

Prelipcean, Gabriela; Boscoianu, Mircea

Article

Stochastic Dynamic Model on the Consumption – Saving Decision for Adjusting Products and Services Supply According with Consumers' Attainability

Amfiteatru Economic Journal

Provided in Cooperation with:

The Bucharest University of Economic Studies

Suggested Citation: Prelipcean, Gabriela; Boscoianu, Mircea (2014) : Stochastic Dynamic Model on the Consumption – Saving Decision for Adjusting Products and Services Supply According with Consumers' Attainability, Amfiteatru Economic Journal, ISSN 2247-9104, The Bucharest University of Economic Studies, Bucharest, Vol. 16, Iss. 35, pp. 201-214

This Version is available at:

<https://hdl.handle.net/10419/168822>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.



<http://creativecommons.org/licenses/by/4.0/>

STOCHASTIC DYNAMIC MODEL ON THE CONSUMPTION-SAVING DECISION FOR ADJUSTING PRODUCTS AND SERVICES SUPPLY ACCORDING WITH CONSUMERS' ATTAINABILITY

Gabriela Prelipcean¹ and Mircea Boscoianu²

¹University Stefan cel Mare of Suceava, Romania

²Henri Coanda Air Force Academy, Romania

Abstract

The recent crisis and turbulences have significantly changed the consumers' behavior, especially through its access possibility and satisfaction, but also the new dynamic flexible adjustment of the supply of goods and services. The access possibility and consumer satisfaction should be analyzed in a broader context of corporate responsibility, including financial institutions. This contribution gives an answer to the current situation in Romania as an emerging country, strongly affected by the global crisis. Empowering producers and harmonize their interests with the interests of consumers really require a significant revision of the quantitative models used to study long-term consumption-saving behavior, with a new model, adapted to the current conditions in Romania in the post-crisis context.

Based on the general idea of the model developed by Hai, Krueger, Postlewaite (2013) we propose a new way of exploiting the results considering the dynamics of innovative adaptation based on Brownian motion, but also the integration of the cyclical concept, the stochastic shocks analyzed by Lèvy and extensive interaction with capital markets characterized by higher returns and volatility.

Keywords: Consumer behaviour, consumer profile, consumption-savings decision, stochastic dynamic model, education and awareness of consumer/ responsibility of producer

JEL Classification C91, D91, D12, D18.

Introduction

The last crisis and turbulences (2008-2012) have led to major changes in consumer's behavior that has been forced to adjust their decision on selecting the products and services, in a radically different way comparing to the previous periods. In order to achieve sustainable consumption, the organizations should also adjust their products and services, in accordance with the changes in the consumer's decision.

During 2002-2007 in Romania there was a real estate boom financed by new mortgages, but also by remittances sent by migrant workers abroad. The banks have rapidly entered in

¹ Persoana de contact, Gabriela Prelipcean - gprelipcean@yahoo.com

competition to offer mortgages and housing prices have experienced unprecedented growth. The global crisis has occurred in Romania in late 2008, but there is still a persistent negative impact as anti-crisis measures have been inconsistent, unrealistic and insufficiently adapted to the real dynamics of macroeconomic processes (e.g. mortgages for young families who do not anticipate problems the non-payment, etc.). The reduced level of wages in Romania in the context of a radically different consumption profile as comparing to the European consumers (70% of income is spent on basic goods / services) can lead to on distortion of middle class concept while continuing / accessing long-term loans becomes risky. The behavior of the Romanian consumer is different in terms of desire of population to become homeowners in a very short period: not easily renounce on the mortgage payment even if they have to dramatically rationalize current consumption; should take into account the fact that remittances have declined significantly since 2010, and interest for the purchase of housing has continued, even if prices decline was not as high as in developed countries, although the index number of wages / sqm is extremely unfavorable for our country. It is interesting to note that although there have been delays in the payment of the mortgages, the banks and their clients were able to cooperate so that there is not a large number of mortgage losses / failures.

The speculative bubble of Romania during 2005-2007 largely followed the same route as that in developed countries, but with some particularities: due to the Romanian consumer characteristics, the number and amounts of the losses in mortgages was quite low, and the houses prices was not reduced in accordance to the anticipated magnitude; one can see a stabilization of prices in 2013 to 700 Euro/square meter, that means 2.8 average wages or 4 minimal wages per square meter; the banks have supported the customers, by finding quite flexible solutions on refinancing (which started from finding a way over the financing in Swiss francs); starting with 2013, the credits in national currency have been encouraged, by reducing the interest date in Lei, although this process is quite low and the costs of financing are quite high; the most significant particularity consists in the Romanian consumers' psychology, and to desire to own a property, often regardless of the revenue perspective and whatever it costs to obtain.

The implications of speculative bubbles for Romania were related generally to reduce costs, especially in the consumer durables (appliances, cars), including changing consumer profile (e.g. preference for used cars with low safety pollutants etc.), maintain interest in computers, TV sets, mobile phones, etc. Also in 2009-2012, the banks were more reluctant to grant loans (mortgages and consumption credits); only in 2012 they have started to select its customers on the basis of signs of economic recovery.

