INFORMATION FRICTIONS AND THE EFFECTS OF NEWS MEDIA BIAS ON CONSUMPTION

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This is to certify that we have read this thesis and that in our opinion it is fully adequate, in scope and quality, as a thesis for the degree of Master of Science.

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ABSTRACT

INFORMATION FRICTIONS AND THE EFFECTS OF NEWS MEDIA BIAS ON CONSUMPTION

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This thesis develops a model that incorporates information frictions and consumption behavior in order to explain the observations of higher volatility of consumption as well as its excess sensitivity to income in the developing countries. The information frictions in the model arise both from the information source, specified as the biased news media, and the conditions of the consumers that affect the costs they face in forming full information rational expectations. These two channels are argued to be more effective in the developing countries. The model in this thesis uses these specifications to define a heuristic by which the consumers dynamically switch their expectation structures. In each period the consumers choose from two types of expectation structures: full information rational expectations, and expectations through the information provided by the news media. The latter may be biased while the former is costlier to use. The simulation results suggest that higher degrees of information frictions cause higher volatility of consumption as well as an excess sensitivity of consumption to income. Therefore, a higher bias in the source of information as well as higher costs of forming full information rational expectations are proposed as candidates for explaining the different dynamics of consumption between the developed and the developing countries.

Keywords: Consumption, Information Frictions, Bounded Rationality, News Media, Expectations

ÖZ

ENFORMASYON SÜRTÜŞMELERİ VE HABER MEDYASI YANLILIĞININ TÜKETİME ETKİSİ

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Bu çalışmada ortaya konan model, enformasyon sürtüşmeleri ve tüketim davranışlarını bir araya getirerek gelişmekte olan ülkelerdeki yüksek tüketim volatilitesi ve tüketimin gelire karşı aşırı duyarlılığı gözlemlerini açıklamayı hedeflemektedir. Modeldeki enformasyon sürtüşmeleri, hem yanlı haber medyası özelinde enformasyon kaynaklarından, hem de tüketiciler açısından bakıldığında tam enformasyon rasyonel beklentiler kullanmanın maliyetlerinden ortaya çıkmaktadır. Bahsi geçen bu iki kanalın gelişmekte olan ülkelerde daha belirgin olduğu savunulmaktadır. Çalışmada ortaya konan model, bu özelliklerden yola çıkarak, tüketicilerin dinamik biçimde beklenti yapılarını değiştirdikleri bir sezgisel kural belirtmektedir. Tüketiciler her dönem bu sezgisel kural üzerinden iki beklenti yapısından birini seçer: tam enformasyon rasyonel beklentiler ve haber medyası tarafından sağlanan enformasyon kullanılarak oluşturulan beklentiler. Bu seçeneklerden ilkinin tüketiciler açısından maliyeti daha yüksekken, ikincinin ise yanlı olma ihtimali bulunmaktadır. Simülasyon sonuçları, enformasyon sürtüşmeleri arttırıldıkça, tüketimin volatilitesinin ve gelire karşı aşırı duyarlılığının da yükseldiğini göstermektedir. Dolayısı ile, enformasyon kaynaklarının daha yanlı olması ve tüketiciler açısından tam enformasyon rasyonel beklentiler kurmanın daha maliyetli olmasının, gelişmekte olan ülkelerde görülen, gelişmiş ülkelerdekinden farklı tüketim dinamiklerini açıklayabileceği savunulmaktadır.

Anahtar Kelimeler: Tüketim, Sınırlı Rasyonellik, Beklentiler, Haber Medyası, Eksik Enformasyon

To My Parents

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CHAPTER 1

INTRODUCTION

The full information rational expectations model has been the main workhorse of the literature on theories of consumption. The model suggests that the consumers decide on their consumption plans by solving an intertemporal optimization problem. Consumers in this model are forward looking, and they have full information on the stochastic processes that may be involved in the optimization problem. Since the main mechanism behind the optimization behavior is based on equalizing expected marginal utilities, a resulting implication is that consumption should be smooth. However, it has frequently been reported that the dynamics of consumption show irregularities when analyzed within the framework of the full information rational expectations model. One well-known example is the difference of the volatility of consumption between the developed and the developing countries, where the latter prominently shows higher variance of consumption. Aside from its own volatility, another point of interest is the excess sensitivity of consumption to income, which also differs between the developed and the developing countries. The excess sensitivity of consumption to income, or to any other predictable variable, has been one of the major puzzles in the literature on theories of consumption.

The "high volatility" or "excess sensitivity" outcomes are basically derived from the implications of the full information rational expectations model, which has its roots in the permanent income hypothesis. The permanent income hypothesis suggests that the income of a consumer is composed of a transitory and a permanent component, and that consumption depends on the level of the permanent income rather than the transitory income. The stochastic implication of this framework is that under a certain set of assumptions, consumption will be smooth over the planning horizon of the consumer.

Thus, any change in consumption will be unpredictable. Since the optimal decision for the rational consumer is to equate the marginal utilities of consumption between two consecutive periods, the consumer uses all the information available regarding the stochastic process of income to form her expectations, and any predictable change in income should already be considered by the consumer when making a consumption plan towards the future. The level of consumption each period therefore, depends on the permanent income of the consumer. Accordingly consumption growth is affected only when the consumer obtains new information regarding her future income stream, i.e. only if there is an innovation in the information set of the consumer. The permanent income hypothesis implies that the transitory income should affect consumption only insofar as it affects permanent income. So, a consumption path that overly responds to the changes in predictable income is attributed with "excess sensitivity" and in such cases the variance of consumption relative to income is also higher than what is implied by the full information rational expectations model.

The literature mainly explains "high volatility" or "excess sensitivity" through theories that emphasize existence of liquidity constraints, precautionary savings or combinations of both[1]. Aside from these now standard approaches, a recent line of research highlights the existence of information frictions as a candidate for explaining such inconsistencies. This approach requires modifications to one of the core assumptions of the basic theory that the consumers continuously form rational expectations with full information.

The literature cites influential work that reports rejection of the hypothesis that individuals consistently form rational expectations[2]. The fact that individuals may form different types

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[1] The liquidity constraints explain the volatility of consumption through the inability of the consumers to adjust their asset stocks in the face of transitory income changes, generally specified as the inability of the consumers to borrow in the face of adverse transitory income realizations. The precautionary savings explanation refers to the saving behavior of the consumers that is solely due to the uncertainty associated with future income realizations, which acts like a "voluntary" liquidity constraint that the consumer imposes upon herself. See Deaton (1991) for an analysis of the effects of liquidity constraints and Carroll and Kimball (2006) for a review on precautionary savings.

[2] Conlisk (1996) reviews an extensive range of literature including empirical evidence on the boundedness of rationality. Tests on individuals underline the frequent use of heuristics, which cause bias and systematic errors in economic reasoning. Tests of unbounded rationality jointly with other hypotheses show that the assumption of unbounded rationality leads to inconsistencies in a broad

of expectations, use heuristics that decrease the cost of decision making or simply become inattentive and update their plans periodically (or discontinuously) all point towards a divergence from the standard assumption of full information rational expectations. Following these findings, models that introduce boundaries on rationality through imperfect information have been introduced when constructing the mechanisms of consumer behavior. This thesis is mainly influenced by such literature including the imperfect information model of Mankiw and Reis (2002), its direct application to consumption theory in Reis (2006), the model of rational inattentiveness of Sims (2003) and the incorporation of the imperfect information model with the news media in Carroll (2003). The imperfect information model suggests that in each period only a proportion of the consumers update their information, and the remaining fraction of consumers continue to use the expectations based on their former, latest updated expectations. Reis (2006) endogenizes the consumers' behavior of updating their information at intervals by assigning costs to making plans through rational expectations, so that along with their consumption plans, the consumers also choose when to plan next. Then, the consumers stay inattentive until the next planning period. Although their implications are similar, the model of rational inattentiveness differs from the imperfect information model that the core of the information frictions is the limited capacity of the consumers to process information, therefore lacking access to full information. The model proposed by Carroll (2003) builds on the assumption of imperfect information and suggests that the consumers obtain their information from news media and update their information sets with a certain probability at each period, and otherwise do not update their information sets and rely on their previous expectations.

Following the above mentioned literature on information frictions, this thesis attempts to elucidate the differences in the volatility of consumption between the developed and the developing countries by underlining the circumstances that the information frictions can be more pronounced in developing countries compared to the developed ones. To this end, the thesis proposes a model of imperfect information with a hybrid structure of expectations. The proposed model can then be used to explain the higher volatility of consumption in developing countries compared to developed ones, as reported in the

range of topics from consumer behavior to asset pricing or auctions and games, with predictions based on strong rationality assumptions often being rejected.

literature. The model proposes that consumers switch between two available options of expectation structures. One of these options is to obtain full information and form rational expectations, and the other option is to rely on the information provided by the news media and form expectations accordingly. The crucial part of this system that separates the two expectation structures is that the news media is assumed to be biased rather than simply providing the professional forecasts obtained through rational expectations, as is the case in Carroll (2003). Furthermore, there is an implicit cost associated with full information rational expectations which is higher than just using the information provided by the news media. As a result, the consumers' expectations switch between the two expectation structures through a backward-looking heuristic and decide on their consumption path accordingly. Under such set-up, both the bias in the news media and the costs associated with forming rational expectations establish the basis of the information frictions and separate the consumption behavior from that of the standard rational expectations model. Thus, the model can be employed to reflect different consumption behaviors in developing and developed countries through assuming different degrees of effectiveness of these frictions.

The simulation results suggest that the volatility of consumption increases with an increase in the degree of information frictions. Increasing costs of forming rational expectations and higher bias in the news media cause the expectations of the consumers to be more unstable relative to the standard rational expectations. Furthermore, as the expectation structures used by the consumers vary with the state of the economy, consumption also shows excess sensitivity to the changes in income. These findings suggest that information frictions may be used to explain the observation of higher volatility of consumption in the developing countries relative to the developed countries.

The specification of the information frictions in this thesis focuses on the characterization of the sources of information, aside from the behavior of the consumers. Instead of specifying the information frictions as exclusively arising from the behavior of the consumers, here the assumption is that the qualities of an information source may itself cause information frictions. The characteristics of the process of obtaining information become heavily influenced by the political and sociological environment of a country through the channel of media, which in turn affects the expectations and thus the behavior

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of the consumers. Therefore, an explicit specification of the sources of information can bring out the differences in the economic environments in which decision making takes place. With consumption being at the core of economic activity, such a framework underlines the relationship between the macroeconomic dynamics and the political and sociological characteristics of a country and thus provides a different perspective for the analysis of consumption behavior.

The organization of this thesis is as follows: In the section that follows, a brief literature review to cover the standard theories of consumption, discussions on bounded rationality, debates on alternative expectation structures along with information frictions and the effectiveness of news in the process of expectation formation and arguments for higher macroeconomic volatility in the developing countries is presented. The third section provides the motivation behind the framework employed in this thesis and gives a formal presentation of the model that underlies this work in comparison to the standard rational expectations model. In the fourth section I present the simulation results of the model. Finally, the fifth section concludes.

CHAPTER 2

LITERATURE REVIEW

2.1 On the Observation of Higher Macroeconomic Volatility in Emerging Market Economies

In a comparison of the dynamics of main macroeconomic variables between developed and developing countries, various studies have reported higher volatility for the latter. As an example, Loayza et al (2007) provide some general characteristics of such observed volatility, including that of consumption along with other variables. Furthermore, Neumeyer and Perri (2005) show that in addition to higher output volatility in emerging market economies, the ratio of the volatility of consumption to the volatility of income is greater than one. Another work by Aguiar and Gopinath (2007) focuses more on consumption and reports that consumption is significantly more volatile vis-à-vis income in developing countries compared to that of developed countries. The authors propose an explanation through a standard real business cycle model, in which the characteristics of the shocks differ substantially between the two groups of countries: developing countries face mostly trend shocks (hence the name of the article) while the same is not true for the developed countries, thus leading to a relatively higher consumption volatility in developing ones. Boz, Daude and Durdu (2008) build on this framework by also accounting for imperfect information, which helps to explain higher volatility for a wider range of cases. The assumption is that higher uncertainty in developing economies makes it difficult for the agents to perfectly distinguish between a transitory and a permanent shock. The work underlies the importance of perception by the agents, separately from the actual characteristics of a shock, in explaining volatility in those economies. From the perspective of consumption, imperfect information of consumers may account for the deviation of

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consumption patterns from those implied by the rational expectations permanent income hypothesis. To the extent that imperfect information is more pronounced in developing countries compared to the developed countries, the dynamics of consumption should differ proportionately between the two groups.

2.2 On Theories of Consumption and Alternative Expectation Structures

2.2.1 Consumption and the Permanent Income Hypothesis

Since its proposal by Friedman (1957) the permanent income hypothesis, along with the life-cycle theory of consumption of Modigliani (1986), has been the main workhorse of the literature on theories of consumption. Even though there have been reports of empirical contradictions with the theory, such findings contributed to the development of the theory as an eclectic one rather than being abandoned as invalid. The permanent income hypothesis suggests that income is composed of two components, mainly of a transitory and a permanent component. Consumers optimally try to smooth out their consumption throughout their planning horizon by adjusting their savings in the face of transitory income shocks, one immediate implication being that consumption should not respond fully to the changes in transitory income, as any shock would be smoothed out and affect consumption insofar as it alters the permanent income. In his famous paper, Hall (1978) shows that within the permanent income hypothesis framework, consumption should follow an AR(1) random walk process; meaning that consumption should not respond to any predictable changes in income. According to this result, consumption should only react to the innovations caused by new information that would alter the consumer's expectation regarding her future income stream. This result is commonly referred as the rational expectations permanent income hypothesis.

A significant number of works have reported excess sensitivity of consumption to the changes in income, as well as possible explanations for it.[3] As for the explanations, the main two probable causes prominent in the literature have been the existence of liquidity constraints and precautionary savings. The former can be represented by Deaton (1991) and Zeldes (1989) and refers to the inability of the consumer to smooth out her

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[3] An example of a test of excess sensitivity can be found in Flavin (1981) where the null of zero excess sensitivity is rejected.

consumption in the face of adverse income shocks (or an income level lower than her permanent income) if her ability to borrow is limited and does not hold or have access to savings. As for the latter, precautionary saving refers to the additional saving behavior that is directly caused by the perceived uncertainty regarding future income, hence the name precautionary saving (see Carroll and Kimball (2006) for a review).

2.2.2 On Bounded Rationality

So far in the discussions mentioned above, the consumers are assumed to form rational expectations with no informational frictions whatsoever. This suggests that in the forecasts of the consumers, or of any economic agent forming rational expectations for that matter, the error terms should be expected to be zero overall. In other words, an agent forming rational expectations with perfect information should not be making systematic errors. As stated by Lovell (1986), for full rationality the prediction error is required to be uncorrelated with any available information to the forecaster by the time the prediction is made. Although this seems to be an almost standard assumption in the consumption literature, there have been a number of studies that have reported anomalies as well. Conlisk (1996) provides a review of a wide range of experiments in which various assumptions and implications of unbounded rationality fail to hold, thus pointing to a possible existence of boundaries on rationality. The author underlines the fact that agents' forecasts are subject to systematic errors and that this may also be related with the conditions of the forecaster, for instance high costs associated with rational behavior. Heuristics/rules of thumb or adaptive behavior provide a less costly alternative for the agent in forming expectations, which at the same time lead to systematic errors and bias. Thus the way expectations are formed may have a crucial impact on the behavior of consumers. Souleles (2004) focuses directly on consumers and tests the implications of rational expectations using data obtained from Michigan Index of Consumer Sentiment on consumers' inflation forecasts and their expectations on other macroeconomic variables such as income growth. The author concludes that the expectations of consumers are biased –at least ex post- even though the sample period covered almost 20 years. Moreover, these errors were serially correlated as well as being correlated with the state of the economy and demographic characteristics of the households.

