research to avoid future violence and unrest due to the negative effects of government policies. Also, they wish for the government to use this research to guide it on its effort in nation building.

The model developed in this paper is based on data gathered from a questionnaire. The questionnaire used 6 parameters as shown in Table 2.1: Monthly Income (I), Government Parameter (Gp), Family Size (F), Expenditure level per month (E), Social Status/Societal Expectation (T) and Standard of Living (S). The questionnaire was distributed to 200 people, but only 20 were ultimately used in the research. Nigeria has a population of 173 million, so it seems that model based on the gathered data has a high chance of inaccurately representing the population as a whole. The author indicates this and other sampling issues in section 1.2

In development of the model, the authors establish several relationships among the parameters. Those that increase S are I and T (S is proportional to I and T). Those that decrease S are Gp, F and E (S is inversely proportional to Gp, F and E). I mostly agree with these relationships and want to clarify that Gp is intended to represent negative government financial policies, as indicated in section 2.1.6. F and E are clearly related, and the authors mention F as an additive factor, but I'm not sure if this fully accounts for the relationship of F and E. Also, it seems to me that the effect of E is more nuanced than indicated by the authors. If E is kept in check with relation to I, then, assuming I is high enough, it should lead to a higher standard of living (e.g. spending on education, good food, entertainment etc.). I think the authors try to account for this in section 2.1.4.

The authors first establish a model that relates S to I, F, T, E, and constants of proportionality alpha and beta. They use the least squares method and partial differentiation to solve for alpha and beta, and then use the data gathered from the questionnaire to determine values for alpha and beta. I will need to review the least squares method, and I am not sure what Z is referring to in section 2.1.5.

Next, the authors improved the model by introducing Gp as a negative parameter. As Gp is defined as some % of income, the authors used the gathered data and the new model (with Gp) to determine a value for Gp in terms of I. With all parameters integrated into the model, the authors set out to optimize the model in section 3.1. I am not familiar with Lagrange's Multiplier Approach, but the process involved was not too difficult to follow. They determined the critical values for F, E, I and Lagrange multiplier lambda in relation to S. These are the locations where the partial first derivatives are 0, indicating a maximum or minimum value for S for that value of F, E, I and lambda. Next, they used the partial second derivatives of S in relation to F, E, I and lambda to determine if the critical values indicate a maximum or minimum value for S.

An analysis of the optimal values followed. The optimal F and T values are clear to interpret. F = 1 means that you only care for yourself, so all of your expenditures are limited to what you choose to do. T = 100% indicates you have a high standing in the community, and will therefore be well taken care of. I = 0 and E = 184% are not quite as clear. I = 0 indicates that income does not matter. While this may seem strange, it makes sense in the context of E. E = 184% indicates that you must spend 184% of your I to achieve a maximal S. This is impossible, therefore, according to the model, there is no value of I that can maximize S.

Further analysis signifies the effect of Gp on S. The evaluation of the model without Gp and with Gp using randomly selected questionnaires indicates that Gp decreases standard of living by around 5-7%. I take issue with the authors' statement that Gp reduces S by "approximately 10%" in section 3.4.1. Why didn't they say 5-7% (or something similar) to more accurately represent the results?

They also validate the model against the collected questionnaires in section 3.4.1. I am particularly impressed by how close the S determined by the model is to the S collected by the questionnaires. However, I do not have enough of an appropriate background to state if this is actually a good model for the data or not.