The current consumption profile is completely changed, but very interesting is how these changes could be integrated into a long-term pattern. Based on observations on the Romanian consumer behavior during the recent crisis and turbulence, including the post-crisis period, characterized by a fragile recovery, a new profile of consumption specific to Romania resulted. In accordance to the analysis of statistical data and the results of people's barometers, almost 60-80% of the Romanians average income is allocated to basic goods, this it is strongly influenced by the existence of long and very-long term mortgage credits, quite hardly to be supported by the middle-income households. There is a large share of the goods to which prices have a strong speculative behavior (e.g. some food items strictly necessary, the price of fuel, electricity and gas). Upon basis of reducing the bank rate interest, the lack of interest for saving occurred, but considering the low income and the quite selective alternative possibilities on fructifying (the capital market in Romania is very small and poorly known, by even the people with an higher level of education), the

consumption will be oriented towards the goods of high necessity and leisure. The Romanian consumers have become more demanding (Internet access, comparisons of prices and quality of foreign products, and the increase of cultural level, etc.).

Due to developments in this complex spectrum result need for further studies to understand the Romanian consumer behavior throughout the active life cycle (20-65 years old), as well as after retirement (65-80 years old). Based on a stochastic dynamic model for the analysis of optimal consumption-saving allocation decisions throughout the lifetime interesting ideas might result, as regards the accessibility on achieving durable goods, solutions on approaching the organization of the consumer in order to create the social value, solutions to achieve scalability and, not least, the learning ability through consumer-producer partnership.

In his paper "An exact consumption-loan model of interest with or without the social contrivance of money", Samuelson (1958) proposed a complete solution of general equilibrium, where the results of Bohm and Fisher were integrated, as regards the part of the interest rate. The issue of revenues uncertainty, as well as the allotment of portfolios on long term, is also reviewed in Gakidis (1997). In their work "The consumption response to income changes", Jappelli, Pistaferri (2010) proposed a comparative critical analysis of models and methods which emphasize the consumption sensitivity, as comparing to the potential revenues reductions, thus underlying the part of the revenues shocks. Kruger, Perri (2006) emphasized the way inequalities, at revenues level, will determine atypical dynamics of consumption, although the shock or volatility type elements were not embedded here. Gorbachev (2011) analyzed the way consumption, at households level has become more and more volatile. Hai, Krueger, Postlewaite (2013) proposed a new classification of consumption goods, and an innovative consumption-saving model suitable to interesting numerical analysis.

The proposed study is based on some general assumptions: it is necessary to conduct a study on the entire active life cycle of consumer, from 20 to 80 years old, by emphasizing the retiring age at 65, to examine, on the one hand, the income-consumption difference, and the accumulation of wealth, on the other hand. In this paper we consider the effect of the following: initial wealth, risk-free rate, possibility to exploit savings outside the money market, e.g. stock market, modelling and integration of long-term financing decision into existing models (for young families or young consumers, with 5-up to 10 active years) or of refinancing decision (for families who have taken a credit during 2005-2007).

The significance of this study results from the following: a harmonization of supply of goods and services has become necessary, with the new profile of the consumer, starting from the creation of a new type of partnership, where the consumer should offer the necessary data for evaluating the accessibility and to create the social value, respectively where the producers should adapt in an agile way the goods and services at the more and more complex requirements of the consumers; the consumer should base their consumption-savings long-term decisions on the critical elements and should not taking long term credits; the margin should be comfortable in order to avoid stopping of payments in major risk situations, but this should not block out the purchasing of durable goods; it is necessary to understand the lifecycle of products, the deterioration of performances, the prevention of malfunctioning with impact over the consumer's health (using some old, non-secure and pollutant products, with high risk and uncertainty as regards the deterioration, but of low price, in comparison with the new, of high performance, but expensive products); the post-selling and warranty services are also taken into account, as well as the possibility of making more expensive the service to those products older than

2-4 years, with negative impact over purchasing new products; the manufacturers need a barometer of the purchasing power and of its dynamics, on different classes of consumers, so that they will be able to underline the new concepts in a balanced way.

1. Stochastic dynamic model over the consumption-saving decisions of allotment during the entire lifecycle

1.1 Goal of the model

The main purpose of this model consists in emphasizing the possibilities of saving versus consumption, during the entire lifecycle, in a manner able to embed the Brownian motion fluctuations, cycles, income or wealth shocks, in a scalable and easy interpretable manner, able to provide many information to both consumers and companies interested in partnerships, in order to stimulate the consumption, as well.

The goal of the model is justified by the applications offered: assessing the possibility of purchasing durable goods, by analyzing the income (V) – consumption (C) and wealth (W) curves; taking decision of accessing long-term loans under income uncertainty (the Brownian fluctuations of income, the shocks by random positive or negative jumps should be considered which signify the surprises and the loop on middle and long term); measuring wellbeing through wealth accumulation and respectively by emphasizing the poorness, by regular reduction of the wealth W (in this way, one might emphasize critical moments, by means of early warning elements); providing information (for both the consumer and the organizations that provide the goods and services - electronics, TV-sets, vehicles, etc.), as regards the optimal periods in order to accomplish the financing on middle and long term, so that the impact of some potential shocks on income or wealth levels should be emphasized, as well as the impact over the exaggerated growth of the strictly necessity goods prices; the study of some solutions on adapting the cycle consumption – saving on long term, according to consumer profile.