Even though direct applications to consumption behavior are scarce, a use of heuristics in the consumption literature without any references to information frictions can be found in Campbell and Mankiw (1990). The authors explore the existence of a proportion of consumers that use a "rule-of-thumb" when making consumption plans. Specifically, a proportion of consumers simply consume their current income rather than consuming their permanent income and thus diverge from the standard rational expectations behavior. Campbell and Mankiw (1991) find that the actual value of the proportion of the consumers, whose consumption behavior can be explained as following a rule-of-thumb decision rule, is found to be significantly different across six different countries with values ranging from 0.2 to almost 1. In another work by Chyi and Huang (1997), the value of the same proportion is found to be significantly higher in five East Asian countries when compared to the results on OECD countries. It should be noted that the findings regarding the existence of such a proportion may simply imply the existence of liquidity constraints rather than a voluntary rule-of-thumb behavior and thus should be approached with caution. Indeed, the finding that a higher proportion of consumers use a rule-of-thumb behavior is associated with less developed credit markets in the literature. However, both Chyi and Huang (1997) and Campbell and Mankiw (1991) report that the proportion of rule-of-thumb consumers does not decrease with an observed financial deregulation, thus making the use of heuristics in the context of bounded rationality a candidate for explaining the observations of rule-of-thumb behavior.

2.2.3 Alternative Expectation Structures

All these findings hint at the possibility of accounting for the existence of different expectations structures, either as a substitute or a complement to the standard rational expectations behavior. Lovell (1986) provides a brief survey of alternative structures of expectations broadly used in economics literature. These are namely Ferber's Law, adaptive expectations, "implicit" modelling of expectations and change underestimation. Comparisons of such different structures of expectations, however, seem to imply that the agents' expectation structures are unchanging through time, which may not necessarily be the case. Branch (2004) develops an empirical model in which economic agents switch the formation of their expectations throughout time depending on the relative performance of each type of expectation. Here the author assigns a "predictor function" that has its own

associated cost to each type of expectation structure. The results suggest that the agents optimally switch between these predictors depending on their recent performances (measured by their mean squared errors, vis-à-vis their costs). Another finding of the study is that the agents are somewhat predisposed to choose certain predictors over others.

Although much of the discussions about different forms of expectations concentrate on a "dichotomy" between adaptive and rational expectations, models of bounded rationality through imperfect information provide some middle ground. Coibion and Gorodnichenko (2010) review two prominent models of expectations with informational rigidities in contrast with the full information rational expectations hypothesis. The two models reviewed are "sticky Information" and "imperfect information" models. The former originates from Mankiw and Reis (2002) while Reis (2006) focuses especially on the implications of the framework on consumer behavior. The sticky information model of Mankiw and Reis (2002) assumes that agents are inattentive: in each period the representative agent obtains new information and updates her expectations only with a certain probability. When she does so, she is fully informed and can in fact, form rational expectations. However when the agent does not update her information, hence her expectations, she is assumed to form expectations on the basis of the past information set. In other words, with a certain probability the consumer updates her expectations based on new information, and with some other probability she does not update her information and stick to the last updated expectations she has formed from previous periods. As a result, forecast errors become correlated with this friction in obtaining new information.

The model of Mankiw and Reis (2002) can be presented more formally as follows:

At each period, agents update their expectations with probability λ and do not update and form their expectations depending on the previous period's forecast with probability $(1-\lambda)$. Time t forecast of the value of a variable in time $t+h$ is then given as:

$$F_t X_{t+h} = \lambda E_t X_{t+h} + (1 - \lambda) F_{t-1} X_{t+h} \qquad (2.1)$$

The first term on the right-hand side corresponds to the rational expectations:

$$E_t X_{t+h} = X_{t+h} + v_{t+h,t} \qquad (2.2)$$

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where $v_{t+h,t}$ is the error in rational expectations, uncorrelated with any current or past information.

When we rearrange the terms, we find that the forecast errors do have a predictable component, which arises from the friction in information:

$$X_{t+h} - F_t X_{t+h} = \frac{1-\lambda}{\lambda}\Delta F_t X_{t+h} + v_{t+h,t} \qquad (2.3)$$

The difference between the realized value in time *t+h* and its forecasted value in time *t* gives us the ex-post forecast error. The case where λ is equal to one corresponds to full information rational expectations as the agent updates information at each period with probability one. In other cases where λ<1, the first term on the right-hand side does not become zero, and creates the predictable component of the forecast error which is proportionate with the degree of stickiness.

In his work regarding the implications for consumer behavior, Reis (2006) endogenizes this behavior through consumer optimization rather than assuming it, by assigning a cost in obtaining new information.

The imperfect information models on the other hand can be represented by the works of Sims (2003) or Woodford (2003) and their conclusions are also similar to that of "sticky information" models. The main difference in this setting is that the consumers update their information sets each period, however, under "imperfect information" setting, they do not observe their current state completely but rather receive a signal about the state that may be subject to noise. Expectations are then formed through a Kalman filter, in which both the received signal and previous forecasts are weighted in order to produce the current forecast. Whenever the signal is not fully informative of the current state, there occurs an informational friction similar to the case of the "sticky information" model. Thus, the forecast errors include a term that follows from the weight of new information with respect to the previous forecasts in updating expectations.

More formally, suppose that the variable *X* follows an AR(1) process,

$$X_t = \rho X_{t-1} + v_t \qquad (2.4)$$

The agents cannot observe X directly, but they receive a signal on the state of X, which is subject to noise:

$$X_t^i = X_t + w_t^i \qquad (2.5)$$

Where X_t^i is the signal observed by agent *i*, and w_t^i is the noise in agent i's observed signal. The signal may include private as well as public components, which may or may not be correlated among agents.

The agents then form expectations through a Kalman filter:

$$F_t^i X_t = G X_t^i + (1 - G) F_{t-1}^i X_t \qquad (2.6)$$

Here *G* is Kalman gain, which denotes the weight placed on the new signal by the agent (in the absence of noise, the signal perfectly resembles the state and G becomes 1). Note that the agents cannot fully observe the current state of X, so that the equation above describes the agents' "forecast" of the current state. For the forecast of future periods, following from the process of X we have:

$$F_t^i X_{t+h} = \rho^h F_t^i X_t \qquad (2.7)$$

Similar to the sticky information model, rearranging the terms gives:

$$X_{t+h} - F_t X_{t+h} = \frac{1 - G}{G} \Delta F_t X_{t+h} + \varepsilon_{t+h,t} \qquad (2.8)$$

Where $\varepsilon_{t+h,t}$ is the rational expectations error. This time the first term on the right-hand side denotes the predictable component of the ex-post forecast error arising from the information frictions.

2.2.4 News and Expectation Formation

One of the main references in this thesis is Carroll (2003). Carroll directly follows the above studies on sticky information models. He presents a model in which the consumers obtain their information regarding the state of the economy from the news media. Here the media is assumed to provide the views of professional forecasters who have rational expectations, and the consumers believe that the forecasts presented by the news are more accurate than their own forecasts. As a result, the agents adopt the forecasts of the news as their

own expectations. Finally, the consumers are also inattentive in the sense that they do not continuously pay attention to the media and update their expectations each period. Those who do not update their information continue to depend on their previous expectations, as is the case with sticky information models.

Originally Carroll examines the forecasts on inflation, therefore the variable of interest here is the inflation rate between time t and *t+h*, denoted as $\pi_{t,t+h}$. Similar to the presentation of sticky information models, the formation of expectations is as follows:

$$M_t[\pi_{t,t+h}] = \lambda N_t[\pi_{t,t+h}] + (1-\lambda)M_{t-1}[\pi_{t,t+h}] \qquad (2.9)$$

Where M_t is the population-mean value of expectations at time t regarding inflation and N_t is the time t forecast of the news (assumed as representing the rational expectations of professional forecasters). Therefore each period a fraction λ of agents absorb the information provided by the news, while the rest continue to have their expectations from the previous period.

While the assumption that the news reflect only the rationally formed professional forecasts may be strong (which I will discuss in the next section), the effect of the news media on consumer sentiment and behavior through both the aforementioned channel and some additional channels have also been reported by other works. Doms and Morin (2004) focus directly on the effect of news media on consumer sentiment and identify three channels that affect consumers. The first of these is through the supply of professional forecasts as also mentioned by Carroll. The second channel is through the tone of the media, as in the way the news are presented to the consumers, which may affect their sentiment separately. Finally the media is found to affect consumer sentiment through the volume of the news provided. Furthermore, the authors identify periods in which the news were not in line with the actual state of the economy and thus affected consumer sentiment. In a complementing paper, De Boef and Kellstedt (2004) show that the consumer sentiment may have political origins as well as the commonly examined economic roots. The authors find that after controlling for the state of the economy, news coverage and politics still significantly influence the consumer sentiment. Moreover, this effect can only last in the short run if it is detached from the actual state of the economy. In

other words, inconsistent rhetoric cannot continuously and independently influence consumer sentiment.

CHAPTER 3

THE MODEL

3.1 The Standard Rational Expectations Model

Before discussing the model proposed in this thesis, I will first review the standard rational expectations model as a benchmark. In this set-up, the consumer has full information regarding the stochastic process that is income, and there are no costs or frictions in obtaining such information. The representative agent solves an intertemporal optimization problem given her budget constraint in order to produce the sequence of choices on consumption and saving.

The problem of the representative agent can be given as follows:

$$max_{c_t} E_t \sum_{t=0}^{\infty} \beta^t u(c_t) \qquad (3.1)$$

$$c_t + \frac{a_{t+1}}{(1+r)} \leq y_t + a_t \qquad (3.2)$$

$$c_t \geq 0 \qquad (3.3)$$

$$a_{t+1} \geq -\alpha \qquad (3.4)$$

$$a_0 \ given$$

Here the consumer maximizes her utility throughout the planning horizon by the choice of values for consumption, which is denoted by "c". The asset stock of the consumer is given

by "a", which can take negative values if the consumer is borrowing, and cannot fall beyond a certain level dictated by the parameter "α", the borrowing limit. "β" is the discount factor, "r" is the rate of return on the stock of assets and "y" denotes the income of the representative agent, and it is a stochastic process which does not have to assume a specific form at this point. At each period the consumer observes her current income, thus involving it in her information set. From that point onwards the uncertainty is regarding the future values of income, which in turn affects future consumption and saving/borrowing choices. The expectation over the future values of income is based on the true stochastic process of the income, with any forecast errors being uncorrelated and having an expectation of zero. This means that the consumer has full information on the process and takes her expectation with no bias whatsoever.

The rate of return on assets is commonly denoted by $R = (1 + r)$ and assumed to be equal to be equal to $1/β$, such that $Rβ = 1$. Aside from its algebraic simplicity, this assumption implies that the cost of waiting an extra period for consumption (the impatience of the consumer) is equal to the benefit of doing so (the rate of return). Therefore, consumption does not assume an increasing or decreasing trend over time. Finally, this assumption leads us to Hall (1978)'s finding that consumption follows a random walk process[4]:

$$C_t = C_{t-1} + \varepsilon_t \qquad\qquad (3.5)$$

or

$$\Delta C_t = \varepsilon_t \qquad\qquad (3.5')$$

where ε_t is the disturbance term.

Therefore, consumption should not depend on any predictable changes in any other variables as the rational consumer would already have included such information in her consumption plan through her expectations. The only change in consumption occurs due to unpredictable innovations in the consumer's information set regarding her future income stream.

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[4] The derivation of this result can be found in the Appendix.

3.2 Model with Expectation Switching

The decision making process of the consumer as defined in the standard rational expectations model is based on the assumption that the consumer is able to obtain full information about the stochastic process that introduces uncertainty in the problem, which is income in this case. In the literature review section I have provided examples where alterations to this assumption is made under a body of work that introduces information frictions to explain individual behavior that is at odds with what the standard theory suggests. Such frictions enter the model through the expectations formed by the consumers. Since expectations play a leading role in the determination of the permanent income by the consumer, they also play as crucial a role in the results of the individual's intertemporal optimization problem. Even though the basic behavior of the consumer may be to attempt to smooth out consumption over the planning horizon, the information set of the consumer defines the framework in which such planning is executed. The way the consumers update their information sets, as well as the sources employed by the consumer to do so, therefore change the consumption pattern of the consumer, including its sensitivity to income.

Even though imperfect information has been a subject of interest in the literature, the peculiar characteristics of the sources that the individuals use to update their information sets have not received much attention. One such source that the consumers rely on to obtain information is obviously the news media. The news media is often assumed to be a neutral medium through which the reality is transferred to the receivers without any narration or commentary, and therefore seen as a mere rational expectations transmitter. However, as discussed in Section 2, an implication of the discussions stemming from the literature is that the news media has a power of influence which can, to a certain extent, be autonomous. In other words, the news media does have a room for maneuver in manipulating the receiving end through both its content and its storytelling. This characteristic of the news media may therefore result in a supply of information and manipulation of consumers' expectations in a way that can diverge from the outcome of rational expectations.

The motivation of this study stems from this important implication and sets the departure of the model constructed in this thesis from the standard rational expectations model.

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Different from the approach of Carroll (2003), here I will assume that the news media may itself be a source of bias and affect consumers' expectations about the state of the economy accordingly.

The problem of the representative household in the model with expectations switching is given as:

$$max_{c_t} E_t \sum_{t=0}^{\infty} \beta^t u(c_t) \tag{3.6}$$

$$c_t + \frac{a_{t+1}}{(1+r)} \leq y_t + a_t \tag{3.7}$$

$$c_t \geq 0 \tag{3.8}$$

$$a_{t+1} \geq -\alpha \tag{3.9}$$

$$E_t y_{t+1} = \lambda_t RE_t + (1 - \lambda_t)NM_t \tag{3.10}$$

$$\begin{cases} \lambda_t = 1 \ if \ |NM_t - y_t| \geq \phi \\ \lambda_t = 0 \ if \ otherwise \end{cases} \tag{3.11}$$

$$y \sim iid$$
$$a_0 \ given$$
$$NM_t \ given \ \forall \ t$$

where the variable "c" denotes consumption, "a" denotes the asset stock held by the consumer (debt stock if negative), "y" denotes income which follows an iid process[5] and α is an exogenous borrowing limit for the consumer. The utility function is taken as quadratic. RE denotes the outcome of rational expectations using the true probability distribution of income, and NM denotes the target level of income set by the news media, which is exogenously given. λ shows which expectation structure is chosen by the consumer at each period and is determined by a decision rule derived by comparing the previous period's

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[5] The case where income follows an AR(1) process is also analyzed in Section 4.2.

consumption with the target set by the news media. ϕ is the parameter that determines the threshold in the decision rule.

The model setup above implies that, when we are interested in a relationship of communication, we in fact have –at least- two parties to be examined: the senders of the messages/signals on the one end, and the receiving party that is supposed to decode the messages on the other. The former role is assumed by the news media in this case, while the latter is evidently the consumers. The specification of each will be handled separately.

Let us first consider the "sender" party, the news media. The media is assumed to provide information on the only stochastic variable in the model, which is income. A major assumption regarding the characteristics of the news media for the developing countries is that there is a considerable probability that we take the media as a single and a whole entity. What this assumption means is that we do not have different and possibly conflicting perspectives within the media as competing for influence but rather the media is assumed to represent a uniform perspective and supply narrative accordingly. Above and beyond being a simplification, this assumption underlies an important distinction between the developing and the developed countries. Even though the direction of causality may be debated, many works suggest that there is a positive relationship between the freedom of press and several measures of development (see for instance Alam and Shah (2013); Pal, Dutta and Roy (2011), Guseva et al. (2008)). One may therefore expect to find a distinctively more homogeneous structure of media in the developing countries where the freedom of press is lower compared to the developed countries. Likewise, other differences that stem from institutional and political qualities and their effects on economic development have caught the attention of the "institutionalists" and can be used to compare the developed and the developing countries in terms of transparency[6]. Such differences between the developed and the developing countries can also be seen as causes for a relative lack of accurate and available information in the latter. Consequently, in my model the influence of the media in the developing countries is modelled as directing the audience towards a certain expectation of future values of income. With the actual

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[6] A representative of an institutionalist approach in economics can be given as Acemoglu et al. (2005) while a broad review and discussion on the issue of transparency can be found in Bellver and Kaufmann (2005).

semantic properties of the communication process being out of the scope of this work, I assume that the news media exogenously provides a reflection of the economic environment (which may not necessarily be accurate) and build its narrative so as to lead the receivers, or more directly consumers, towards an expectation of a certain level of income. In practice, following from the properties that have been outlined regarding the conditions of the news media in developing countries, one would expect the bias in the information provided by the news media to be upwards. This means that the media would primarily influence the consumers in a way that periods with high income would be perceived as "the new standard" and periods with low income would be reflected as "transitory". In fewer words, we would expect the media to promote the expectation of a higher "permanent" income. For simplicity, I will take the behavior of the news media to be static (in that the news media exogenously builds around the same level of income throughout the planning horizon of the consumer).

