Life: A Theoretical and Empirical Case Study

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Abstract

In this paper I approach life from an optimal standpoint modelling the intertemporal utility maximization of a rational representative agent to obtain its optimal decision-making path —in terms of consumption and leisure—. Afterwards, an empirical model is derived from the theoretical results and parameters are calibrated using observed data. The results are a satisfactory life full of joy, love for knowledge and interdisciplinary activities, and the forecasts of the model follow a consistent path into the future.

1 Past

Intertemporal utility maximization models in economics range from approaches such as Ramsey (1928) where the individual lives infinite periods, to model the uncertainty of death in the future. Nevertheless, the procedure used in this document should focus more on the profile of the representative agent. Thus, to model perfectly its behavior, both a background context and a literature review shall be conducted.

1.1 Context

The individual of the model is a young male born in a small and open economy (i.e. Colombia) during the late 1990s, hence experiencing his childhood between two dominant eras: the end of the 90s and the beginning of the new millennium. Regarding the context of the country, he grew up in the countryside near the country's capital, surrounded by nature and dogs for pets, making the individual's preferences focused on the joy of being outside, taking pleasure in both sunny and rainy days in company of animals.

Furthermore, literature in child development such as Jacobs (2007) has shown results that young individuals that enjoy parental attention tend to have better social and psychological performance. And this was one of the household's characteristics for our agent: both a loving mother and a caring step father that, through the years, taught him about good morals and developing interests in several areas. As this progressed, the child started growing fond of music, sports, literature and mathematics, knowledge areas that I try to model in this paper.

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2 Present

Taking into account the past context of the representative agent, a theoretical model is created based on Ramsey (1928) for intertemporal maximization.[1]

2.1 Theoretical Model

Firstly, the intertemporal utility function of the individual is defined by:

$$V(0) = \int_0^\infty e^{-\rho t} u(c(t), l(t)) dt \ . \tag{1}$$

Where $u(c(t), l(t))$ is the instantaneous utility function in time t. Let us suppose that $u(\cdot)$ is strictly increasing and strictly concave, $u'(\cdot) > 0$ and $u''(\cdot) < 0$, and follows the *Inada* conditions: $\lim_{c(t),l(t)\to\infty} u'(\cdot) = 0$, $\lim_{c(t),l(t)\to 0} u'(\cdot) = \infty$. The term $e^{-\rho t}$ is the discount factor, with $\rho > 0$. The arguments $c(t)$ and $l(t)$ are consumption and leisure respectively, both in time t. Our interest resides in the latter, where it is composed by the activities the individual does during his free time, such as playing guitar, training with the university's track and field team, travel photography, literature and being with friends. Without loss of generality, $c(t)$ can be simplified as coffee consumption.

The individual maximizes (1) subject to the following budget constraint:

$$\dot{a}(t) = w(t)n(t) + r(t)a(t) - c(t) \ . \tag{2}$$

Where $\dot{a}(t)$ is the change in wealth respect to time, $w(t)$ is the salary earned for every unit of time $n(t) = 1 - l(t)$ he works, normalizing the unit of time to 1. And $r(t)$ is the yield of his savings every period. This individual works as a research assistant in the area of public policy evaluation with professor Philipp Hessel at Uniandes' School of Government.[2]

It is as well important to highlight that any course regarding the increment of knowledge on empirical matters (i.e. *Causal Inference and Research Design* with professor Scott Cunningham) is assumed as human capital accumulation and, including this in $l(t)$, makes the individual happier, for it makes him more capable in his work as a research assistant and a more competitive economist.[3]

3 Future

Solving the theoretical model through optimal control methodology and reinterpreting the Euler Equations of consumption and leisure, a k-variable VAR(1) model can be constructed

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[1]It is important to note that the assumption of the individual being an economics student is consistent with the *methodological individualism* assumption for the model, thus he is a rational agent. Besides, his love for various activities helps with the maximization process of (1) subject to the budget constraint.

[2]This work can be motivated by how the individual sees the grand potential of economics, as a discipline composed of several, very well integrated areas, that give its user tools in world modelling through the use of the consistent and coherent language of mathematics and a strong mental structure for optimizing decisions and work with strong arguments.

[3]The model works perfectly taking into account as well the other interests in economics of the individual, such as macroeconomics (fiscal, monetary and FX policy) and several areas of econometrics like time series and other statistical areas like machine learning and data mining.

from these optimal intertemporal equations.[4]

3.1   Empirical Model

The reduced VAR(1) model can be represented as:

$$\mathbf{y}_t = \nu + A_1 \mathbf{y}_{t-1} + \mathbf{e}_t \ . \tag{3}$$

Where $\mathbf{y}_t$ is the $[k \times 1]$ vector of consumption and leisure variables in t, ν is the $[k \times 1]$ vector of intercepts, A_1 is the $[k \times k]$ matrix of regression coefficients and $\mathbf{e}_t$ is the $[k \times 1]$ vector of residuals.

3.2   Results

Estimating (3) and calculating the 1-step, 5-steps and 10-steps forward forecasts, Table 1 shows the results of the forecasts:

Table 1: Results of VAR(1) model forecasts.

Forecast	Description
1 year	Finishing a successful internship at an economic policy institution such as Banco de la República, Ministerio de Hacienda or Planeación Nacional and starting first year of the Master in Economics (PEG) at Universidad de los Andes.
5 years	Coming back to work at one of the mentioned institutions or an international institution like IDB, IMF or World Bank. Working with the most important economists in Colombia and the world to use knowledge to propose public policies for the welfare of the country. And preparing for a second masters degree, this time in Public Administration or Public Policy.
10 years	Assuming a high position at one of the economic policy institutions (i.e. sub-direction of macroeconomic policy) after accumulating experience in public policy and economic studies. Perhaps preparing for a PhD abroad.

4   Conclusions

Certainly, self-knowledge of one's preferences and optimal path to achieving one's dreams is truly important. I fondly believe that my discipline provides me of all the tools I need to realize the results in Table 1, and with the combination of my loves and interests, everyday is a great day to enjoy, to learn and to show how capable I am to be useful to the world and to attain that desired welfare.

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[4]Procedure is in the attached document with the appendix (not really, but the focus is the essay and its information).