1.2 Hypothesis of the model

For the proposed application we start from the model Hai, Krueger, Postlewaite (2013) with the following particularities: the model is designed on very long-term and contains additional cyclical elements, stochastic shocks Lèvy type to both income levels and accumulated wealth as well; it is extended the possibilities for saving from the money market (the risk-free rate) to the capital markets, with higher returns, but also high volatility. These elements are well harmonized with the expression of income and consumption dynamics starting from Brownian motion.

a) The general hypotheses of the models are the following: normalization of the income ($V_1=1$), to enable the desired scalability (considering as reference point the middle wage level); the adjustment of the initial consumption (considering $C_1 = 0.8C$); the possibility of introducing the initial wealth (essential model for Romania, since many times this signifies the necessary condition on accessing the durable goods).

b) Set 1 of assumptions regarding the income dynamics

In order to simplify and make clear such assumptions, we consider the work income, since financial revenues (from savings) are incorporated in wealth dynamics.

Hypothesis 1a (the first model of work income) is based on the following mechanism:

$$dV_t = \mu V_t dt + \sigma V_t dB_t, \text{ with } V_0 > 0, \tag{1}$$

where V_t signifies the work income, B_t signifies the Brownian motion, μ the rate of revenue growth, by volatility σ .

Hypothesis 1b (decrease of income at retirement) refers to sudden decrease of income from wages (in 45 work-years) with retirement.

$$dV_t = \begin{cases} \mu V_t dt + \sigma V_t dB_t, t < 45, \\ (1 + r_f)^{t-45} dt, t \geq 45 \end{cases}$$

Hypothesis 1c (introducing elements of cyclicity) refers to emphasizing the specific business cycles based on a very long term model (50-60 years), the period $T = \frac{2\pi}{k}t$ can be introduced.

Hypothesis 1d (introducing the special revenues) by means of stochastic jump mechanisms, with a constant probability; at a jump, the income is changed with a stochastic fraction, denoted by Z :

$$dV_t = \mu V_t dt + \sigma V_t dB_t + k V_t dJ_t, \text{ with } V_0 > 0, \text{ and } J \text{ signifies the pure jump process.}$$

$$V_t = V_0 e^{L_t}, \text{ where } \{L_t, 0 \leq t \leq T\} \text{ means the Levy process and}$$

$$L_t = \left(\mu - \frac{\sigma^2}{2}\right)t + \sigma B_t + \sum_{i=1}^{N_t} X_i,$$

where $\{N_t, t \geq 0\}$ signifies the Poisson process of λ intensity, and $\{X_i\}$ are the random independent variables, identically distributed, representing the magnitude of the jump.

If within the interval, dt , the revenue has a jump from V_t up to $s_t V_t$, then the equation of dynamics of the diffusion jump process can be rewritten:

$$\frac{dV_t}{V_t} = \mu dt + \sigma dB_t + (s_t - 1)dN_t.$$

Applying the Itô lemma, can achieve:

$$\begin{aligned} d \ln V_t &= \frac{\partial \ln V_t}{\partial t} dt + \mu V_t \frac{\partial \ln V_t}{\partial V_t} dt + \frac{\sigma^2 V_t^2}{2} \frac{\partial^2 \ln V_t}{\partial V_t^2} dt + \sigma V_t \frac{\partial \ln V_t}{\partial V_t} dB_t + \ln s_t V_t - \ln V_t = \\ &= \mu V_t \cdot \frac{1}{V_t} dt + \frac{\sigma^2}{2} V_t^2 \left(\frac{-1}{V_t^2}\right) dt + \sigma V_t \cdot \frac{1}{V_t} dB_t + \ln s_t + \ln V_t - \ln V_t = \\ &= \left(\mu - \frac{\sigma^2}{2}\right) dt + \sigma dB_t + \ln s_t \end{aligned}$$

$$\text{Therefore, } \ln V_t - \ln V_0 = \left(\mu - \frac{\sigma^2}{2}\right)t + \sigma B_t + \sum_{i=1}^{N_t} \ln s_i \Rightarrow$$

$$V_t = V_0 e^{\left(\mu - \frac{\sigma^2}{2} \right) t + \sigma B_t + \sum_{i=1}^{N_t} \ln s_i}, \ln s_i = X_i.$$

c) The set 2 of assumptions regarding the consumption dynamics

In this general model, we consider the following allocation:

$$C_t = c(w_t)V_t \tag{2}$$

Even for a long term pattern, can be considered a constant volume of the consumption and the evolution of the unit prices can be decomposed into two components, one component (e.g. 60-80% of the total consumption volume), subject to increase risk-free risk rate, and the other component (20-40%) subject to speculative growth (represented by increasing the price of goods, in general, and of the food merchandises, payments to utilities and oil/fuels, in particular). In fact, the combination 80%-20% is only a representation of the global structure of the expenditures of the households that take into account the results observed during very long periods of time, and can be easily adjusted in the calculations on small time intervals, in which we can detail and perform again with revised allocations.

At the end, the equation of the consumption dynamics can be written as follows:

$$\frac{dC_t}{C_t} = p_u (1 + r_f) dt + (1 - p_u) [(1 + \mu') dt + \sigma' dB_t] \tag{3}$$

In the particular situation of the combination 80%-20%, the equation becomes:

$$dC_t = 0,8C_t(1 + r_f) dt + 0,2[(1 + \mu')C_t dt + \sigma' C_t dB_t], \text{ with } V_0 > 0 \tag{3a}$$

d) The set 3 of assumptions regarding the dynamic process of accumulating the wealth that can be liquid

Liquid wealth accumulation equation if the previous ownership is capitalized at the risk free rate (hypothesis 3a) is given by

The equation of the liquid wealth accumulation, by the hypothesis point of view, where the previous ownership is capitalized at the risk-free rate r_f (assumption 3a) is given by:

$$dW_t = (r_f W_t + V_t - C_t) dt, \quad W_t \geq 0, \quad t \geq 0. \tag{4}$$

where r_f signifies the risk-free rate, W_t signifies the liquid wealth, V_t the work income, and C_t signifies the consumption.