On the other end of the line of communication, we have the consumers as the protagonists of the model to be presented. As mentioned before, the major difference on the part of the consumers in this model is that the consumers do not constantly form rational expectations with full information. Much like the idea of switching expectations reported by Branch (2004), here in each period the consumer will be switching between two possible types of expectation formation dependent on the state in that period, hence the name "expectation switching". More precisely, with no prior knowledge on whether the information of the news media is biased or not, in each period the consumer has two options: forming rational expectations and forming expectations through the news media. Before moving on to the switching mechanism, let us pause for a moment to discuss these two options for expectation formation.

The first option for the consumer, which we will allow to be chosen most of the time, is to rely on the information provided by the news media. As mentioned when discussing the characteristics of the "sender", the news media is assumed to build rhetoric around a certain level of the state of income, which we can refer to as the "targeted" level of income. Whenever the consumer forms expectations through this structure, the expectations of the consumer regarding her income in the future periods will be equal to this target level set by the news media. Formation of expectations through this structure is an absolute substitute

for rational expectations; the consumer does not form expectations as a combination of both, but absolutely adapts the expectations implied by the news. A combination of both would require the consumer to first obtain the outcome of the full information rational expectations, which would in turn render the need for the possibly biased information provided by the news media void.

The specifics of the option of using full information rational expectations follow directly from the above discussion. The fact that consumers switch expectation structures (as reported in Branch (2004)) suggests that there are costs involved in choosing any of these structures. For the consumer to be relying on the information of the news media instead of forming rational expectations, there must be an implicit cost of forming rational expectations vis-à-vis the news media, since rational expectations is always unbiased and relatively more efficient. In Reis (2006) such information costs are explicitly defined and integrated into the intertemporal optimization problem of the consumer, which ultimately makes the consumer inattentive (the consumer does not make a consumption plan each period and stays "inattentive" between planning periods). In our case, rather than being inattentive, the consumer has the alternative of obtaining information through the news media at a lower cost. A major difference here is that I do not define the costs explicitly in this model. Defining such costs and including them in the forward-looking optimization behavior of the consumer would ultimately mean that the consumer has to solve a much more complex problem of discrete choice regarding the expectation structures, which would be costlier than simply choosing rational expectations from the very beginning. Furthermore, in such a comparison the consumer would need to assess the probability that the news will be biased in the future, and with a fixed target of the news media, rationally doing so requires the consumer to know the true probability distribution of the income process, of which the consumer is trying to obtain information in the first place. The costs are thus included in an implicit way through the switching mechanism.

The mechanism by which the consumers switch their expectations depends on a heuristic that represents both the costs and the finding of Branch (2004) that the consumers are predisposed to choose a certain expectation structure over another. At the beginning of each period, the consumer first observes the realization of her income. This observation is then compared to the target level of income of the news media around which the rhetoric

is built. Whenever the absolute gap between the observed income and the expectation of income adapted from the news media exceeds a certain value, the consumer switches her expectations from the news media to the rational expectations. This value of the gap, which may be interpreted as a threshold for the consumer's preferred expectation structure, represents the costs of forming rational expectations. If the formation of rational expectations is costlier, the consumers will be more predisposed to form expectations through the news media, which defines a higher threshold for the switching mechanism. This threshold can be affected by the overall difficulty of obtaining information on the side of the consumers. Aside from the institutional qualities that we have discussed in the previous sections, another point which distinguishes developing countries from the developed ones can be seen as the level of education. Forming rational expectations outside the information provided by the news media requires the individual both to obtain information through other sources and make forecasts based on individual skills and knowledge, which are directly related to the qualities of human capital, primarily set by the level of education. Lower education levels can be seen to lead to higher costs of obtaining rational expectations and vice versa.

To sum up, there are basically two channels through which the possibly biased information of the news media affects the expectations of the consumers in the developing countries. First of these is the actual magnitude of bias in the news media which arises from lower freedom of press and higher homogeneity of media in the developing country. The second channel operates through the costs of forming rational expectations (as the cost of the alternative to the possibly biased information), which is higher in the developing country due to lower education levels and overall human capital as well as lower institutional qualities in terms of making access to accurate information more difficult. As obtaining information through the news media is assumed to be less costly, the consumer is predisposed to form expectations through the news media. Whenever the gap between the actual level of income and the level of income implied by the news exceeds the switching threshold in magnitude, the consumer switches her expectation structure and forms rational expectations.

CHAPTER 4

SIMULATION RESULTS

In this chapter, the results of the simulations covering both the standard rational expectations and the switching expectations models are presented. The first section of this chapter presents the results with an independent and identically distributed (iid) income process. The results are based on three different simulations differing from each other by the value of the cost parameter ɸ, which denotes the threshold for the consumer to switch expectations. In the second section the same three simulations are carried out using an autoregressive - AR(1) income process.

4.1 Income Process*: iid*

This section is comprised of three parts: In the first part the numerical values chosen for the parameters as well as other specifications regarding the simulation are presented. In the second part I examine the differences in consumers' behavior in each of the models by taking a sub-period of the whole simulation horizon. So, I explain the mechanisms behind the consumption/saving choices of the consumers as well as their expectations in detail. In the last part of this section the results on the whole simulation horizon are presented with a focus on the relative volatilities of the variables.

4.1.1 Specifications

In all three simulations that follow in this section, the specifications for the parameters are the same except the cost variable ɸ, which is used to control the degree of information rigidity in each of the simulations. The numerical specifications are as follows:

The asset stock "a" can take any integer value between -1000 and 1000. Note that a negative asset stock implies debt stock, and a positive asset stock denotes the accumulated

(positive) savings of the consumer. The set of all possible values for the asset stock must be bounded from below to ensure that the consumer is not able to borrow infinitely. The reason that it is also bounded from above is technical, and the limit is chosen to ensure that practically there is no constraint on savings in the simulations. Whether it is debt or savings, the asset stock of the consumer is subject to returns. The return rate on the asset stock for the consumer, "r", is set to be 0.01. I follow the standard assumption in the literature that $R\beta=1$ where $R=(1+r)$ and β is the discount factor . This assumption ensures that the consumption path does not intrinsically include an increasing or decreasing trend, as the condition derived from the Euler equation becomes that of simply equalizing the marginal utilities of consumption between consecutive periods (see Appendix A). Under this assumption, the choice of "r" affects only the "levels" of asset stock and consumption and not the optimal choice of the consumer and therefore chosen in an arbitrary manner.

Another state variable in the simulations is income. Income is assumed to have five possible states and follow an iid process[7]. The values of each of these states are ranged from 10 to 30 with 5 unit margins, with the median being 20 units. The probabilities associated with each of these states is (from low to high) [0.05 0.05 0.80 0.05 0.05]. Therefore one can verify that the median value is also the outcome of the income expectation using the given invariant probability vector. The reason for this kind of a specification is to allow for high, medium and low level ranges for the possible realizations of income while also including intermediary levels to clarify the effects of changing the cost parameter on expectations.

The rational expectations and expectations through the news media are based on the probability vector of the true income process and the news media's implied probability vector respectively. The former is simply the probability vector we have discussed above. For the latter, I assume that the income level implied by the news media is fixed, and is equal to the second highest level of income in the income state vector (which corresponds to 25 units). In other words, the consumer uses the probability vector [0 1 0 0 0] when forming expectations through the news media.

Finally, all three simulations are carried out for 1000 periods to approximate infinite horizon, and after being generated randomly, the income process is fixed among these

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[7] Following Aguiar and Gopinath (2007) and Coibion and Gorodnichenko (2010), the case where the income process is AR(1) is analyzed in Section 4.2.

simulations. The simulations differ from each other by the value of the cost parameter ф. Remember that ф shows the threshold for the difference between the realization of income and the income level implied by the news media. Whenever the gap between these two levels is equal to or higher than ф, the consumer switches to using rational expectations:

$$E_t y_{t+1} = \lambda_t \, RE_t + (1 - \lambda_t) NM_t \qquad (3.10)$$

$$\begin{cases} \lambda_t = 1 \; if \; |NM_t - y_t| \geq ф \\ \lambda_t = 0 \; if \; otherwise \end{cases} \qquad (3.11)$$

Therefore, ф=0 corresponds to the case where the consumer always forms rational expectations, (since for ф=0, λ_t=0 ∀ t) and it is chosen as the first of the three simulations to represent the standard rational expectations case.

Note that from the specifications of the income vector in the iid case, the gap between two different income states cannot be less than 5 units. Therefore if ф is specified to take a value between 0 and 5, the consumer forms expectations through the news media only when the actual level of income is exactly equal to the one implied by the news media (i.e. the consumer forms expectations through the news media in only 1 of the 5 possible income states). Ultimately, the rule in equation (21) becomes:

$$\begin{cases} \lambda_t = 0 \; if \; y_t = 25 \\ \lambda_t = 1 \; if \; otherwise \end{cases} \qquad (4.1)$$

This specification therefore constitutes the second case. Lastly for the third case, I specify ф as a value between 5 and 10 so that the consumer forms expectations through the news media whenever the difference between the realized level of income and the level implied by the news media is less than or equal to 5 units in absolute value (i.e. the consumer forms expectations through the news media in 3 of the possible income states). In this case the rule in equation (21) becomes:

$$\begin{cases} \lambda_t = 0 \; if \; 20 \leq y_t \leq 30 \\ \lambda_t = 1 \; if \; otherwise \end{cases} \qquad (4.2)$$

4.1.2 Mechanics of Consumer Behavior

Before moving on to the results for the whole simulation horizon, in this section I provide an examination on the differences in the consumer behavior across different simulations. This part is therefore based on a sub-period from the whole simulation horizon in order to see the characteristics of each simulation. For this purpose, I choose the first 100 periods as the sub-period to be examined. As mentioned before, the income state is randomly generated and fixed across the simulations with ϕ being the only changing variable.

In the first case I set ϕ to be equal to zero, which corresponds to the standard rational expectations model. Figure 1 and Figure 2 show the paths of consumption and asset stock respectively.
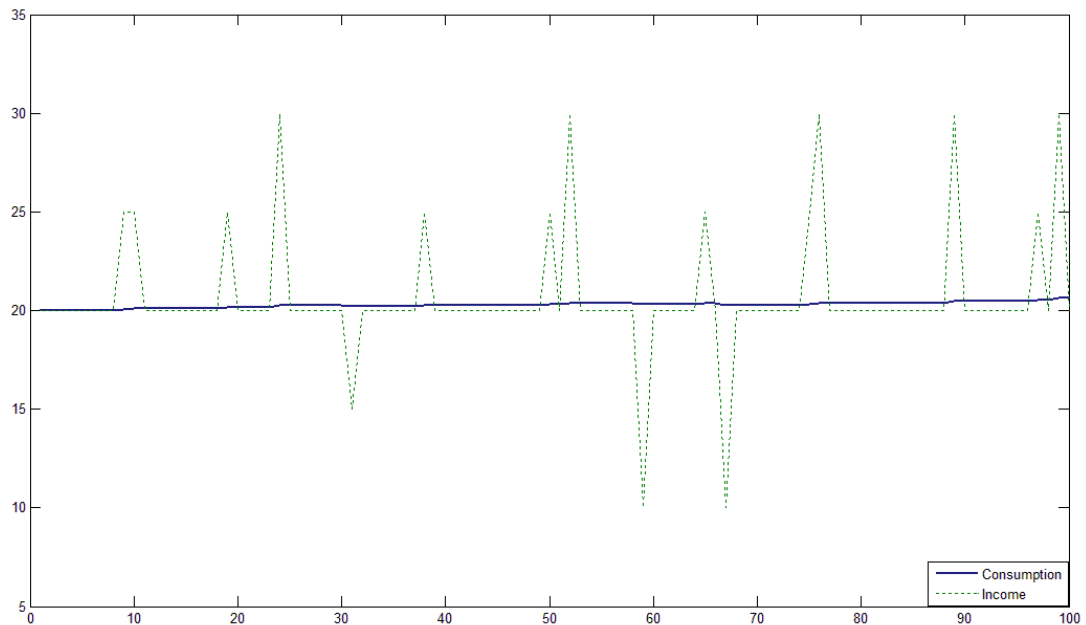

Figure 1: The Path of Consumption with ϕ=0.

One of the main implications of the standard rational expectations consumption model is that consumers smooth out their consumption over time, and consumption changes only if there is an innovation in the consumer's information set regarding her future stream of income (i.e. there is a change in the consumer's perception of her permanent income). As

can be seen in Figure 1, consumption is smooth across the simulation period and does not respond one-to-one to any changes in the transitory income level as such changes are accounted for by the consumer through expectations. Finally, one can observe that consumption is slightly increasing throughout the period. Even though we have the assumption that Rβ=1, the frequency of higher income levels in this particular sub-period leads towards an asset accumulation as is apparent from Figure 2 and through the returns on the asset stock, the consumer is able to consume at higher levels than her income.
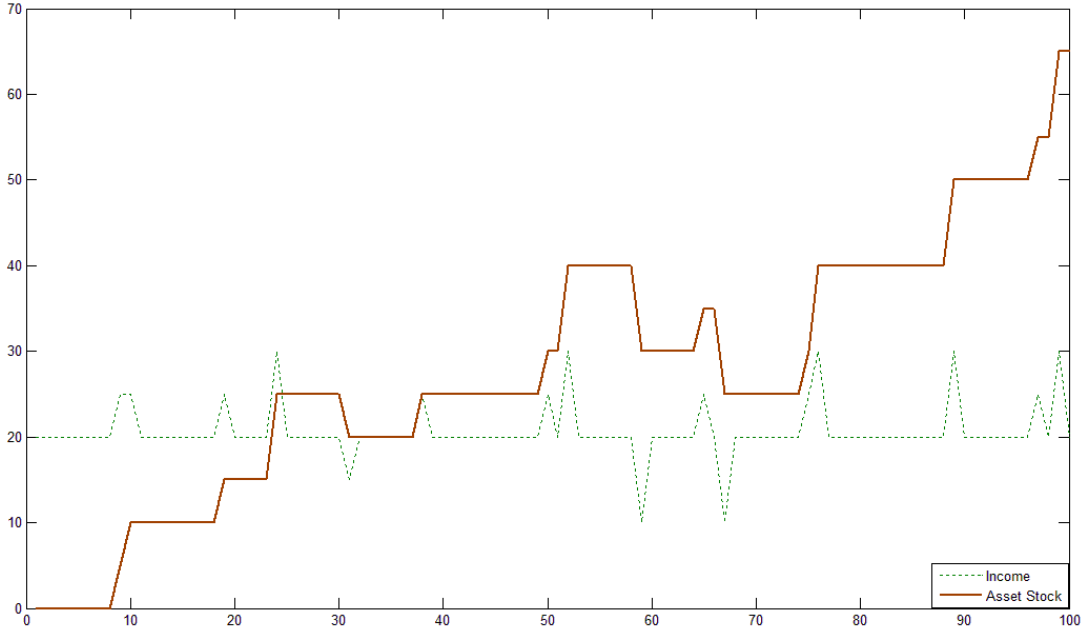

Figure 2: The Path of Asset Stock with ф=0.