Hypothesis 3b (introducing the extended possibilities of fructifying the wealth); the possibility of using capital market.

If the possibility of wealth fructifying is extended towards the capital market (investments in stocks, bonds or derivatives, of high yield, but positive volatility), besides the risk free rate risk r_f , it appears the capital market rate r_M , as well as the associated Brownian motion; in this situation, the equation of wealth accumulation becomes:

$$dW_t = (rW_t + V_t - C_t) dt, \tag{5}$$

where $r = \alpha(1 + r_f) + (1 - \alpha)[1 + r_M(1 + \sigma'' dB_t)]$

If the wealth-revenue rate is introduced, $w = \frac{W}{V}$, which suggests the number of revenues accumulated during the entire life (active and passive), the following relationship can be written:

$$dw_t = \left[(r_f - \mu'' + \sigma''^2)w_t + 1 - c_t \right] dt - \sigma'' w_t dB_t = \mu_w(w_t)dt - \sigma'' w_t dB_t, \text{ where}$$

$\mu_w(w) = (r_f - \mu'' + \sigma''^2)w + 1 - c(w)$ signifies the drift of w .

Hypothesis 3c (introducing the possibility of a loan, for certain periods of time, where the current expenditures exceed the revenues)

There are periods of time, when the expenditures exceed income, so that in order to take into account this loan facility can be considered a correction, based on the loan at the risk-free rate, of the equation of wealth accumulation. If $C > V$, the consumption is higher than the income for that period, and the additional consumption will be achieved out from the owned wealth. Therefore, in equation of the liquid wealth (4), an additional cost will be introduced $\Delta C = r_f(C_t - V_t)$.

In this situation, the following relationship is achieved:

$$dW_t = ((1 + r_f)W_t + V_t - C_t - \Delta C)dt = (1 + r_f)(W_t + V_t - C_t)dt \quad W_t \geq 0, t \geq 0. \tag{6}$$

Hypothesis 3d (introducing the cyclicity in liquid wealth equation, the period $T = \frac{2\pi}{k}t$).

The model's equation is represented as follows:

$$dW_t = \begin{cases} \alpha(1 + r_f)W_t dt + (1 - \alpha)W_t \left[1 + r_M \left(1 + \sin \frac{2\pi}{k} \right) \sigma'' dB_t \right] + (V_t - C_t)dt, C_t \leq V_t \\ \alpha(1 + r_f)W_t dt + (1 - \alpha)W_t \left[1 + r_M \left(1 + \sin \frac{2\pi}{k} \right) \sigma'' dB_t \right] + (1 + r_f)(V_t - C_t)dt \end{cases}$$

2. The results achieved in accordance to the stochastic model

Further it represents the impact of the revenue growth rate (Figure no. 1.1-1.3), the effect of initial wealth expressed in number of wages (Figure no. 2.1-2.2), risk-free rate effect (Figure no. 3.1-3.3), the effect of speculative goods weight on the dynamics differential of the consumption-income and accumulated wealth (Figure no. 4.1-4.2). It also proposes a detailed explanation of the post-retirement period (Figure no. 5.1-5.2). These results are based on numerical simulations of the model using Matlab.

Case 1. Situation when the growth rate of the income is modified, μ

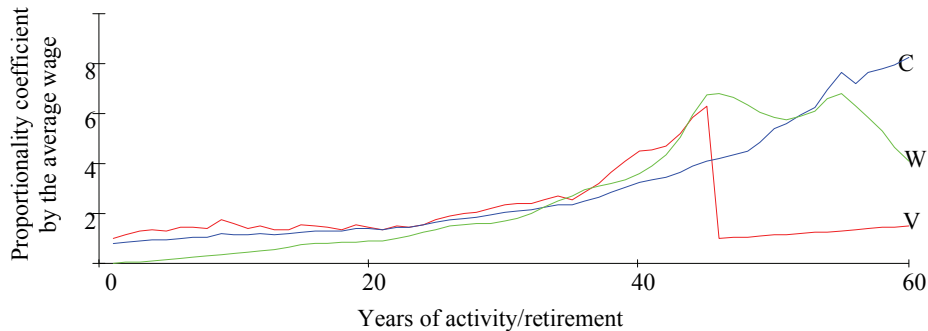


Figure no. 1.1: $W = 0; r_f = 0,03; \mu = 0,06$

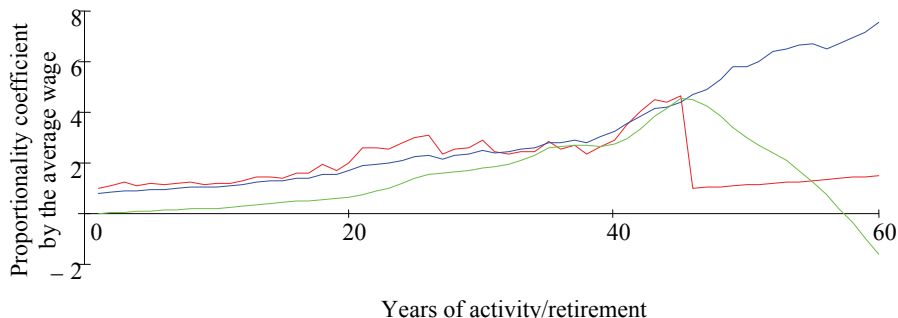


Figure no. 1.2: $W = 0; r_f = 0,03; \mu = 0,08$

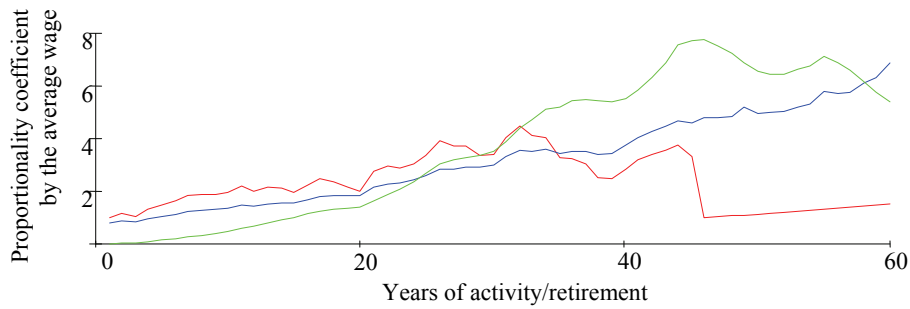


Figure no. 1.3: $W = 0; r_f = 0,03; \mu = 0,1$

Figures 1.1 - 1.3 shows the impact of the growth rate of income on the dynamic of the income-consumption relation and on the accumulated wealth.

Case 2. The situation when the initial wealth is modified

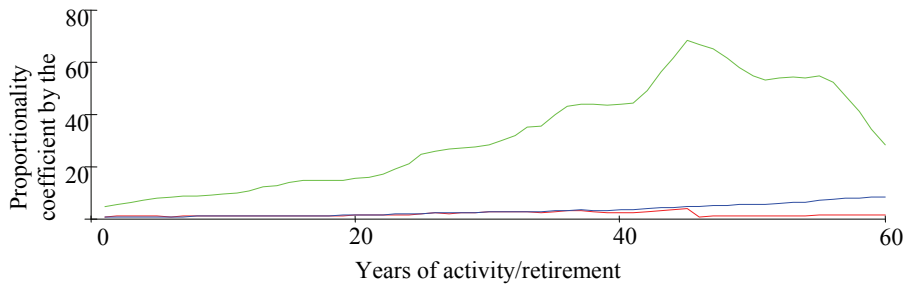


Figure no. 2.1: $W = 5; r_f = 0,04; \mu = 0,06$

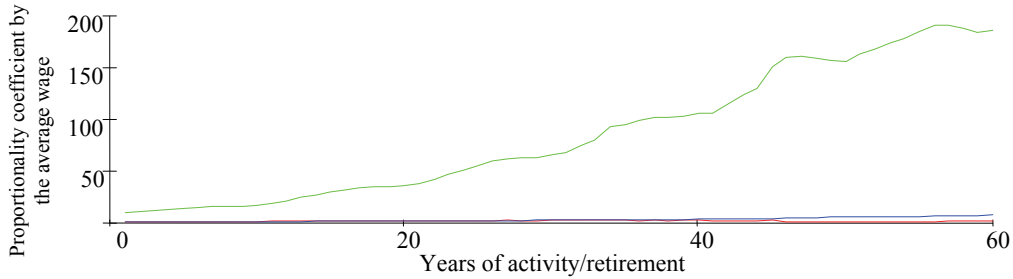


Figure no. 2.2: $W = 10; r_f = 0,04; \mu = 0,06$

The effect shown in Case 2 is intuitive and is a typical case for Romania where initial wealth resulting intergenerational transfer has a special effect. It is noted that there is a tendency to reduce volatility accumulated wealth even if higher volatility of consumption.

Case 3. The effects when the risk-free rate is modified, r_f .

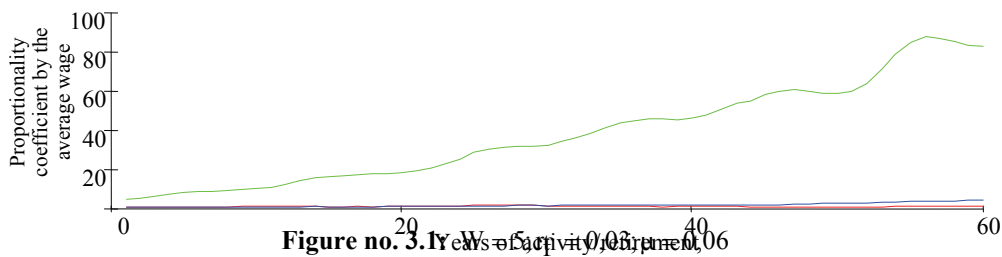


Figure no. 3.1: $W = 5; r_f = 0,03; \mu = 0,06$

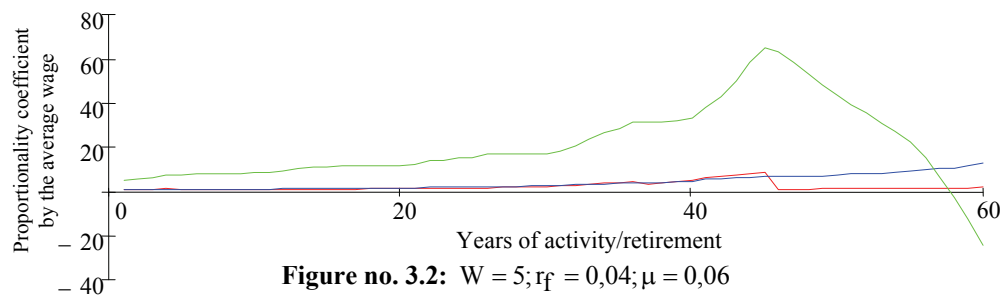


Figure no. 3.2: $W = 5; r_f = 0,04; \mu = 0,06$

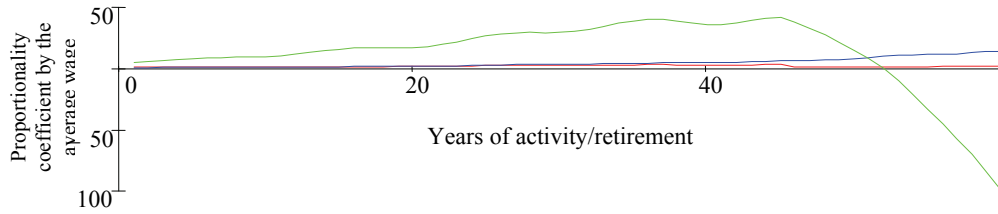


Figure no. 3.3: $W = 5; r_f = 0,05; \mu = 0,06$

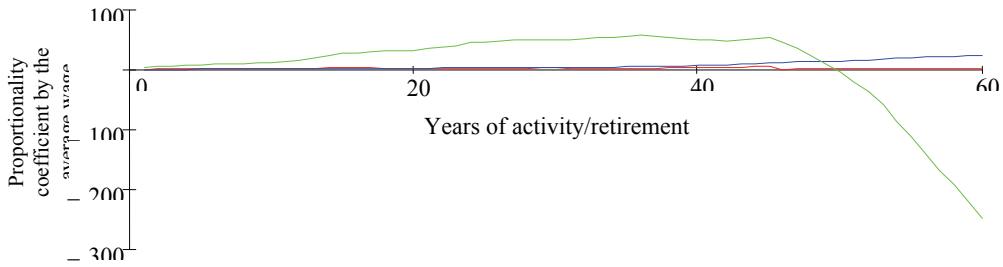


Figure no. 3.4: $W = 5; r_f = 0,06; \mu = 0,06$

In Case 3 consumption is approaching several times the income and, in some cases, there are intersections of these curves, but the wealth increases in a reasonable pace until near the time of retirement.

Case 4. The impact of changes of speculative goods on the accessibility of consumers

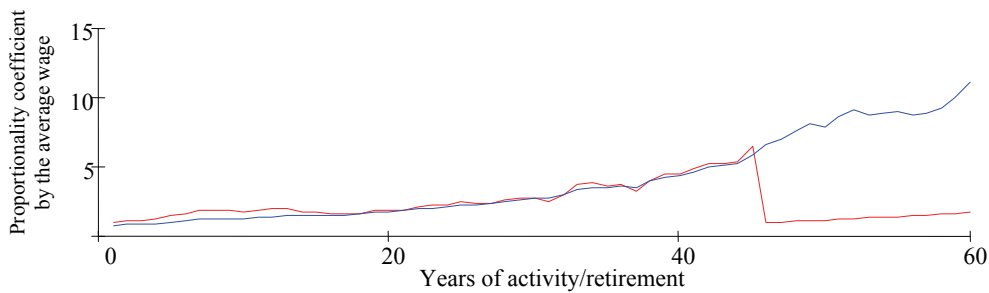


Figure no. 4.1: $r_f = 0,04; \mu = 0,06$

Dynamic of consumption within the 60%-40% combination is the following:

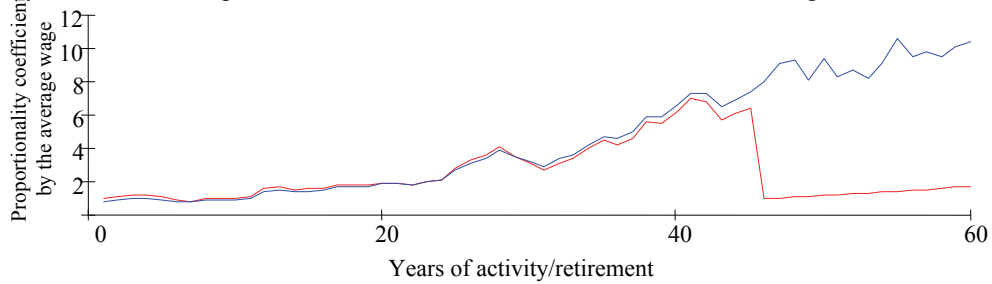


Figure no. 4.2: $r_f = 0,04; \mu = 0,06$

In this case, the impact of increasing the share of speculative goods on the accessibility of consumers is significant in the near retirement period, and requires special attention on the consumer spending control, which typical households faced in times of crisis and turbulences.

Case 5. Detailed remarks during the retirement rapprochement (55-70 years old)

This case is particularly interesting for emerging countries, including Romania, and in Figure 5.2 a significant decrease in performance even at a modest increase in the risk-free rate can be observed.