From Figure 2 we can see that the consumer's main response to the changes in transitory income is through changes in her asset stock. The optimal behavior of the consumer is to smooth out consumption across periods and consume at a level determined by the permanent income. This is achieved by keeping consumption steady while accumulating assets whenever the transitory income is higher than the consumer's expected income, and likewise de-cumulating assets whenever the transitory income is lower than the consumer's expectation. In the simulation the consumer is aware of the true probabilities of each income realization and the expected value is 20 units. When the realized value of income is

equal to the expected value there is no asset accumulation. Thus, in periods where transitory income is higher than the expected value of income the consumer accumulates assets.

In our second case I set φ to take a value between 0 and 5. A positive value for this parameter indicates that the consumer now switches between expectations whenever the gap between the realized income level and the income level implied by the news media is higher than the value assigned to the parameter. Figure 3 and Figure 4 show the paths of consumption and asset stock in this case.
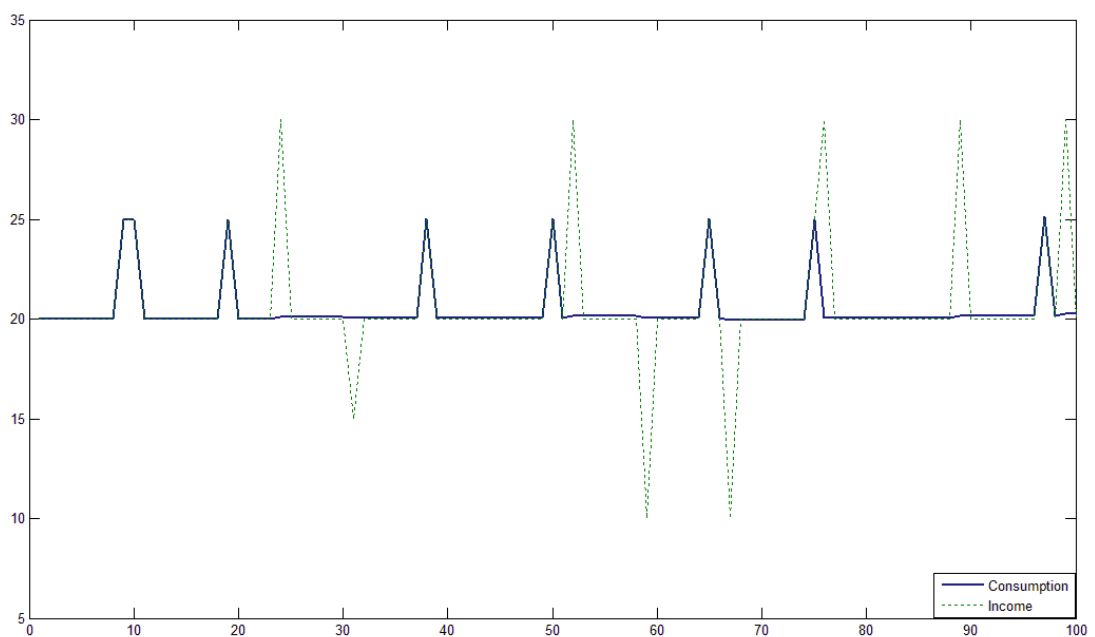

Figure 3: The Path of Consumption with 0 < φ ≤ 5.

From Figure 3 it can be seen that the consumption path of the consumer is remarkably different than its counterpart in the standard rational expectations model (Figure 1). As discussed before, the level of consumption depends on the consumer's perception of permanent income and changes only when there is an innovation in the consumer's information set. With a value of φ above zero however, the consumer switches her expectations; thus creating a different expectation of future income stream, which in turn

determines the consumer's perception of permanent income. Since ф is also below 5, the smallest possible difference between any two income realizations in the simulation, the consumer switches expectations only whenever the realized income level is exactly equal to that implied by the news media. As we have established the fixed level of news media expectation as 25 units, the consumer uses the news media expectation in periods where the actual income level is equal to 25 units. As a result of the change in expectations towards a higher permanent income, the consumer increases the level of her consumption in these periods. In all other periods the consumer uses standard rational expectations and sets her consumption accordingly.
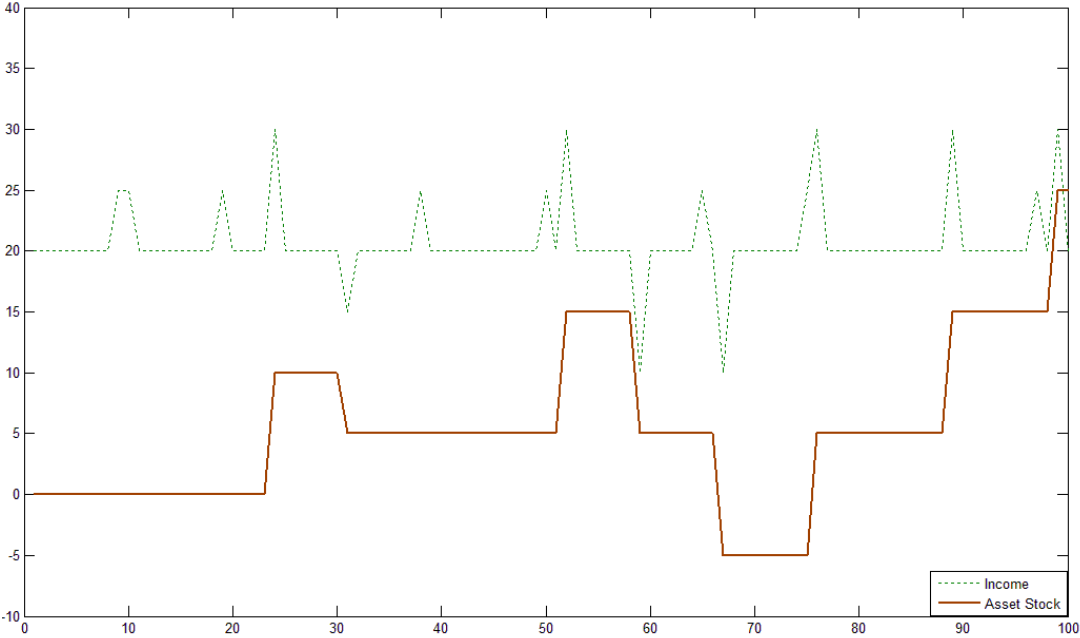

Figure 4: The Path of Asset Stock with 0 < ф ≤ 5.

Figure 4 illustrates that the asset stock also follows a distinctive path from that of standard rational expectations case. The behavior of smoothing consumption through adjusting assets in periods where transitory income is different than that of the expected permanent income is still observed here. The source of the difference is once again the changed expectations of permanent income. The expected value of income under rational expectations is 20 units, while the expected value of income under the news media

expectations is 25 units and the consumer switches expectations from rational to news media oriented whenever the transitory income becomes 25 units. This means that in both periods where transitory income is equal to 25 and periods where transitory income is equal to 20, due to different expectations in both periods, the transitory income is equal to the expectation of future income values. Therefore unlike the case of standard rational expectations, the consumer does not accumulate assets when income increases to 25 units. Since the consumer uses rational expectations whenever the actual level of income is different than the level implied by the news media; in periods where income is lower than 20 units, the consumer de-cumulates assets and in periods where income is greater than 25 units, the consumer accumulates assets.

The third and the final case that will be examined is where ϕ is set to take a value between 5 and 10. In this case the consumer uses different expectation structures depending on whether the difference between the actual level of income and the income level implied by the news media is lower than 10 or not. Figure 5 and Figure 6 show the results of this case for consumption and asset stock.
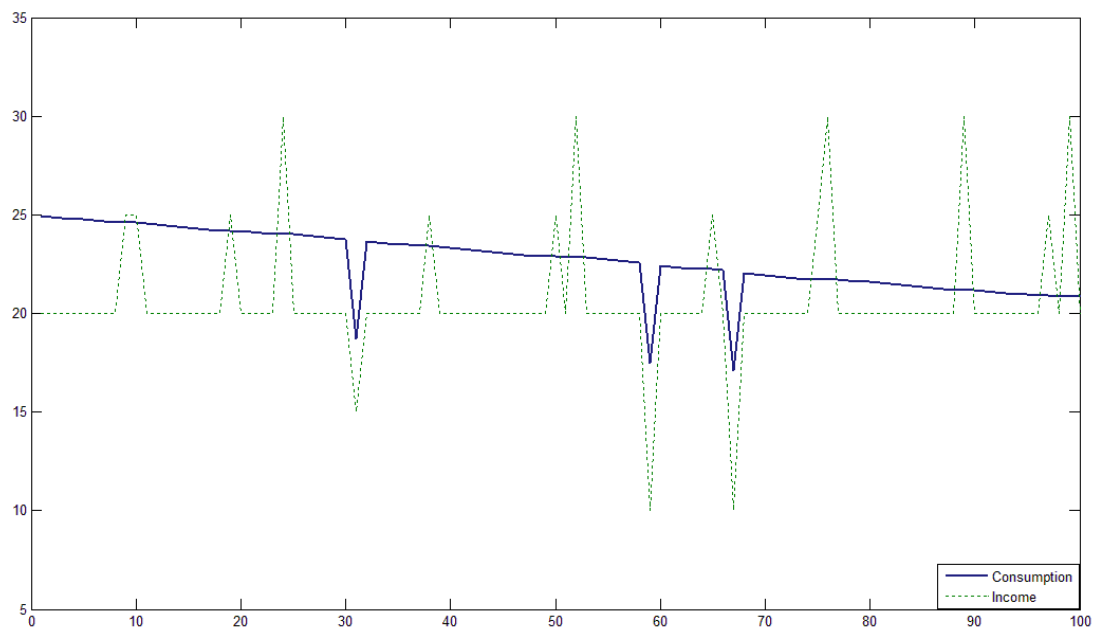

Figure 5: The Path of Consumption with 5 < ϕ ≤ 10.

The major difference of this case from the previous one is that the consumer now forms expectations through the news media whenever the gap between the realized level of income and the income level implied by the news media is not greater than or equal to 10 units in absolute value. In other words, the threshold for the consumer to switch expectations is set in a way that the consumer allows for some deviations of actual income around the level implied by the news media when assessing the performance of news media expectations. As a result, the consumer uses rational expectations only when the actual level of income is below 20 units (as the threshold is exceeded when the actual income level is 15 units or less). The level of consumption is then set in a way consistent with the expectation of future income. In periods where the transitory income is between 20 units and 30 units there is no change in expectations, which results in a relatively smooth consumption path in these periods. Whenever the transitory income is lower than 20 units, the consumer switches to rational expectations, and adjusts her consumption in a way consistent with the perceived permanent income through rational expectations. Another point to note from Figure 5 is that consumption is overall decreasing throughout the simulation sub-period, which is the opposite of what is observed in Figure 1. This is again due to the changes in the asset stock as presented in Figure 6, where the returns on negative asset stock (debt stock) decreases the resources available for the consumer to allocate for consumption. In the first simulation the consumer is able to consume at a higher level than her income because she holds a positive asset stock, on which she obtains returns. The consumer can therefore allocate these returns for consumption. In the case of the third simulation however, the consumer holds a debt stock, which means the returns are negative. The consumer needs to allocate a certain fraction of her income to the cost of borrowing, i.e. the payment of her debt. This decreases the resources the consumer can use for consumption. Remember also that the consumption path is generated through the optimization rule of the consumer, which depends on the Euler equation. The consumer therefore aims to equalize the expected values of her marginal utility across two consecutive periods. This behavior prevents the consumer from changing her consumption radically in a single period by over-borrowing. As a result the consumption path does not show sharp decreases but instead decreases steadily.
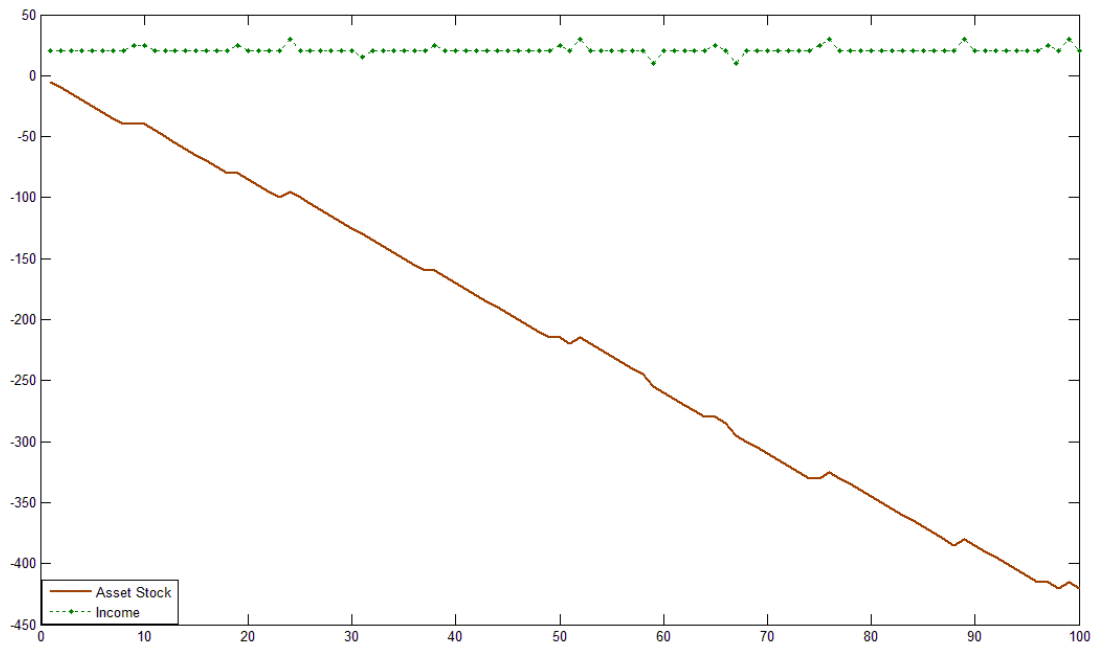
Figure 6: The Path of Asset Stock with 5 < φ ≤ 10.

Figure 6 clearly indicates that the path of asset stock is radically different in this case. Assets are accumulated whenever transitory income is greater than the permanent income, and de-cumulated whenever it is lower. In this case there is only one income level in which the transitory income is greater than the expected value of future income, which is the level where income is equal to 30 units (at this level the consumer is using news media expectations, which has an expected value of 25 units for future income). Assets are unchanging whenever transitory income is equal to 25 units as the transitory income equals permanent income at this level. Assets are de-cumulating whenever transitory income is less than 20 units as for both rational expectations and news media expectations, the transitory income becomes lower than the permanent income. In short, due to the probabilities associated with each realization of income and the response of the consumer in these outcomes, the consumer can be expected to de-cumulate assets almost 90% of the time. This results in an accumulation of debt stock until the consumer reaches the borrowing constraint, which becomes apparent in the results for the whole simulation horizon.

4.1.3 Analyzing the Overall Simulation Horizon

The results of the three simulations for the whole simulation horizon are presented in this section[8]. While explaining the mechanics behind the differences of consumer behavior among these simulations, the previous section has provided some preliminary intuition on the issue of volatility. We have seen that the consumption patterns change towards bearing a more pronounced response to the changes in income as we increase the value of the cost parameter ϕ that defines the expectation switching threshold for the consumer. In the tables below I examine how these changes in consumption behavior translate into the time series characteristics of the variables of the model. The graphs for the overall simulation horizon as well as the plots of the respective value functions can be found in the Appendix.

When discussing the possible effectiveness of the switching expectations model in explaining higher consumption volatility in the developing countries, two channels at work are mentioned. The first channel is the overall existence of bias in the news media, which I have anchored from the beginning by setting the income level implied by the news media as different from the outcome of rational expectations. The second channel is through the parameter ϕ which I have associated with the cost of forming rational expectations, defining the predisposition of the consumer to rely on the information provided by the news media. Aiming to explain higher consumption volatility through these channels necessitates findings that show increasing volatility that accompany the increasing effectiveness of these channels. Table 1 shows that the findings of the simulations are consistent with this condition, with "C" denoting consumption and "Y" denoting income. The first row of Table 1 presents the variance of consumption choices of the consumer throughout each simulation. All else being equal, the variance of consumption increases with an increase in the cost parameter ϕ, which with the specifications of my model may imply that the volatility of consumption is higher on its own in the developing countries where the cost of forming rational expectations is higher and the consumers are more predisposed to form expectations through the news media, compared to their counterparts in the developed countries. The second row shows the variance of income, which is the same in all three of the simulations as after being generated randomly, the income process is then fixed across the simulations. The third row is informative of the relative variance of

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[8] The results with an AR(1) income process are presented in Section 4.2.

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consumption vis-à-vis income. The full information rational expectations hypothesis requires consumption to be smooth and hence much more stable than income, which means that the ratio of consumption variance to income variance should take a low value below one. As can be observed from the third row, this ratio is 0.01 with standard rational expectations and increases with an increase in ϕ, up to 2.23 under the case where ϕ is strictly greater than 5. A high variance of consumption relative to income hints at the existence of excess sensitivity of consumption.

Table 1: Variances and the Relation of Consumption and Income

	Standard Rational Expectations $\phi = 0$	Switching Expectations $0 < \phi \leq 5$	Switching Expectations $5 < \phi \leq 10$
σ(C)	0.12	1.65	26.51
σ(Y)	11.88	11.88	11.88
σ(C)/σ(Y)	0.01	0.13	2.23
ρ(C,Y)	0.02	0.31	0.50
Mean(C)	20.78	19.67	12.30

Even though the parameters in these simulations are not calibrated, one can verify that the findings regarding the differences in the moments of the developing and the developed countries are consistent with the simulation results. Aguiar and Gopinath (2007) find that the ratio of consumption variance to income variance is 1.45 in the emerging markets while the same ratio is 0.94 in the developed ones. Neumeyer and Perri (2005) find this ratio to be 1.71 in the emerging markets and 1.08 in the developed markets. The relation of income and consumption is further explored in the fourth row where we have the values of correlation between consumption and income. The full information rational expectations hypothesis suggests that changes in consumption should not be related with changes in

transitory income, accounting for its effects on permanent income. On the other hand in the switching expectations model, since switching is state-dependent and consumption is also adjusted with changing expectations, there occurs a prominent relation between transitory income and consumption. These ideas can be followed from the fourth row of the table where the correlation between income and consumption is 0.02 within the standard rational expectations, and increases with an increase in the parameter ϕ, taking a value of 0.50 in the last column. Again a comparison of levels may require calibration but the differences between these moments can also be seen in empirical works: Aguiar and Gopinath (2007) find that the coefficient that shows the correlation between income and consumption is 0.74 in the emerging markets while the same coefficient is found to be 0.66 in the developed markets. Similarly, Neumeyer and Perri (2005) find the coefficient to be 0.79 in emerging economies and 0.68 for the developed ones. Finally, in the last row we see that the mean level of consumption is higher in the standard rational expectations model and it decreases with an increase in ϕ. Since the income level implied by the news media is higher, the consumer in the switching expectations model is inclined to borrow more as there are more periods in which the consumer perceives transitory income as being lower than permanent income. A higher borrowing results in fewer resources available for the consumer to allocate for consumption, which is discussed in more detail with Table 2.

Table 2: Variances and the Relation of Asset Stock and Income

	Standard Rational Expectations $\phi = 0$	Switching Expectations $0 < \phi \leq 5$	Switching Expectations $5 < \phi \leq 10$
σ(ΔA)	11.88	10.55	6.74
σ(Y)	11.88	11.88	11.88
σ(ΔA)/σ(Y)	1.00	0.88	0.56
ρ(ΔA,Y)	1.00	0.94	0.37
Mean(A)	79.37	-58.75	-885.43

Table 2 illustrates the characteristics of asset stock changes in the whole simulation periods, where "A" denotes the asset stock and "Y" denotes income. In the last row one can see that the mean asset stock is positive for the standard rational case, which shows the dominance of the saving behavior over borrowing. As ϕ increases across simulations, the mean value of the consumer's asset stock decreases and becomes negative. As also mentioned above, with expectation switching the consumer's response through changes in her asset stock becomes more asymmetric. Even though the probability of a realization of high income is the same as that of low income, the consumer with switching expectations borrows in more states than she saves. With infinite horizon this suggests that the consumer in the switching model is more inclined to borrow and accumulate debt. As a result, we see that the mean value of the asset stock is increasingly negative as we move from left to right in the last row of the table. In fact, in the standard rational expectations simulation, the asset stock of the consumer never falls below zero while in the simulation with ϕ between 0 and 5 the consumer holds a debt stock for 76.30% of the time with the minimum value of asset stock in the simulation being -200. On the other hand, in the case where ϕ is between 5 and 10 the consumer never holds a positive asset stock, and is borrowing constrained for 68.80% of the whole simulation. As a result the variance of the changes in the asset stock decreases as ϕ increases both due to the consumer's neutrality in an additional state where transitory income equals the income expectations and due to a limit on the consumer's ability to borrow in the third case. Accordingly, the ratio of the variance of the change in asset stock to the variance of income also decreases as we increase the value of ϕ, which can be seen from the third row of the table. Finally in the fourth row we have the correlation between the change in the asset stock of the consumer and income. There is a one-to-one correlation between the changes in the asset stock and the income level of the consumer in the case of standard rational expectations, as the consumer always buffers the changes in income by adjusting her asset stock in order to keep her consumption smooth. In the second case, different from the standard rational expectations case, the consumer does not accumulate assets when the realized income is equal to that implied by the news media, resulting in a lower correlation. Similar to this behavior, the consumer in the third case also adjusts her asset stock less frequently. However in this case we have an additional effect of the consumer being borrowing constrained for a large part of the simulation.

4.2 Income Process: AR(1)

In Chapter 3 the base model is specified to include an iid income process, and Section 4.1 provides the simulation results from such a specification. Here I carry out the same analysis by using an AR(1) income process instead of an iid process[9]. The AR(1) income process is used in the simulations where the volatility of consumption vis-à-vis income is examined, for instance by Aguiar and Gopinath (2007). The AR(1) process is also used in some models with information frictions in order to decompose the components of individuals' forecasts, so as to explicitly show the parameters causing information frictions, as in Coibion and Gorodnichenko (2010). When income follows an iid process, the transitory level of income in a given period has no effect on other periods. In other words, there are no persistent shocks. In the case with an AR(1) process however, the random shocks continue to have an effect beyond the period in which they are observed. Therefore in this case I allow the shocks to be more persistent and examine whether the behavior of the consumer changes, and if so, how it is different from the case with iid income. Furthermore, using AR(1) includes state-dependence of income forecasts for the case with standard rational expectations as well. The full information rational expectations forecast of next period's income, for instance, will depend on the current level of income. This also constitutes a point of distinction from the case with iid income process where, by definition the probability distribution of the consumer's income is unchanging throughout the simulation. Therefore here in addition to the expectation switching mechanism, the future forecasts of income will also depend on the state of the economy. Overall, in this section I provide the results with an AR(1) income process so as to show whether and how these changes affect the analysis in Section 4[10].

In this case the income follows the process:

$$y_{t+1} = \delta + \rho y_t + \varepsilon_t \qquad\qquad (4.3)$$

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[9] I would like to thank my examining comittee for their comments on carrying out the analysis (with AR(1)) of this section.

[10] Figures 10, 11 and 12 in the Appendix show the graphs of the full simulations.

where ε is the random error term that follows a white noise process with standard deviation equal to 2.

In the simulation I take δ=10, ρ=0,50 and y_0=20 so that the value range of the income is similar to the case with an iid process. The simulations are again carried out for 1000 periods with the lowest possible value for the asset stock being -800 (so that the consumer cannot hold a debt stock of more than 800 units). Following the analysis in the previous section once again I carry out 3 different simulations with φ being the only variable that is different across the simulations. The first case where φ=0 represents the standard rational expectations model. In the second case φ=2 so that the consumer starts switching expectations and using the news media expectations. In the last case φ=4 and the consumer is more predisposed to use the news media expectations compared to the first two cases. The exact values of φ are chosen in accordance with the standard deviation of the error term.

Table 3: Variances and the Relation of Consumption and Income with an AR(1) Income Process

	Standard Rational Expectations $φ = 0$	Switching Expectations $φ = 2$	Switching Expectations $φ = 4$
σ(C)	0.20	11.14	15.49
σ(Y)	5.63	5.63	5.63
σ(C)/σ(Y)	0.03	1.97	2.74
ρ(C,Y)	0.42	0.44	0.51
Mean(C)	19.59	16.12	14.32

From Table 3 one can see that the results are very similar to the iid case which is presented in Table 1. The variance of consumption increases with an increase in the information frictions, represented by the implicit cost parameter. The ratio of consumption variance to income variance is also very low and below 1 in the standard rational expectations case,

while it increases with an increase in ɸ, reaching 2.74 in the case where ɸ is highest. The major difference in this case is that the correlation between consumption and income is higher in the standard rational case, and shows a mild increase with ɸ. The reason for this is that when the consumer forms rational expectations regarding next period's income, she takes the expectation of the true income process. In the AR(1) case, the value of income also depends on its one period lag. This means that the expectation of the next period's income is affected by the income level observed in the current period. Accordingly, the consumer's perception of permanent income, which in turn affects the consumption decision, is dependent on the current level of income. Ultimately this creates a relation between the current level of income and consumption, as reflected in the correlation coefficient[11]. Finally, again similar to the case of iid income, the mean level of consumption decreases with ɸ as the consumer in the expectation switching model is more inclined to borrow (or less inclined to save).

Table 4: Variances and the Relation of Asset Stock and Income with an AR(1) Income Process

	Standard Rational Expectations $\phi = 0$	Switching Expectations $\phi = 2$	Switching Expectations $\phi = 4$
σ(ΔA)	4.85	2.23	1.84
σ(Y)	5.63	5.63	5.63
σ(ΔA)/σ(Y)	0.86	0.39	0.32
ρ(ΔA,Y)	0.99	0.65	0.27
Mean(A)	-30.97	-455.45	-636.70

From Table 4 one can see that the results regarding the asset stock of the consumer are also similar to the case with iid income (Table 2). The variance of assets decrease as ɸ

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[11] Remember that the probability distribution of income in the iid case is not state-dependent, therefore the correlation coefficient was significantly lower in that case.

increases, since the consumer's change of expectations along with income makes her less responsive to the changes in income. This results in a matching movement in the ratio of the variance of asset stock to the variance of income. The value of the correlation coefficient between the changes in asset stock and income is found to be 0.99. This value is barely different from the one found in the iid simulation, which is exactly equal to 1. The difference occurs from the fact that the consumer's expected value of future income also depends on the current income, which causes the consumer to adapt her expectations and thus respond less through her assets. However this effect is negligible for the case of standard rational expectations as the difference between the two results is only 0.01. The value of the correlation coefficient falls with an increase in ϕ as is the case in the simulations with iid income. As the consumer adapts her expectations more, her response through saving/borrowing in face of transitory income shocks is less frequent. Finally one can see that the mean value of the consumer's asset stock also decreases as ϕ is increased. As is the case in simulations with iid income, the consumer becomes more inclined to borrow as information frictions increase.

CHAPTER 5

CONCLUSION

The point of departure in this work has been to drop the assumption that the consumers continuously obtain full information and form rational expectations accordingly. I have specified the news media as a source of information which can be biased, and at the same time provide information that is less costly to obtain than full information. The information frictions in the model operate through two channels: the actual level of bias in the information provided by the news, and the relative cost of using rational expectations compared to obtaining information from the news media. The expectation structure that the consumer uses is then determined through a backward-looking heuristic and the consumers decide on their consumption and savings accordingly. The simulations of the model are carried out with both an iid income process and an AR(1) income process. The results are very similar in both cases, except for the fact that in the AR(1) case the consumer's forecasts of future income are state-dependent while the same is not true for the iid case. Although this difference alters the behavior in the standard rational expectations, the change in the dynamics of consumption is the same as it is in the iid case as information frictions increase. As long as the gap between the realization of income and the target of news media is changing, the consumer switches between expectation structures regardless of the persistence of shocks to income. The expectation switching behavior then leads to higher volatility of consumption through its effect on permanent income.

Since the decision rule depends on the state of the economy, the structure of the expectations that the consumers use and the resulting consumption behavior become more state dependent as the frictions increase. One can argue that the aforementioned channels through which information frictions operate are more effective in the developing countries

than the developed countries. Lower freedom of press and resulting homogeneity in the media increases the bias in the information provided by the news media whereas lower education and lower institutional qualities such as transparency increase the cost of obtaining full information. With increasing information frictions, the volatility of consumption also increases as well as the excess sensitivity of consumption to the predictable changes in income. The findings of the model can therefore be explanatory for the difference in the volatility of consumption between the developing countries and the developed countries, which is accounted by the existence of higher information frictions in the former.

The model that is presented in this thesis can be developed in several ways for future research. First and foremost, for a more accurate and grounded comparison between the developed and the developing countries, the parameters of the model can be calibrated to match the data for these groups of countries. Moreover, even though it is argued that a model in which the consumer is completely forward looking would require the consumer to solve a redundantly complex problem, the mechanism behind the decision of switching expectations may not simply depend on a heuristic. Therefore the expectation switching mechanism can be developed to combine both forward-looking elements and backward-looking elements. To this end, a comparison with a case that includes explicit costs can also be beneficial. Finally, the true structure of the heuristic itself, which is used for expectation switching, can be further explored empirically in order to allow for more differentiation between different types of consumption behavior (the decision of expectation switching may be influenced by different variables in different countries, for instance).

The characteristics of the model I have constructed in this thesis have a potential of leading to a few contributions to the literature: The overall setting of the model is indicative of the argument that a direct characterization of the sources of information may as well be explanatory for the differences of consumption behavior (volatility of consumption) between the developing and the developed countries, which also has the potential to integrate the different political and sociological characteristics among these sets of countries to the context of economic analysis. Ideological apparatuses in their broad definition have played a central part in the political science literature on ideology and hegemony. Media being at the core of the culture industry deserves attention not only in

political science but also in economics through its effects on the expectations of a large fraction of economic agents. A direct relation exists between the news media and the consumers, based on the interpretation of the current state of the economy as well as projections on its future. Methodologically however, a systematic analysis of this kind of a relation through the tools employed by economic research still awaits attention. A more thorough specification of the structure of the news media in terms of its role in the economy and its connection with the consumers is a candidate for further unveiling the mechanics behind informational rigidities. As the link between consumption behavior and the state of the economy goes through mediation, the dynamics of the news media over economic and political cycles may also be illuminating for the cyclical behavior of consumption.

Finally, an analysis of this type can also be employed in an attempt to explain the differences in the saving behavior of economically more similar countries. While the focus in this work has been on the differences between the developing and the developed countries, one can encounter different types of saving behavior among the countries that are generally grouped together as "developing countries". Such differences have been highlighted in terms of their contribution to the growth paths of the respective countries. The differences in the political structures and their reflections on informational rigidities may therefore be analyzed in terms of their effects on the types of saving behavior in these countries.

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APPENDIX A

DERIVATION OF THE EULER EQUATION AND THE RANDOM WALK RESULT IN THE STANDARD RATIONAL EXPECTATIONS MODEL

The value function for the problem presented in the section "A Review of the Standard Rational Expectations Model" and the aforementioned derivations are as follows:

The problem can be written in sequential form by substituting $c_t = y_t + a_t - \frac{a_{t+1}}{(1+r)}$ in the value function:

$$V(a_t, y_t) = \max_{a_{t+1}} \left\{ u\left(y_t + a_t - \frac{a_{t+1}}{(1+r)}\right) + \beta E_t[V(a_{t+1}, y_{t+1})] \right\} \quad \text{(A.1)}$$

or equivalently,

$$V(a_t, y_t) = u\left(y_t + a_t - \frac{a_{t+1}^*}{(1+r)}\right) + \beta E_t[V(a_{t+1}^*, y_{t+1})] \quad \text{(A.2)}$$

where * denotes the argmax of (A.1).