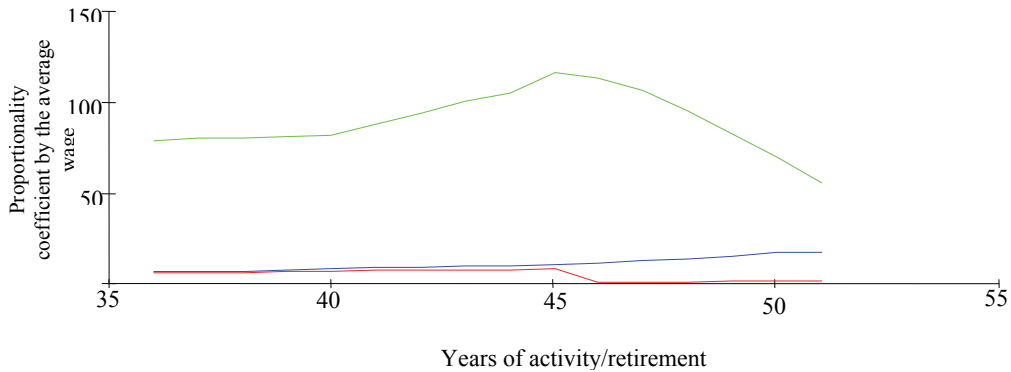


Figure no. 5.1: $W = 5; r_f = 0,04; \mu = 0,06$

Starting with the age of 45 years, the income will decrease (nearness the retirement), while the habits of consumption remain the same.

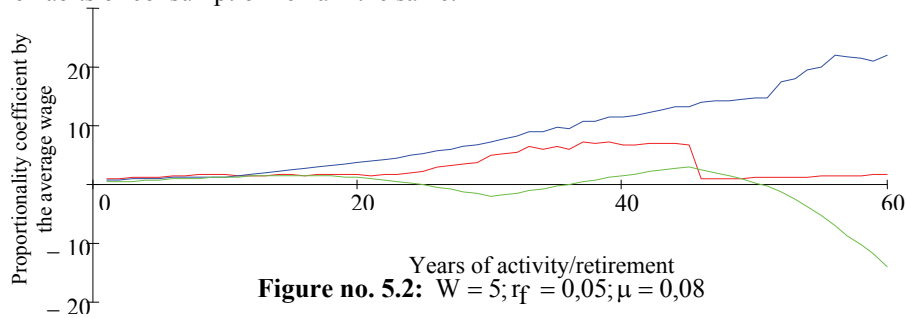


Figure no. 5.2: $W = 5; r_f = 0,05; \mu = 0,08$

The interpretation of results. Consequences over the responsibility of organizations towards the durable consumption

The movements in the typical consumer profile involve a flexible and continuous adaptation of organizations, in order to achieve sustainable consumption, suggested by the results shown in Table 1.

Table no. 1: Summary of results based on numerical simulations of the model using Matlab

Parameter Case	w_0	r_f	μ	Observations and conclusions
1.1	0	0,3	0,06	μ has an expected impacts, but moderate, even long-term
1.2			0,08	
1.3			0,1	
2.1	5	0,04	0,06	w_0 has a significant effect on the accumulation of wealth over time (this is a typical case of intergenerational transfer)
2.2	10			
3.1	5	0,03	0,06	r_f has a surprisingly consistent impact, the proximity r_f by μ leads to lower aggregate wealth, if $r_f < \mu$ results a critical case with implications for long-term accessibility of consumer
3.2		0,04		
3.3		0,05		
3.4		0,06		
4.1/4.2	0	0,04	0,06	The share of expenditures on speculative goods influences the income-consumption differentials that oscillating in the negative values area, future research may examine this effect in the medium term
5.1	5	0,04	0,06	Detailed study of the processes of saving - spending near retirement years brings interesting details useful in the study of social protection programs and / or poverty reduction.
5.2		0,05	0,08	

The use of durables old goods, non-ecological, with risk of injury or risk on people health, in the context of low income can become a persistent habit; in this case, the organizations should provide better products, more accessible and able to be achieved by the consumers with a high adaptability. In the current post-crisis context, the perception over the credit risks has become significant, and the middle-income families prefer increasing the usage period of goods, or purchasing second-hand products, with risks over the health and security. The education and consumers awareness have involved better information and consciousness over the alternative solutions, and the organizations should look to the new comprehensive partnerships with the consumers, as an additional source of knowledge. The organizations should fructify such knowledge and act consequently and consistently to increase the level of information and to educate consumers.

Conclusions

Adjusting the products and services supply according to consumer accessibility is an essential issue in the current post-crisis period in which consumer accepts harder and harder the products offered by organizations.

The current paper proposes a stochastic dynamic model to study the consumption-saving decisions on very long term (50 or 60 years), in which a dynamics of income expressed by Brownian motion was considered, with cyclicalities on middle and long term that embodies an insertion of the special revenues, by stochastic jumps (Levy type); a dynamic of strictly necessary consumption and current consumption, where the unit prices of the replaceable products are able to be adjusted with a risk-free rate, but are also able to respond to the speculative growth of the products prices by Brownian motion; these can also be achieved

by liquid wealth achievement, where the owning from the previous period is either fructified to the risk-free rate, or considering dynamics based on Brownian motion to express the performance of the capital market, in various combinations.

The model is simple, intuitive and scalable offering a global picture of the dynamics of differential income-consumption and accumulated wealth. Based on this model it can be analyzed the accessibility and customer satisfaction in close correlation with the responsibility of companies and of financial institutions, the opportunities for direct purchases of durable goods, or long-term mortgage financing. The proposed model is extremely realistic, since it allows the emphasizing of work income, incorporate the cyclicity components and stochastic jumps, with a sudden reduction at the moment of retirement ($t=45$ years), embedding the goods submitted to the speculative price growth, as well as underlying the possibility of carrying out higher consumptions rather than the income for certain periods, by loans at the risk-free rate. This model emphasizes critical situations, where the expenditures will be higher during a significant period of time, with a value over the income, and tracing a signal as regards the critical point of decreases of the achieved wealth, or the subsequent point of warning the bankruptcy rapprochement.