The first order condition for this problem is:

$$-\frac{1}{(1+r)} u'\left(y_t + a_t - \frac{a_{t+1}^*}{(1+r)}\right) + \beta E_t[V'(a_{t+1}^*, y_{t+1})]$$
$$= 0 \quad \text{(A.3)}$$

The envelope conditions:

$$V_x(a_t, y_t) = u'(c_t^*) \quad \text{(A.4)}$$

$$V_x(a_{t+1}, y_{t+1}) = u'(c_{t+1}^*) \tag{A.5}$$

Denoting $R = (1 + r)$, the first order condition in (24) becomes:

$$u'(c_t) = R\beta E_t[u'(c_{t+1})] \tag{A.6}$$

Assume that $R\beta = 1$ and the utility function has a quadratic form $u(c) = ac - bc^2$.
Equation (A.6) then becomes:

$$c_t = E_t c_{t+1} \tag{A.7}$$

$$c_{t+1} = c_t + \varepsilon_t \tag{A.8}$$

where ε_t is the error term.

APPENDIX B

TURKISH SUMMARY

Tüketim teorileri literatüründe genel olarak temel alınan model tam enformasyon rasyonel beklentiler modelidir. Bu modelin temelinde tüketicilerin tüketim planlarını bir dönemler arası optimizasyon problemi çözerek belirlemeleri fikri yatmaktadır. Modele göre tüketiciler ileriye dönük bir davranış sergilemenin yanında, bu problemin içerisinde yer alabilecek herhangi bir stokastik sürece dair tam bilgiye sahiptirler. Bu optimizasyon davranışının arkasındaki temel mekanizma tüketicilerin dönemler arası marjinal fayda beklentilerini eşitlemeleri olduğu için, sonuç olarak da tüketim patikası düz bir görüntü çizmektedir. Öte yandan, tam enformasyon rasyonel beklentiler çerçevesinden bakıldığında tüketim dinamiklerinin düzensizlikler gösterdiği sıkça belirtilmektedir. Bu düzensizliklerin en ünlü örneklerinden biri tüketim volatilitesinin gelişmiş ve gelişmekte olan ülkeler arasında farklılıklar göstermesi ve gelişmekte olan ülkelerde volatilitenin belirgin bir şekilde daha yüksek olmasıdır. Tüketimin kendi volatilitesinin yanında dikkat çeken bir başka düzensizliği ise gelire karşı olan aşırı duyarlılığıdır ve bu duyarlılığının da gelişmekte olan ülkelerde daha yüksek olduğu görülmektedir. Tüketimin gelire veya başka herhangi bir öngörülebilir değişkene karşı aşırı duyarlı olması tüketim teorileri literatüründe özellikle merak uyandıran bir konudur.

"Yüksek volatilite" veya "aşırı duyarlılık" şeklinde adlandırılan ve doğaları gereği görecelik belirten bu kavramlar tam enformasyon rasyonel beklentiler modelinin sonuçlarıyla yapılan bir karşılaştırma sonucu ortaya çıkmışlardır, ve temel olarak sürekli gelir hipotezine dayanırlar. Sürekli gelir hipotezine göre, bir tüketicinin geliri "sürekli gelir" ve "geçici gelir" olarak iki parçadan oluşmaktadır. Tüketim ise geçici gelire değil, sürekli gelire bağlıdır. Bu

hipotezin kurduğu çerçeveden bakıldığında stokastik bir ortamla ilgili ulaşılacak sonuç, bir takım ek varsayımlar altında, tüketimin tüketicinin planlama ufku süresince düz, oynak olmayan bir görüntü çizmesidir. Dolayısı ile tüketimde oluşacak herhangi bir değişiklik öngörülebilir olmamaktadır. Rasyonel tüketici için optimal karar iki ardışık dönem arasındaki marjinal fayda beklentilerini eşitlemek olduğu için, tüketici bir stokastik süreç olan geliriyle ilgili elde edebileceği bütün bilgiyi kullanarak beklentilerini kurmakta, ileride oluşabilecek herhangi bir öngörülebilir değişikliği ise halihazırda planlamasına dahil etmiş olmaktadır. Dolayısı ile öngörülebilir/geçici değişiklikler tüketicinin tüketim kararlarını etkilemez ve tüketim her dönem tüketicinin sürekli gelirine bağlı olur. Buradan hareketle tüketimin büyümesi de sadece tüketicinin gelecekteki gelir akışıyla ilgili yeni bir bilgi edinmesiyle gerçekleşir. Sürekli gelir teorisine göre, geçici gelir sadece sürekli geliri etkileyebildiği ölçüde tüketimi de etkiler. Dolayısı ile gelirde oluşan öngörülebilir değişikliklere tüketimin bu etkinin de üzerinde bir tepki vermesi "aşırı duyarlılık" olarak adlandırılmakta ve tüketimin gelire oranla varyansı da tam enformasyon rasyonel beklentiler modelinin öngördüğünden daha yüksek olmaktadır.

Tüketim teorileri literatüründe yüksek volatilite ve aşırı duyarlılık kavramlarına yönelik yapılan açıklamalar genel olarak likidite kısıtları ve ihtiyati tasarruf davranışları etrafında şekillenmektedir[12]. Bu standart sayılabilecek yaklaşımların yanında, yakın zamanda ortaya çıkan bir yaklaşım da enformasyon sürtüşmelerini yüksek volatilite ve aşırı duyarlılığı açıklamak için bir aday olarak ön plana çıkarmaktadır. Bu yaklaşım, tüketim literatüründe bugüne kadar kullanılan teorilerin temel bir varsayımını (tüketicilerin rasyonel beklentiler içerisinde tam enformasyon sahibi olmalarını) değiştirmeyi gerektirir.

Sadece tüketici değil, genel olarak bireylerin davranışını inceleyen birçok farklı literatürde bireylerin sürekli olarak rasyonel beklentiler kullandığı varsayımını reddeden sonuçlar bulunmaktadır[13]. Tüketicilerin farklı yapılarda beklentiler kurması, karar verme sürecinin bireyler açısından maliyetini düşüren sezgisel kuralların kullanımı veya rasyonel beklentilerin belli aralıklarla kullanılması, standart tam enformasyon rasyonel beklentiler

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[12] Likidite kısıtları tüketicilerin düşük geçici gelir dönemlerinde tüketimlerinin düşmesini engelleyecek likidite kaynaklarına sahip olmamaları veya borçlanamamaları fikrine dayanır. Deaton (1991)'de detaylı bir incelemesi bulunabilir. İhtiyati tasarruf davranışları ise tüketicinin tamamen geleceğe yönelik belirsizliğe karşı bir tedbir amacıyla yaptığı birikimi ön plana çıkarır ve bir nevi tüketicinin gönüllü olarak kendini kısıtlamasına dayanır. Bu konuyla ilgili Carroll ve Kimball (2006)'a bakılabilir.
[13] Bu sonuçların geniş bir taraması için Conlisk (1996) incelenebilir.

varsayımlarının aksine işaret eden bulgulardır. Bu bulguların üzerine tüketim davranışlarıyla ilgili, rasyonelitenin üzerinde belirli sınırlar olduğu varsayımına dayanan yeni bir akım modeller ortaya çıkmaya başlamıştır. Bu akımdan sayılabilecek Mankiw ve Reis (2002)'in eksik enformasyon modeli, bu modelin Reis (2006) tarafından tüketim özelinde uygulanması, Sims (2003)'in rasyonel dikkatsizlik modeli ve eksik enformasyon modelinin Carroll (2003) tarafından haber medyasıyla birleştirilmesi bu tezin ilham kaynakları arasında yer almaktadır. Eksik enformasyon modeli her dönem tüketicilerin sadece belli bir kısmının yeni enformasyon edinerek beklentilerini güncellediklerini, geri kalanların ise eski beklentilerini kullanmaya devam ettiklerini savunur. Reis (2006), tüketicilerin belirli aralıklarla bilgilerini güncelleme davranışlarını içsel bir mekanizmaya oturtarak rasyonel beklentilere birer maliyet atamakta ve tüketicilerin tüketim planları yanında ne zaman yeniden tüketim planı yapacaklarına da ayrıca karar vermelerini sağlamaktadır. Dolayısı ile bir sonraki planlama dönemine kadar tüketiciler "dikkatsiz" olurlar ve yeni bir bilgi edinmezler. Sims (2003)'in rasyonel dikkatsizlik modeli de sonuçları açısından diğerlerine benzer. Bu modelde tüketiciler her dönem yeni enformasyon edinirler fakat bu aşamada bir kapasite kısıtına tabidirler ve her dönem bu kapasitenin öngördüğü kadar enformasyon elde edebilmektedirler. Dolayısı ile tam enformasyon sahibi olamazlar. Carroll (2003) ise modelinde tüketicilerin enformasyon kaynağı olarak haber medyasını kullandıklarını ve eksik enformasyon modeline benzer şekilde her dönem belli bir kesim tüketicinin haberlere dikkat ederek beklentilerini güncellediklerini, geri kalanın ise eski beklentilerini kullanmaya devam ettiklerini savunur. Bu modelde medyanın sağladığı profesyonel tahminlerin, tam enformasyon rasyonel beklentiler olduğu varsayılır.

Haber medyası ve genel olarak medyanın rolünün, ekonominin içinde bulunduğu durum ve geleceği ile ilgili tahminler üzerine gerçeği tamamen yansıtmaktan ibaret olup olmadığı bir tartışma konusudur. Doms ve Morin (2004) medyanın tüketici güvenini doğrudan etkileme gücü olduğunu ortaya koyarken, bu gücün üç farklı kanal aracılığıyla kullanıldığını savunur: Profesyonel tahminlerin iletilmesi, haber medyasının kendi yorumlaması ve üslubu ve yapılan haberlerin yoğunluğu. Aynı çalışmada Amerika özelinde haber medyasının bazı dönemlerde ekonomik gerçeklikle uyuşmayan bir enformasyon akışı izlediği, ve tüketici güveninin haber medyasının söylemiyle uyumlu olarak şekillendiği gözlemlenmektedir. Bu çalışmaya ek olarak gösterilebilecek bir başka çalışmada ise De Boef ve Kellstedt (2004)

tüketici güveninin sadece ekonomik değil, politik kaynaklardan da etkilendiği gösterilmektedir. Aynı çalışmada ayrıca retoriğin kısa vadeli de olsa tüketici güvenini yönlendirebildiği ortaya konulmaktadır.

Enformasyon sürtüşmelerine dair bahsi geçen literatürün bir uzantısı olarak bu tez gelişmiş ve gelişmekte olan ülkelerin tüketim volatilitelerindeki farklılıkları aydınlatmayı amaçlamakta, ve bunu yaparken gelişmekte olan ülkelerde gelişmiş ülkelere nazaran enformasyon sürtüşmelerinin çok daha etkili olduğu gözlemini temel almaktadır. Önceki literatürün aksine, bu tezdeki modelin temel varsayımlarından birinin haber medyasının yanlı olmasıdır. Dolayısı ile enformasyon sürtüşmesi, bir ucunda enformasyon kaynağı ve diğer ucunda tüketici olan ilişkide haber medyasının yanlılığı ile dolaysız olarak kaynaktan ortaya çıkmakta ve tüketici tarafında maliyetlerle desteklenmektedir. Nihai olarak haber medyasının yanlılığı, tüketicilerin içinde bulundukları ekonominin durumuyla ilgili algıları üzerinden tüketici beklentilerinin yanlı olmasına yol açmaktadır.

Modelde medyanın rolü, modelin içindeki tek stokastik değişken olan gelir üzerine enformasyon sağlamaktır. Gelişmekte olan ülkelerdeki haber medyasının özelliklerini ilgilendiren önemli bir varsayım, bu medyanın tek ve bir bütün olarak tanımlanabilme ihtimalidir. Bu varsayım medyanın içinde birbiriyle çelişki içerisinde olma ihtimalini de barındıracak şekilde farklı perspektiflerin olmadığını belirtir. Medya tüketiciyi etkileme açısından içerisinde bir rekabet barındırmadan, tüketiciye tek bir perspektif sunmakta ve anlatımını bu çizgide belirlemektedir. Bu varsayım problemin sunumunu basitleştirmenin yanında gelişmekte olan ve gelişmiş ülkeler arasında da bir farklılaşma noktasına işaret eder. Nedenselliğin yönü tartışmaya açık olmakla birlikte, birçok çalışma basın özgürlüğü ile farklı gelişmişlik ölçütleri arasında pozitif ilişki olduğunu göstermektedir[14]. Dolayısı ile basın özgürlüğünün gelişmiş ülkelere oranla daha düşük olduğu gelişmekte olan ülkelerde, medyanın belirgin bir ölçüde daha homojen olması beklenebilir. Bunun yanı sıra kurumsal ve politik niteliklerdeki farklılıkların ekonomik gelişime etkisi, literatürde "kurumsalcı" olarak geçen akımın ilgi odağı olmuş ve özellikle şeffaflık açısından gelişmiş ve gelişmekte olan ülkeler arasında bir karşılaştırmaya olanak tanımıştır[15]. Bu tarz farklılıkların doğru ve

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[14] Bkz. Alam ve Shah (2013); Pal, Dutta ve Roy (2011); Guseve ve diğerleri (2008).
[15] İktisat yazınında kurumsalcı yaklaşıma örnek olarak Acemoğlu ve diğerleri (2005) verilebilir. Şeffaflık konusunda geniş bir tarama ve tartışma için Bellver ve Kaufmann (2005) incelenebilir.

eksiksiz bilgiye ulaşım imkânlarının, gelişmekte olan ülkelerde gelişmiş ülkelere nazaran daha düşük olduğuna işaret ettiği söylenebilir. Bu tartışmanın bir neticesi olarak bu tezdeki modelde haber medyasının etkisi, tüketicileri gelecekle ilgili belli bir gelir seviyesine dair bir beklentiye yönlendirme olarak belirlenmiştir. Tüketici ve haber medyası arasındaki iletişim sürecinin semantik özellikleri bu çalışmanın kapsamı dışında kalarak, medyanın, tüketicinin içinde bulunduğu ekonomik ortamın dışsal olarak yanlı bir yansımasını sağladığı ve tüketicinin beklentisini spesifik bir gelir seviyesine eşitleyecek şekilde anlatımını kurduğu varsayılmaktadır. Gelişmekte olan ülkelerin yukarıda belirtilen özellikleri doğrultusunda, pratikte haber medyasının belirlediği "hedef" gelir seviyesinin gerçek gelir seviyesinden daha yüksek olması(yanlılığın yukarı yönlü olması) beklenebilir. Bunun anlamı, haber medyasının birincil etkisinin tüketicilerin yüksek gelir dönemlerini "yeni standart", düşük gelir dönemlerini ise geçici olarak algılamasına yol açması olduğudur. Daha kısa bir ifadeyle, haber medyasının sürekli geliri olduğundan daha yüksek göstermesini bekleyebiliriz. Basitlik açısından haber medyasının bu davranışı sabit alınmaktadır (haber medyası tüketicinin planlama ufku boyunca dışsal olarak aynı gelir seviyesini işaret etmektedir).

İletişim ilişkisinin diğer ucunda tüketici bulunmaktadır. Tüketici her dönemin başında, medyanın yanlılığı hakkında bir bilgisi olmayarak, iki beklenti yapısından birini seçer: haber medyası aracılığıyla kurulan beklentiler ve tam enformasyon rasyonel beklentiler.

Tüketici beklentisini haber medyasının sağladığı enformasyon üzerinden kurmayı seçtiği takdirde, ileri dönemlerdeki gelirine dair beklentisi haber medyasının hedeflediği gelir seviyesine eşit olur. Bu yapı aracılığıyla kurulan beklentiler, tam enformasyon rasyonel beklentileri mutlak olarak ikame eder. Tüketici bu iki farklı beklenti yapısının kombinasyonlarını kullanmaz, zira bu iki yapının kombinasyonu tam enformasyon rasyonel beklentiler sonucunu bilmeyi gerektirir ve bu sonucu bilen bir tüketicinin iki beklenti arasında seçim yapmasına zaten gerek yoktur.

Tam enformasyon rasyonel beklentiler kurma seçeneği yukarıdaki tartışmanın bir uzantısı olarak incelenebilir. Tüketicilerin (Branch (2004) tarafından da vurgulandığı üzere) dinamik bir biçimde beklenti yapıları arasında geçiş yapıyor olmaları, bu beklenti yapılarının birer maliyeti olduğunu göstermektedir. Tam enformasyon rasyonel beklentiler her zaman yansız ve etkin olduğu için, tüketicinin yanlı olma ihtimali olan haber medyası üzerinden

beklentilerini kurması, rasyonel beklentilerin bu beklenti yapısına göre daha maliyetli olduğunu gösterir. Dolayısı ile bu modelde tüketiciler beklenti maliyetlerinden ötürü dikkatsiz olmak yerine, tam enformasyon rasyonel beklentilere göre daha düşük maliyetli olan, haber medyasından enformasyon edinme seçeneğini kullanmaktadır.

Tüketicilerin farklı beklenti yapıları arasında geçiş yapmalarını sağlayan mekanizma bir sezgisel kurala dayanır. Bu kural hem beklentilerin maliyetlerini, hem de Branch (2004) tarafından bildirilen, tüketicilerin belirli bir beklenti yapısını kullanmaya daha meyilli olma davranışlarını içinde barındırır. Bu modelde kullanılan maliyetler örtük bir biçimde belirtilmiştir. Diğer bir deyişle, maliyetler tüketicinin fayda fonksiyonu veya kısıtları arasında yer almaz. Bunun sebebi tüketicinin beklenti yapıları arasında geçiş yaparken ileriye dönük bir karşılaştırma ve planlamada bulunmamasıdır. Beklenti yapıları arasındaki geçişin bu şekilde bir sezgisel kurala ve örtük maliyet olarak düşünülebilecek eşik değerine bağlı olmasının iki temel sebebi vardır. Bunlardan ilki, tüketicinin sonsuz planlama ufku içerisinde ileriye dönük bir plan yapmasının ve her dönem ayrı ayrı seçilebilecek her bir beklenti yapısı için ortaya çıkabilecek sonuçları karşılaştırmasının, en baştan itibaren tüketicinin tam enformasyon rasyonel beklentiler kurmasından çok daha zor bir problem teşkil etmesidir. Maliyetlerin örtük bir şekilde dahil edilmesinin ikinci sebebi ise, tüketicinin kullanabileceği beklenti yapılarının sonuçlarını karşılaştırırken, haber medyası üzerinden kuracağı beklentilerin isabetsiz olma ihtimalini değerlendirme zorunluluğudur. Haber medyasının hedef gösterdiği gelir seviyesi sabit alındığında, bu enformasyon aracılığıyla kurulan beklentilerin yanlı olma ihtimali ise gelir sürecinin olasılık dağılımıyla birebir ilintilidir. Bu sebepten dolayı, tüketici böyle bir karşılaştırma yapmak için gelirin gerçek olasılık dağılımına ihtiyaç duymaktadır. Gelirin özdeş ve bağımsız dağılmış (iid) bir süreç izlediği düşünüldüğünde, bu olasılık dağılımını bilen bir tüketici zaten halihazırda tam enformasyon beklentiler sahibi demektir. Dolayısı ile iki beklenti yapısı arasında bir tercih yapmasına gerek yoktur.

Yukarıdaki tartışmanın devamında tüketicinin kullandığı sezgisel kural şu şekilde açıklanabilir: Her dönemin başında, tüketici öncelikle gerçekleşen gelirini gözlemler. Daha sonra bu gözlem, haber medyasının söylemini temellendirdiği hedef gelir seviyesiyle karşılaştırılır. Gerçekleşen gelir ile haber medyası aracılığıyla beklenen gelir seviyesi arasındaki fark belli bir eşik seviyesini aştığında, tüketici beklentilerini haber medyası

aracılığıyla kurmayı bırakıp tam enformasyon rasyonel beklentilere geçiş yapar. Tüketicinin iki gelir seviyesi arasındaki farkı karşılaştırdığı bu eşik değeri, rasyonel beklentilerin maliyetlerini temsil etmektedir. Tam enformasyon rasyonel beklentilerin maliyeti ne kadar yüksekse, tüketici de haber medyası üzerinden beklenti kurmaya o kadar meyilli olur. Bu da tüketicinin geçiş mekanizmasında bulunan eşik değerinin bir o kadar yüksek olduğu anlamına gelir. Eşik değeri, tüketiciler açısından bakıldığında, genel anlamda enformasyon edinmenin zorluğu tarafından belirlenir. Haber medyasını açıklarken bahsedilen kurumsal niteliklerin yanı sıra, tüketiciler açısından baktığımızda gelişmekte olan ülkeleri gelişmiş ülkelerden farklılaştıran bir nokta da eğitim seviyesidir. Haber medyasının sağladığı enformasyon haricinde rasyonel beklentiler kurmak, bireyler açısından hem başka kaynaklardan enformasyon edinmeyi hem de bu enformasyon üzerinden geleceğe dönük etkili tahminlerde bulunmayı gerektirir. Böyle bir süreç ise, beşeri sermayenin gelişimi çerçevesinde birincil olarak eğitim seviyesi tarafından oluşturulan, bireysel bilgi ve beceriye dayanır. Dolayısı ile düşük eğitim seviyelerinin, tam enformasyon rasyonel beklentilerin daha maliyetli olmasına yol açtığı söylenebilir.

Özetle, yanlı olma ihtimali bulunan haber medyasının sağladığı enformasyon, gelişmekte olan ülkelerde tüketicilerin beklentilerini iki kanal aracılığıyla etkilemektedir. Bunlardan ilki, düşük basın ögzürlüğü ve yüksek homojenlikten kaynaklanan, haber medyasının enformasyonundaki yanlılık seviyesidir. İkinci kanal ise haber medyasının enformasyonunu kullanmanın alternatifi olarak, rasyonel beklentiler kurmanın maliyetidir. Eğitim seviyesi, beşeri gelişim düzeyi ve kurumsal niteliklerin daha düşük olması sonucu tam bilgiye erişimin daha zor olmasıyla birlikte, bu maliyet gelişmekte olan ülkelerde daha yüksektir. Haber medyası aracılığıyla beklenti kurmanın daha düşük maliyetli olduğu varsayımıyla beraber tüketici bu beklenti yapısını kullanmaya daha meyilli hale gelir. Gerçekleşen gelir ile haber medyasının hedeflediği gelir seviyesi arasındaki farkın tüketicinin eşik değerini geçtiği durumda ise, tüketici beklenti yapıları arasında geçiş yaparak tam enformasyon rasyonel beklentiler kullanmaya başlar. Eşik seviyesi bu sebeple aynı zamanda maliyet parametresidir.

Simülasyon sonuçları maliyet parametresinin farklı değer aldığı üç farklı simülasyonu temel almaktadır ve sonsuz dönemli bir planlama ufkunu temel alacak şekilde yürütülmüştür. Bu çalışmada öne sürülen tezin desteklenebilmesi için, enformasyon sürtüşmelerinin

etkinliğinin arttıkça tüketimin varyansında ve gelire karşı duyarlılığında artış görülmesi gerekir. Simülasyon sonuçları da bu koşulla uyumlu olacak şekilde, tüketimin normalleştirilmiş varyansının maliyet parametresindeki bir artışa bağlı olarak yükseldiğini göstermektedir. Dolayısı ile rasyonel beklentiler kurmanın daha maliyetli olduğu ve tüketicilerin haber medyasını kullanmaya daha meyilli olduğu gelişmekte olan ülkelerde, gelişmiş ülkelere nazaran tüketim volatilitesinin daha yüksek olduğu söylenebilir. Simülasyon sonuçları aynı zamanda tüketim ve gelir arasındaki ilişki açısından da açıklayıcı sonuçlar ortaya koymaktadır. Tam enformasyon rasyonel beklentiler hipotezine göre tüketimin, gelirde görülen geçici oynaklıklardan (sürekli gelire olan etkileri hariç) etkilenmemesi gerekir. Öte yandan tüketicilerin beklenti yapıları arasında geçiş yaptıkları modelde ise, tüketicilerin geçiş yapmaları ekonominin o dönemki durumuna bağlıdır. Beklenti yapıları arasında geçiş yapıldığında da tüketicinin sürekli gelir algısı değişerek tüketim seviyesi farklılaştığı için, nihai olarak ekonominin geçici durumu ile tüketim seviyesi arasında bir ilişki kurulmuş olur. Simülasyon sonuçları da bu özelliklerle uyumlu niteliktedir. Standart rasyonel beklentiler modelinde gelir ve tüketim arasındaki korelasyon katsayısı 0.02 olarak bulunurken, bu değer maliyet parametresinin yükselmesiyle beraber artarak, maliyet parametresinin en yüksek olduğu simülasyonda 0.50 seviyesine ulaşmaktadır. Son olarak, ortalama tüketim seviyesinin standart rasyonel beklentiler modelinde daha yüksek olduğu ve maliyet parametresindeki bir artışla beraber azaldığı görülmektedir. Beklentiler arası geçiş yapılan modelde tüketicilerin borçlanmaya daha meyilli olmaları, borç stoku üzerinde negatif getiri olması neticesinde tüketicinin tüketime ayırabileceği kaynakların azalmasına yol açmaktadır.

Maliyet parametresinin simülasyonlar arasında yükseltilmesiyle beraber, tüketicilerin varlık stokunun ortalama değerinin azaldığı ve negatif seviyelere (borç stokuna) dönüştüğü görülmektedir. Simülasyonların sonsuz ufukla yapıldığı da göz önünde bulundurulduğunda bahsi geçen bulgular tüketicilerin beklentiler arası geçiş yaptıkları modelde borçlanmaya ve borç stoku biriktirmeye daha meyilli olduklarına işaret etmektedir. Bu durumun bir sonucu olarak varlık stokundaki değişimlerin varyansı maliyet parametresindeki bir artışla birlikte düşmektedir. Tüketici açısından geçici gelirin sürekli gelirden daha yüksek olduğu dönem sayısı, beklentilerin değişmesiyle birlikte sürekli gelirin de değişmesi sonucunda azalmaktadır. Hem tüketicinin daha az durumda birikim yapması (veya daha çok durumda

borçlanması) hem de borçlanma kısıtına dayanma ihtimalinin artması sonucu varlık stokundaki değişimlerin varyansı, maliyet parametresi arttığında daha düşük olur. Ayrıca benzer bir tabloya varlık stokundaki değişimler ile gelir arasındaki korelasyon katsayısına bakarak da ulaşılabilir. Bu katsayının değeri standart rasyonel beklentiler modelinde 1'e eşittir, çünkü bu modelde tüketici gelirin değiştiği her dönemde bu değişikliğe karşı varlık stoku üzerinden bir tepki vermektedir. Sürekli gelir beklentisi sabitken geçici gelirin yüksek olduğu dönemlerde tasarruf, düşük olduğu dönemlerde ise varlık stokundan harcama veya borçlanma görülür, ve bu sayede tüketici tüketim seviyesini sabit tutar. Bu durumdan farklı olarak tüketicinin beklentiler arası geçiş yaptığı modelde ise, gelir seviyesi rasyonel beklentilerden yüksek fakat haber medyasının gösterdiği seviyeye eşit olduğunda tüketicinin sürekli gelir beklentisi de yükseldiğinden, tüketici gelirdeki artışa bir tepki vermemektedir. Dolayısı ile varlık seviyesindeki değişimle gelir arasındaki korelasyon katsayısının seviyesi daha düşük bir değer alarak 0.94 bulunmuştur. Buna benzer olarak maliyet parametresinin daha da yükseltildiği ve tüketicinin borçlanma sınırına ulaştığı bir başka simülasyonda bu katsayı 0.37 değerini almıştır. Bu simülasyonda tüketicinin büyük ölçüde borçlanma sınırında olup, geçici gelir seviyesinin beklentinin altında olduğu dönemlerde borçlanma imkânı olmadığını da göz önünde bulundurmak gerekir.

Sonuç olarak, bu tezde ortaya konan model gelişmiş ve gelişmekte olan ülkeler arasındaki tüketim volatilitesi farklılığını açıklayabilmekte, ve bunu yaparken gelişmekte olan ülkelerde bahsi geçen enformasyon sürtüşmelerinin daha etkin olduğu gözlemini temel almaktadır. Aynı şekilde tüketim teorileri literatüründe sıkça karşılaşılan aşırı duyarlılık problemi de, enformasyon sürtüşmeleri ile birlikte incelenebilmekte ve gelişmekte olan ülkelerde bu kanal aracılığıyla gelişmiş ülkelerden daha yüksek olduğu savunulabilmektedir.

Bu tezde bulunan model, enformasyon sürtüşmelerinin tanımlanması açısından literatürdeki çalışmalardan önemli ölçüde farklılaşmaktadır. Tüketim literatüründe enformasyon sürtüşmeleri, genel olarak tamamen tüketici davranışı ile tanımlanmakta ve tüketiciler açısından beklentilerin yüksek maliyetli olmasından kaynaklanmaktadır. Bu tezde ortaya konan modelde ise tüketici ile enformasyon kaynağı arasındaki iletişim ilişkisi göz önünde bulundurularak, tüketicinin karşısında ve bu iletişim diğer ucunda yer alan enformasyon kaynaklarının da (haber medyası özelinde) başlı başına bir enformasyon sürtüşmesine sebep olduğu öne sürülmektedir. Dolayısı ile enformasyon sürtüşmeleri hem

alıcı (tüketici) tarafında, hem de gönderen (haber medyası) tarafında ayrı ayrı kanallardan kaynaklanmaktadır. Tüketicilerin enformasyon edinmek amacıyla medyayı kullanmaları, makroekonomik göstergeler üzerinde yapılan gözlemlerin ve değerlendirmelerin farklı bir perspektifle, politik ve sosyolojik farklılıkları da kapsayacak şekilde yapılmasını mümkün kılar. Enformasyon edinme sürecinin nitelikleri, medya aracılığıyla içinde gerçekleştiği çevrenin politik ve sosyolojik karakterinden yoğun olarak etkilenmekte, ve aynı ölçüde tüketicilerin beklenti ve davranışlarına yansımaktadır. Dolayısı ile enformasyon sürtüşmelerini incelerken, enformasyon kaynaklarının açık ve net bir şekilde incelenmesi, tüketicilerin karar mekanizmalarını yürürlüğe koydukları ekonomik ortamlar arasındaki farklılıkları da açığa çıkaracaktır.

Bu tezde kurulan modelin nitelikleri literatüre önem teşkil eden katkılarda bulunma potansiyelini taşımaktadır. Modelin genel yapısı, enformasyon kaynaklarının doğrudan tanımlanmasının, gelişmiş ve gelişmekte olan ülkeler arasındaki tüketim davranışı farklılıklarını açıklamakta kullanılabileceği argümanını desteklemektedir. Bu özelliği itibariyle modelin bahsi geçen ülke grupları arasındaki politik ve sosyolojik farklılıkları da iktisadi analiz çerçevesine entegre etme potansiyeli bulunmaktadır. Tüketim davranışı ve ekonominin içinde bulunduğu durum arasındaki ilişkinin bir aracılık vasfı taşıyan medya üzerinden kurulması, haber medyasının ekonomik ve politik döngüler üzerindeki kendine özgü dinamiklerinin aynı zamanda tüketimin de döngüsel davranışlarını aydınlatmakta kullanılabileceği anlamına gelmektedir.