Changing the typical consumer profile has involved a flexible and continuous adaptation of organizations. In this frame, the innovation might signify a first factor of stimulating a durable consumption. As regards the emergent countries, as Romania, there is a totally especial preference for the property investments. Within the frame of increasing the price of commodities, by values over the risk-free rate, a persistent mechanism occurred as regards the usage of old, non-ecological goods, with risk of accidents or having a negative impact over the consumer's health state. Moreover, approaching the consumption curves to that of income, caused by the under-dimensioned revenues, might lead towards the continuation of this habit, and the organizations should offer new and higher efficient products, more accessible and that are able to be used by the consumers, by a superior adaptability. Within the current post-crisis context, the perception over the credit risks is currently significantly changed, and the middle income families will prefer the increase of the usage period of goods or the purchase of second-hand products, with risks over the security in use and the health state.

References

- Aguiar, M., and Hurst, E. 2005. Consumption vs. expenditure. *Journal of Political Economy*, 113(5), pp. 919-948.
- Alessie, R., Devereux, M. and Weber, G. 1997. Intertemporal Consumption, Durables and Liquidity Constraints: A Cohort Analysis. *European Economic Review*, 41, pp. 37-59.
- Attanasio, O. and Weber, G., 1995. Is Consumption Growth Consistent with Intertemporal Optimization? Evidence for the Consumer Expenditure Survey. *Journal of Political Economy*, 103, pp. 1121-1157.
- Attanasio, O., Browning, M., 1995. Consumption over the Life Cycle and over the Business Cycle. *American Economic Review*, 85, pp. 1118-1137.
- Blundell, R., Browning, M. and Meghir, C., 1994. Consumer Demand and the Life-Cycle Allocation of Household Expenditures. *Review of Economic Studies*, 61, pp. 57-80.
- Caballero, R. J., 1990. Consumption puzzles and precautionary savings. *Journal of Monetary Economics*, 25(1), pp. 113-136.

- Caballero, R. J., 1991. Earnings uncertainty and aggregate wealth accumulation. *American Economic Review*, 81(4), 859-871.
- Carroll, C. and Summers, L., 1991. Consumption Growth Parallels Income Growth: Some New Evidence, in D. Bernheim and J. Shoven (eds), *National Saving and Economic Performance*, University of Chicago.
- Dinu., V. 2012. Consumers' education and information from the perspective of their awareness and ecological behavior. *Amfiteatru Economic*. XIV(31), pp. 5-6.
- Duesenberry, J.S., 1949. *Income, Saving and the Theory of Consumption Behavior*, Cambridge, Mass.: Harvard University Press.
- Duffie, D., and Epstein, L., 1992. Asset Pricing with Stochastic Differential Utility. *The Review of Financial Studies*, 5, number 3, pp. 411-436.
- Eberly, J., 1994. Adjustment of Consumers' Durables Stocks: Evidence from Automobile Purchases. *Journal of Political Economy*, 102, pp. 403-436.
- Fernandez-Villaverde, J. and Krueger, D., 2007. Consumption over the life cycle: Facts from consumer expenditure survey data. *The Review of Economics and Statistics*, 89(3), pp. 552-565.
- Gorbachev, O., 2011. Did household consumption become more volatile?. *American Economic Review*, 101(5), pp. 2248-2270.
- Gourinchas, P. and J. Parker, 2002. Consumption over the Life Cycle. *Econometrica*, 70, pp. 47-89.
- Hai, R., Krueger, D. and Postlewaite, A., 2013. *On the welfare cost of consumption fluctuations in the presence of memorable goods*, New York.
- Jappelli, T. and Pistaferri, I., 2010. The consumption response to income changes. *Stanford institute for economic policy research*. [pdf] SIEPR discussion paper no. 08-52, Available at: < <http://www-siepr.stanford.edu/RePEc/sip/08-052.pdf>> [Accessed 5 September 2013].
- Jorgenson, D. and Slesnick, D., 1987. Aggregate Consumer Behavior and Household Equivalence Scales. *Journal of Business Economics and Statistics*, 5(2), pp. 219-232.
- Kruger, D. and Perri, F., 2006. Does Income Inequality Lead to Consumption Inequality? Evidence and Theory. *Review of Economic Studies*, 73, pp. 163-193.
- Meghir, C., and Pistaferri, L., 2011. *Earnings, consumption and lifecycle choices*. Handbook of Labor Economics, 4B, pp. 774-854.
- Merton, R. C., 1971. Consumption and portfolio rules in a continuous-time model. *Journal of Economic Theory*, 3, pp. 373-413.
- Samuelson, Paul A., 1958. An Exact Consumption-Loan Model of Interest with or without the Social Contrivance of Money. *Journal of Political Economy*, 66(6), pp. 467-482.
- Smeureanu, I. and Ruxanda, G. 2013. Considerations on the stochastic approach in economics. *Amfiteatru Economic*, XV(34), pp. 401-416.
- Storesletten, K., Telmer, C. and Yaron, A., 2004. Consumption and risk-sharing over the life-cycle. *Journal of Monetary Economics*, 51, pp. 609-633.
- Zeldes, S., 1989. Consumption and Liquidity Constraints: An Empirical Investigation. *Journal of Political Economy*, 97, pp. 305-346.