Son olarak, bu tezde izlenen bir perspektifle analiz yapıldığında, ekonomik olarak birbirine daha yakın görünen ülkeler arasındaki tasarruf davranışı farklılıklarını da yeniden incelemek mümkün kılınabilmektedir. Gelişmekte olan ülkelerin büyüme patikalarındaki farklılıklar açısından tasarruf davranışları ön planda tutulmaktadır. Bu tezin odaklandığı karşılaştırma gelişmiş ve gelişmekte olan ülkeler arasında görülebilecek farklılıklar iken, izleyecek çalışmalarda aynı grup içerisinde yer alan ülkeler arasındaki farklılıklar da bu çerçeveyle incelenebilir.

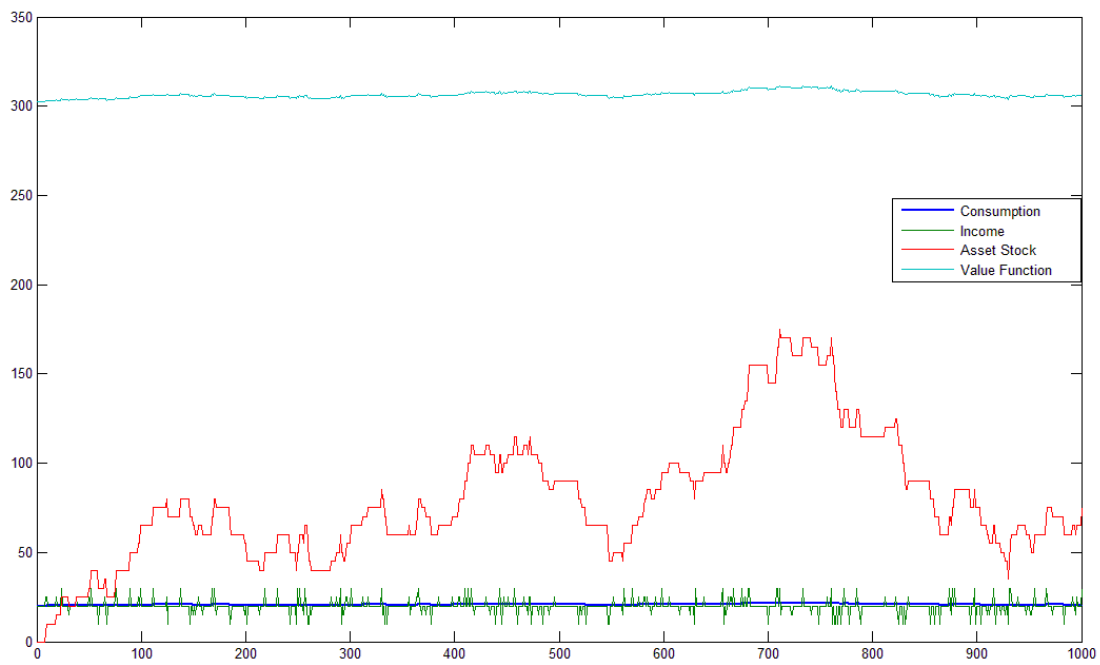# APPENDIX C

GRAPHS OF THE OVERALL SIMULATION HORIZONS

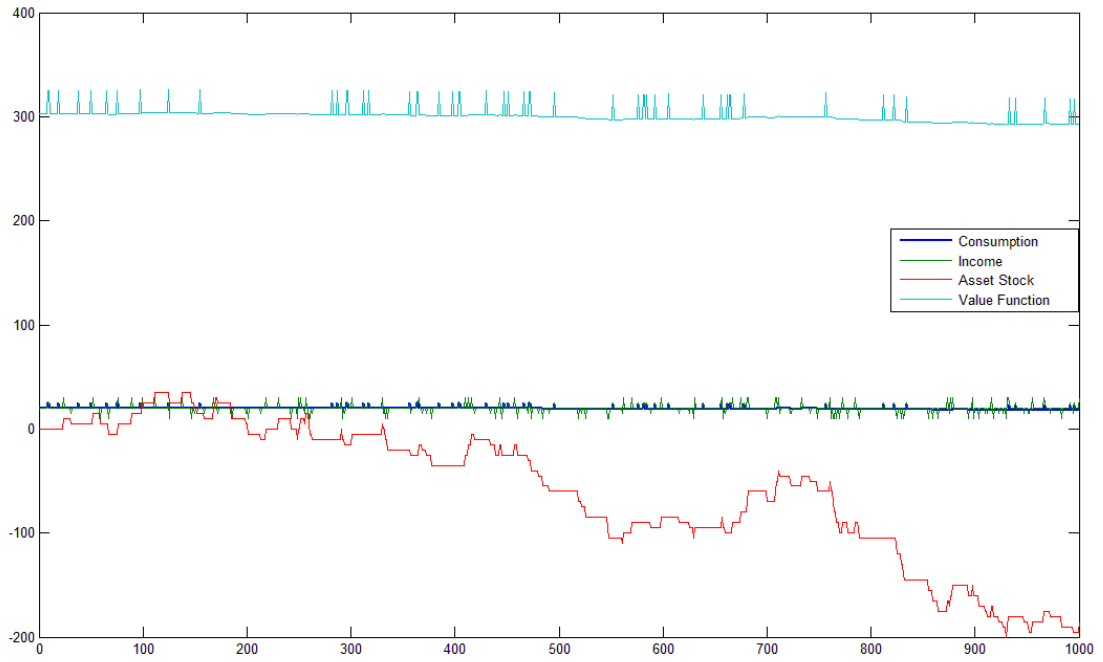
Figure 7: Graph of the Simulation With φ = 0.
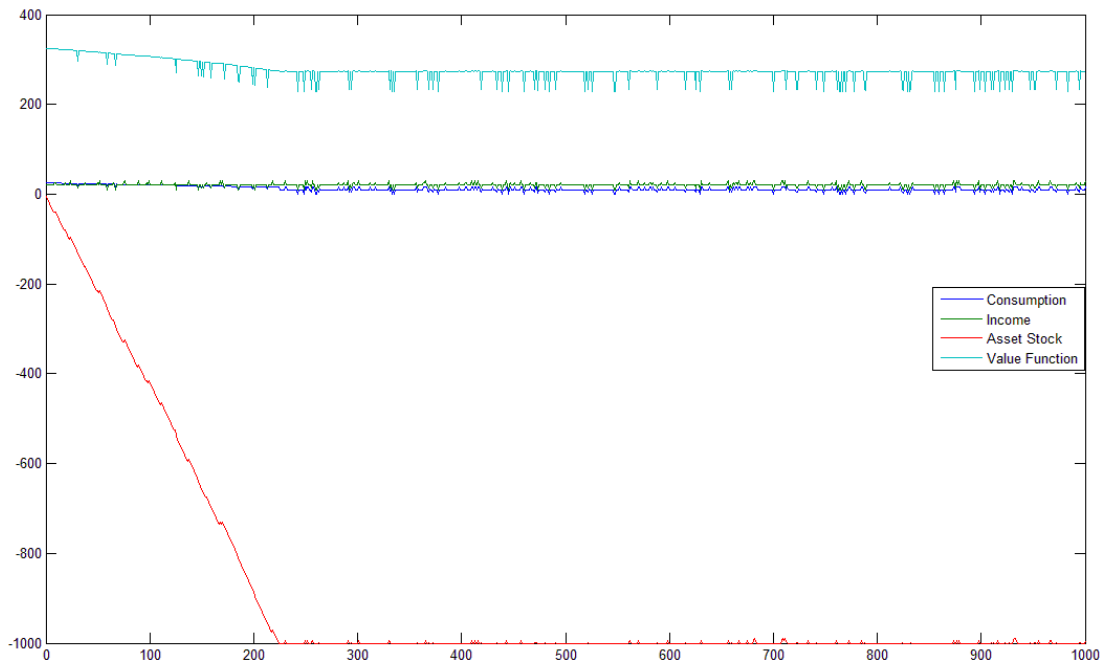
Figure 8: Graph of the Simulation With 0 < ф ≤ 5.

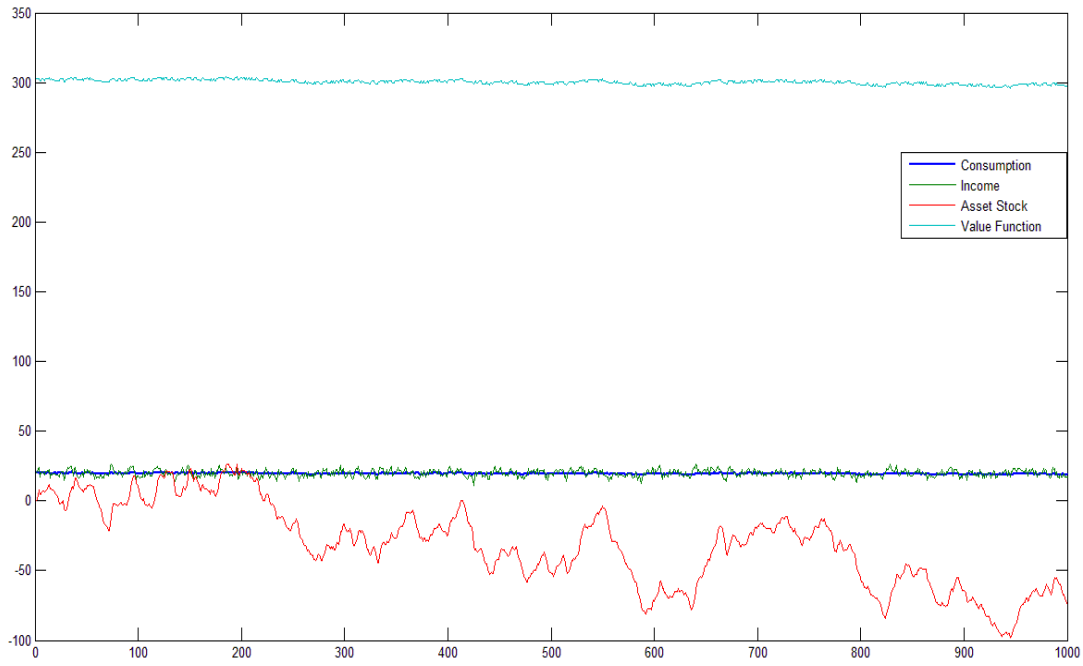**Figure 9: Graph of the Simulation With 5 < ф ≤ 10.**

60

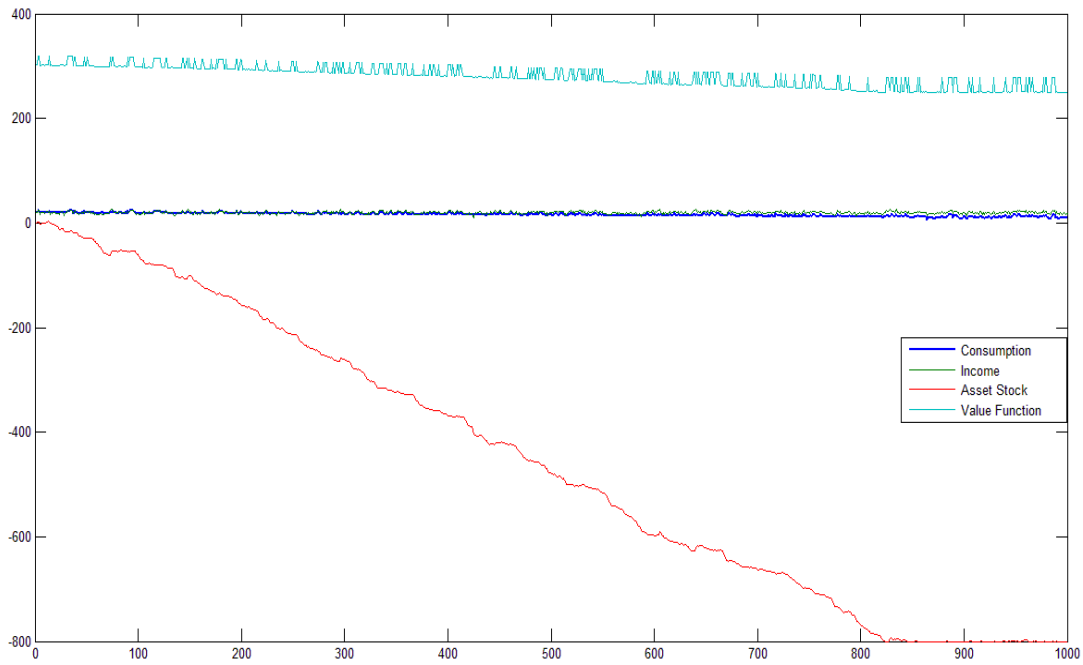**Figure 10: Graph of the Simulation With AR(1) Income and φ = 0.**

Figure 11: Graph of the Simulation With AR(1) Income and φ = 2.

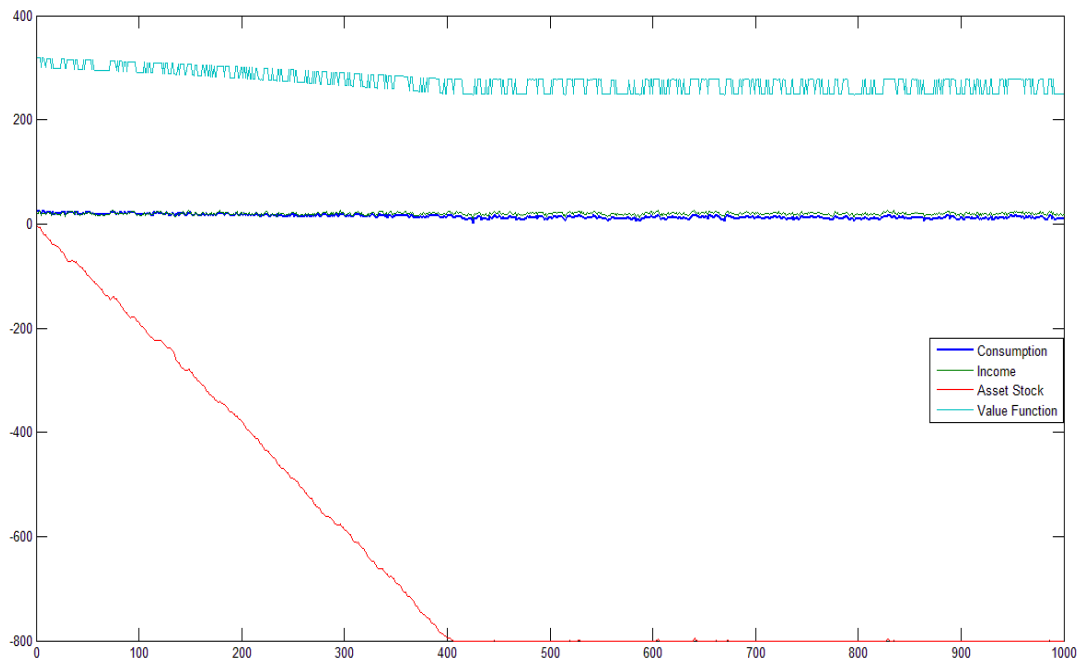**Figure 12: Graph of the Simulation With AR(1) Income and φ = 4.**

APPENDIX D

TEZ FOTOKOPİSİ İZİN FORMU

ENSTİTÜ

Fen Bilimleri Enstitüsü ☐

Sosyal Bilimler Enstitüsü ■

Uygulamalı Matematik Enstitüsü ☐

Enformatik Enstitüsü ☐

Deniz Bilimleri Enstitüsü ☐

YAZARIN

Soyadı : Aşçıoğlu
Adı   : Mert
Bölümü : İktisat

TEZİN ADI (İngilizce) : Information Frictions and the Effects of News Media Bias on Consumption

TEZİN TÜRÜ : Yüksek Lisans ■   Doktora ☐

1. Tezimin tamamından kaynak gösterilmek şartıyla fotokopi alınabilir. ■

2. Tezimin içindekiler sayfası, özet, indeks sayfalarından ve/veya bir bölümünden kaynak gösterilmek şartıyla fotokopi alınabilir. ☐

3. Tezimden bir bir (1) yıl süreyle fotokopi alınamaz. ☐

TEZİN KÜTÜPHANEYE TESLİM TARİHİ: