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CONTENT

SUSTAINABILITY OF FISCAL POLICY: AN EMPIRICAL EXAMINATION FOR TURKISH ECONOMY

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ABSTRACT

Our paper aims to examine the sustainability of Turkish fiscal stance over the period 2006:1-2013:3. The long-run relationship between the tax revenues and the government expenditures are analyzed with regard to the framework of Hakkio and Rush (1991) by employing the bounds testing methodology of Pesaran, Shin and Smith (2001) which test the cointegration in terms of whether the series are I(0), I(1) or mutually cointegrated. To investigate the degree of fiscal sustainaibility, we estimate a long-run ARDL model. We find evidence of weak sustainability condition since the empirical results reveal the existence of cointegration relation though the long-run coefficient is found to be smaller than one.

1. INTRODUCTION

In the last decades, the persistence of rising budget deficits have aroused interest on the sustainability of the fiscal balance for Turkish economy. Although the sustainability phenomenon has been widely discussed (Özatay 1997; Akçay et al. 2001; Kalyoncu 2005; Kuştepeli and Önel 2005), particularly in the aftermath of 2001 financial crisis, a few recent studies (Kia 2008; Payne et al. 2008; Budina and Wijnbergen 2009) focused on the issue. In this context, we aim to examine the long-run sustainability of fiscal stance by using the framework of Hakkiko and Rush (2001). The empirical part of our study stressses on two points which are the analysis of cointegration relationship between the tax revenues and government expenditures and the determination of long-run coefficients. For those purposes, after the implementation of bounds testing procedure of Pesaran et al. (2001) to examine the cointegration, we estimate the ARDL long-run model to analyze the degree of sustainability.

The remainder of the paper is organized as follows. In Section 2 we discuss the theoretical background of the sustainability discussion. In Section 3 we discuss data, methodology and empirical results. We give the concluding remarks in Section 4.

2. THEORETICAL FRAMEWORK

Following the similar analytical frameworks of Hamilton and Flavin (1986), Wilcox (1987) and Kremers (1989); Hakkio and Rush (1991) developed a new approach to analyze the budget deficit sustainability through the intertemporal budget constraints. This approach of Hakkio and Rush (1991) arises from the government's one-period budget constraint,

$$G_t + (1+i_t)B_{t-1} = R_t + B_t$$

(1)

where B_t, G_t, R_t and i_t present the government debt, government expenditures excluding interest payments, government revenues and the interest rate, respectively. Solving forward the equation (1) for t+1, t+2,… periods, the intertemporal budget constraint of government is derived as follows:

$$B_0 = \sum_{t=1}^{\infty} r_t (R_t - G_t) + \lim_{n \to \infty} r_n b_n$$

(2)

where the discount factor $r_t = \prod_{s=1}^{t} \prod \sigma_s$ and $\sigma_s = (1+i_s)^{-1}$. Equation (2) implies that for the intertemporal budget solvency to be hold, the limit should equal to zero. More briefly, outstanding stocks of bonds should equal to the present value of the government budget surplus. Otherwise, Ponzi scheme in which government finances debt by debting would probably arise with regard to the model.

Rearranging the regarding equations through some assumptions, the model is reduced to be as:

$$R_t = \alpha_0 + \alpha_1 GR_t + u_t$$

(3)

where GR$_t$ implies the government expenditures including the interest payments on public debt. The cointegration relation between the government expenditures and revenues is interpretted in support of fiscal sustainability. In addition to the existence of a long-run relationship, if $\alpha_1 = 1$ then it leads to strong sustainability while weak sustainability emerges if 0<α_1<1. Thus, the estimation of long-run coefficients carries a vital importance to determine the degree of sustainability.

3. METHODOLOGY AND EMPIRICAL RESULTS

We utilize monthly data over the period 2006:1-2013:3 to analyze the fiscal stance of Turkish economy. The data which is seasonally adjusted by Census X12 methodology is obtained from CBRT Electronic Data Distribution System. As the first step of the ARDL methodology, we employ bounds testing procedure for cointegration of Pesaran et al. (2001) which provides the opportunity to examine the long-run relationship irrespective of the integration order of the series. To test the cointegration relation for equation (3), we estimate the conditional error correction form of the ARDL model,

$$\Delta REV_t = \alpha_0 + \alpha_1 t + \beta_1 REV_{t-1} + \beta_2 GOV_{t-1} + \sum_{i=1}^{p} \delta_i \Delta REV_{t-i} + \sum_{i=1}^{p} \phi_i \Delta GOV_{t-i} + u_t$$

(4)

where REV and GOV represent tax revenues and government expenditures including interest payments as a percentage of GDP. Case IV (unrestricted intercept and restricted trend case) and V (unrestricted intercept and unrestricted trend case) which are defined by Pesaran et al. (2001) are based on the testing of null hypotheses H_0: $\alpha_1 = \beta_1 = \beta_2$ and H_0: $\beta_1 = \beta_2$, respectively. On the other hand, Case III (unrestricted intercept and no trend case) relies on the test of the joint significance of the lagged variables for the model in which the deterministic trend is excluded. In addition to the F-tests, the long-run relationship can also be examined by means of the t-test of Banerjee et al. (1998) which tests the null H_0: $\beta_1 = 0$, in the models with and without trend. Since the asymptotic distributions of both statistics are non-standard, the F- and t-statistics are compared to lower and upper asymptotic critical values which correspond to I(0) and I(1) regressors, respectively. As a consequence of the cointegration testing procedure, three alternative results could be obtained that are;

i) F- or t-statistic > upper bound (cointegration)

ii) F- or t- statistic < lower bound (no cointegration)

iii) lower bound < F- or t- statistic < upper bound (inconclusiveness of the inference)

Our empirical results regarding the bounds testing are presented in Table 1. The appropriate lag lengths are selected by means of Schwarz Bayesian Criteria (SBC) and Lagrange Multiplier Statistics for autocorrelation. As a consequence, both models with and without trend are estimated with 2 lags as in equation (4). Finally, we compare the F- and t-tests reported in Table 1 to the lower and upper critical bounds and find evidence of long-run relationship between tax revenues and government expenditures with regard to Case V at %5 significance level.

Table 1: Cointegration Results

	P	F_{IV}		F_V		t_V		F_{III}		t_{III}	
REV-GOV	2,2	4.974495		7.310706		-3.797040		3.354538		-2.531771	
Critical values		I(0)	I(1)	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
%1		9.15	10.09	8.74	9.63	-3.96	-4.26	6.84	7.84	-3.42	-3.82
%5		7.02	7.73	6.56	7.30	-3.41	-3.69	4.94	5.73	-2.86	-3.22
%10		6.07	6.74	5.59	6.26	-3.13	-3.40	4.04	4.78	-2.57	-2.91

Notes: p values indicate the appropriate lag lengths for the models with and without trend, respectively which is selected by SBC and LM autocorrelation tests. I(0) and I(1) show the lower and upper bound critical values.

Although the evidence of cointegration between the variables in question could be evaluated in support of fiscal sustainability, we also estimate long-run ARDL model to intensify this finding with regard to the coefficient conditions. Thus, we next estimate the long-run coefficients derived from the ARDL(1,1) model which provides the minimum SBC value. The long-run coefficients are shown in Table 2.

Table 2: Long-run ARDL Model

Estimated long-run coefficients from ARDL (1,1)			
Dependent variable: REV			
Regressor	*Coefficient*	*Standard error*	*t-stat (prob)*
GOV	0.10605	0.046909	-2.2608 (0.027)
intercept	0.0019659	0.1142E-3	17.2164 (0.00)
trend	0.3596 E-5	0.5883 E-6	6.1122 (0.00)

According to the results in Table 2, all coefficients are found to be statistically significant. Moreover, although we find evidence of long-run relationship, the low and negative value of the government expenditure coefficient smaller than 1 could be an indicator of weak sustainability of the fiscal deficits for Turkish economy. More briefly, the tax expenditures could fail to finance the rising government expenditures.

4. CONCLUSION

Turkish economy has experienced macroeconomic instabilities and several crises as a consequence of fiscal deficits since 1960s. Thus, the analysis of the sustainability of fiscal balance has a vital importance to shape the economic policies. Within this objective, we examine the sustainability of budget deficits by utilizing the intertemporal budget solvency framework of Hakkio and Rush (1991) for the recent period of Turkish economy. The long-run relationship between the government revenue and expenditures are analyzed by means of bounds testing methodology. The empirical results assert the existence of cointegration relation which supports the fiscal sustainability.

However, we find that α_1 coefficient is smaller than 1 through to the estimation of long-run ARDL model implying the weak sustainability. Thus, the appropriate macroeconomic policies should be implemented to eliminate the risk of government in financing the future debt.

REFERENCES

- Akçay O.C., Alper C.E., Özmucur S. (2001), Budget Deficit, Inflation and Debt Sustainability: Evidence from Turkey, 1970-2000, Ins. *Inflation and Disinflation in Turkey*, Eds. Kibritçioğlu A., Rittenberg L., Selçuk F., pp. 77-97.

- Budina N., Wijnbergen S.V. (2009), Quantitative Approaches to Fiscal Sustainability Analysis: A Case Study of Turkey since the Crisis of 2001, *The World Bank Economic Review*, 23(1), pp. 119-140.

- Hakkio, C.S., Rush, M. (1991), Is the Budget Deficit too Large?, *Economic Inquiry*, 29,pp. 429-445.

- Hamilton J.D., Flavin M. A. (1986), On the Limitations of Government Borrowing: A Framework for Empirical Testing, *American Economic Review*, pp. 808-816.

- Kalyoncu H. (2005), Fiscal Policy Sustainability: Test of Intertemporal Borrowing Constraints, *Applied Economics Letters*, 12, pp. 957-962.

- Kia A. (2008), Fiscal Sustainability in Emerging Countries: Evidence from Iran and Turkey, *Journal of Policy Modeling*, 30(6), pp. 957-972.

- Kremers J.M. (1989), U.S. Federal Indebtedness and the Conduct of Fiscal Policy, *Journal of Monetary Economics*, pp. 219-238.

- Kuştepeli Y., Önel G. (2005), Fiscal Deficit Sustaianbility with a Structural Break: An Application to Turkey, *Review of Social, Economic and Business Studies*, 5(6), pp. 189-208.

- Özatay F. (1997), Sustainability of Fiscal Deficits, Monetary Policy and Inflation Stabilization: The Case of Turkey, *Journal of Policy Modeling*, 19(6), pp. 661-681.

- Payne J.E., Mohammadi H., Cak M. (2008), Turkish Budget Deficit Sustainability and the Revenue-Expenditure Nexus, *Applied Economics*, 40, pp. 823-830.

- Pesaran M.H., Shin, Y., Smith R.J. (2001),Bounds Testing Approaches to the Analysis of Level Relationships, *Journal of Applied Econometrics*, 16, pp. 289-326.

- Wilcox D. W. (1987), The Sustainability of Government Deficits: Implications of the Present Value Borrowing Constraint, *Board of Governors of the Federal Reserve System Working Paper*, 77.

THE EFFECT OF SOCIO-DEMOGRAPHIC VARIABLES ON ENTREPRENEURIAL MARKETING AMONG POTENTIAL SME OWNERS: A CASE STUDY IN TURKEY

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ABSTRACT

Marketing and entrepreneurship are two different disciplines. The concept of entrepreneurial marketing which serves as the interface of marketing and entrepreneurship is proportionally more significant for SMEs than for large businesses. SMEs which constitute 99.9% of all businesses in Turkey are the focal points for economic expansion. In this sense, the study defines the relationship between the entrepreneurial marketing aspects and socio-demographic features of potential entrepreneurs in Turkey. In the fieldwork done in line with this aim, a relationship between gender and innovation-orientation, one of the aspects of entrepreneurial marketing, has been found. Educational status makes a significant difference in the aspects of risk taking-orientation, innovation-orientation, resource leveraging, proactive-orientation, customer intensity and opportunity-driven.

1. INTRODUCTION

Today, businesses operate in an uncertain market which is increasingly competitive and full of risks due to the removal of borders. From a qualitative point of view, the difference between domestic and foreign markets has already lost its meaning and the ever-changing market affects marketing as well. In this changing and competitive environment businesses which become successful and maintain that success are those that can meet customer demands quickly and offer even more than customers' expectations and have the flexibility to quickly adapt themselves to dynamic market conditions. However traditional marketing is more suitable for larger businesses which have extensive distribution and operate in high competitive atmospheres.

Small and medium-sized enterprises (SMEs), which are given great importance and encouraged in all countries of the world, provide a significant contribution to the national economy and play a key role in this sense. SMEs, which are faced with large businesses, their opponents and global actors may encounter difficulties from time to time in the capacity of marketing.

SMEs can provide efficiency by emphasizing certain features, despite their own weaknesses and the constraints they may experience. In this sense, the concept of entrepreneurial marketing which resulted from the interactions of entrepreneurship and marketing is much more useful, especially for SMEs.

For businesses, there are differences in many aspects between the more efficient traditional marketing and entrepreneurial marketing. Entrepreneurial marketing which possess a different understanding of perspective in regards to method used, focal point, content, approach, etc. can be used to achieve competitive advantage in particular for SMEs. Consequently, first marketing and entrepreneurship and later entrepreneurial marketing concepts and its dimensions will be dealt with. Finally, the results of the fieldwork done towards examining the purpose of the study are presented.

2. MARKETING AND ENTREPRENEURSHIP

As a consequence of the increasing importance of concepts such as employment creation, social development and economic development, entrepreneurship, which is almost as old as human history, has developed a greater importance. Entrepreneurship, which is one of the critical determinants of social welfare and balanced development between regions, is constantly directed by systems, policies and strategies. Thus, it is important to comprehend the meaning of the concepts of entrepreneurship and entrepreneur in the information age and also, in this context, the role of marketing in entrepreneurship. The idea of venture and entrepreneurship has been defined in different ways by different researchers.

The concept of entrepreneurship is a sum of seizing an opportunity, identifying a business idea, finding the required resources, putting these activities into operation and getting the results (Müftüoğlu *et al.*, 2005). According to Lounsbury (1998), entrepreneurship is analyzing alternative production processes and ensuring their optimization. On the other hand, Low and MacMillan (1988) suggest that entrepreneurship be defined as the 'creation of new enterprise' and the purpose of entrepreneurship research should be to 'explain and facilitate the role of new enterprise in furthering economic progress'. Mueller and Thomas (2000) reached the conclusion that some cultures are much more creative than other in terms of entrepreneurship. That there is different entrepreneurship perspectives in different cultures are hence can be considered. In this context, information, which is one of the needs of entrepreneurship, is affected by innovation and creativity.

An entrepreneur is the person who supplies goods in order to meet the needs of others, produce services and combine factors of production such as labor, capital and natural resources appropriately (Mucuk, 1998). It is indicative of the entrepreneur's personality that he or she makes decisions and identifies current and future needs of society based on his or her intuition and experience (Muftuoglu *et al.*, 2005). Entrepreneurs of the information age, operate with the benefit of the information they possess and can quickly offer to the market.

Entrepreneurs usually move with the main aim of making a profit and from this perspective bear the risk they may face. As a result, they are a factor of production themselves (Mucuk, 1998). As a factor of production, the decisions about marketing faced by entrepreneurs, play an important role in their own success. The American Marketing Association (AMA) defined marketing in 2007 as 'the activity, set of institutions, and processes for creating, communicating, delivering, and exchanging offerings that have value for customers, clients, partners, and society at large' (www.marketingpower.com). In this sense, it can be thought that, in the information age, entrepreneurs who are engaged in activities appropriate to the changing nature of consumers, have the ability to adapt rapidly to changing markets and create values can from the perspective of marketing obtain a competitive advantage.

3. ENTREPRENEURIAL MARKETING

Marketing and entrepreneurship are two different disciplines. The concept of entrepreneurial marketing which serves as the interface of marketing and entrepreneurship is a concept which has been developing for almost 30 years (Hills and Hultman, 2013). The concept of entrepreneurial marketing was first used in a conference at the University of Illinois in Chicago which was sponsored by Council for Small Business and AMA in 1982 (Marangoz and Erboy, 2013). Although entrepreneurial marketing is a concept developed all over the world, there are still numerous and exciting opportunities for new discoveries.

When it is considered that entrepreneurship and marketing conceived together increase the chance of success of businesses, the importance of this issue can be understood more easily (Kocak and Ozer, 2005). Definitions for entrepreneurial marketing have been developed in the literature. The concept of entrepreneurial marketing is an approach which focuses on the intuitive perception of market requirements and the development of ideas (Stokes, 2000). Entrepreneurial marketing is defined prospectively as using opportunities in risk management, resource development and value creation, through innovative approaches in order to retain profitable customers. Entrepreneurial marketing is a set of processes and an organizational function which is applied in contributing to the organization and to the stakeholders, creating value, transferring that value and distribution of the value. This concept is characterized by innovativeness, risk-taking, proactivity and only be achieved resources which are not presently controlled (Kraus *et al*., 2010). When the definitions of entrepreneurial marketing are examined, four different tendencies are seen: marketing-orientation, complete integration of marketing and entrepreneurship, associating traditional marketing with innovative marketing techniques and focusing on the point where the company stands in the life curve (Ionita, 2012). In brief, entrepreneur marketing, which combines two different disciplines, presents an alternative approach in marketing.

In entrepreneurial marketing, the components of the marketing mix are adapted to the market where the entrepreneurs operate. Where entrepreneurial marketing is different is where there is a high level of uncertainty in the market. Traditional marketing management encompasses market research conducted to select the target market followed by a meticulous planning and the combination of elements of the marketing mix in order to differentiate it. Entrepreneurial marketing necessitates informal and fast decision making (Collinson and Shaw, 2001). The point in which these two disciplines intersect is a change-oriented, opportunist and management-innovative approach (Marangoz and Erboy, 2013).

Determining the opportunities in the market and producing new, products, innovativeness in the whole marketing process and being open and quickly adaptable to the changes can be considered as the requirements which connect these two disciplines. An important point not to be forgotten is that opportunities are a result of the combination of the abilities of enterprises and a market's needs.

The seven basic dimensions of entrepreneurial marketing are proposed as proactive-orientation, opportunity-driven, risk taking-orientation, innovation-focused, customer intensity, resource leveraging and value creation (Morris *et al*. 2002). These dimensions are the main features which differentiate entrepreneurial marketing from the traditional marketing. Proactive-orientation, opportunity-driven, risk taking-orientation and innovation-focused dimensions are more related to entrepreneurship, while the dimensions of customer intensity, value creation and resource leveraging are more related to marketing. The dimensions of entrepreneurial marketing interact each other and cannot be considered independent from each other.

3.1. Proactive Orientation

Proactive-orientation is behavior aimed towards satisfying previously unnoticed potential needs, taking action by using initiative and creating a new market or a competition environment (Bulut *et al*., 2013). As a response to opportunities, proactive-orientation is a viable approach especially in developing industries or dynamic environment. Proactive-orientation is a future focused perspective which researches opportunities by anticipating future demands in order to change the operating environment and present new services and products before competition even occurs. (Lumpkin and Dess, 2001). As an important dimension of entrepreneurship, proactive behavior can be explained, in the context of entering into markets or sector development opportunities, as decision-makers' tendency to see opportunities in advance and taking action to seize opportunities. In summary, proactive-orientation can mean the mobilization by a company to influence its environment in an entrepreneurial way. It is inevitable that an entrepreneur who takes future into account becomes forward thinking, can see the results of the occurring changes and moreover becomes a part of that change.

3.2. Opportunity-driven

Opportunity expresses unnoticed market positions which are the source of a potential sustainable profit (Morris *et al*., 2002). Businesses which focus too much on the changing demands and needs of their customers in the market and adapt their continuous change efforts accordingly, become vulnerable to new fields and opportunities.

In this context, companies should, on the one hand, engage in market-oriented activities, and on the other hand should engage in the process of obtaining and evaluating entrepreneurial information. Therefore, detecting the opportunities can mean a number of research processes and foresight can be the first stage of innovatively defining opportunities. However, it must be accepted that as part of the nature of entrepreneurship, ever opportunity brings along with it a risk.

3.3. Risk-taking orientation

With the goal of an obtaining economic or social benefit while taking into account potential losses, the thoughts and feelings related to the adoption of a course of action express a risk taking tendency and from this perspective taking action is a risk taking behavior (Bulut *et al*., 2013). Risk is present in all the distribution channel decisions made by a company in regard to selecting a product, service and market (Hacıoglu *et al*., 2012). Entrepreneurial marketing focuses on the redefinition of the environmental factors and continuous collection of information so as to reduce the uncertainty which is seen as the source of risk (Marangoz and Erboy, 2013). Marketers, redefine the elements of the external environment of a company to reduce the company's commitment and sensitivity, in addition to market uncertainty, and also to narrow the external environment in which it operates (Morris *et al*., 2002). In this context, to be controlled can mean that the risk undertaken is significant and the risk is lower than the foreseen result.

3.4. Innovation-focused

Innovation is a priority in companies' achieving a competition advantage and in their survival in the market (Hacıoglu *et al*., 2013). Innovation-focused is not only a phenomenon about new products, it is a comprehensive concept encapsulating all the resources and processes of a company. This concept includes the creation and re-shaping of goods and services to meet the demands; designing new processes to improve efficiency; use of new marketing techniques to promote sales opportunities and use of management systems and techniques to increase operational efficiency (Atik, 2013). Accordingly, entrepreneurship is not only a process which reveals new ideas, products and implements them, but it also should be considered as a process which implements innovative marketing (Kocak and Ozer, 2005). Therefore, a company can be expected to remain within the borders of innovativeness in its future plans and every decision that it will encounter while operating including human resources, information, marketing tactics and product development.

3.5. Customer-Intensity

Entrepreneurial marketing comprises finding customers, keeping them and the need for creative approaches for customer development (Morris *et al*. 2002). Customer intensity means being sensitive to the conditions in the market and creating innovation and company defining characteristics according to conditions (Marangoz and Erboy, 2013). Customer intensity of entrepreneurial marketing can be thought to be associated with market-centeredness. Customer intesity allows new and innovative opportunities in meeting the demands and needs of the customers (Bulut *et al*., 2013).

It is emphasized that especially small business entrepreneurs should adopt and use the internet in developing and sustaining of customer care (McGowan and Durkin, 2002). Today, it is inevitable from this perspective that consumers' easily identifiable or hidden needs must be met through innovative ways.

3.6. Resource Leveraging

Resource Leveraging is an issue present in both marketing and entrepreneurship literature and needs to be focused most of all (Morris *et al*. 2002).

In general, it can be considered that SMEs develop their competitive advantage through the efficient use of scarce resources efficiently and by creating value by developing innovative products or applications. According to Morris *et al*. (2002), resource leveraging in marketing can be achieved by realizing the resources others businesses have not noticed, benefiting from the sources of other businesses, using resources together, using the resources at hand to find other resources and using the past resources of other businesses in different ways. In this perspective, the important method of using the resources of other businesses can be achieved via methods such as using resources together, renting a resource or benefiting from external sources and in so doing scale economy can be utilized.

3.7. Value Creation

While customer intensity is a customer-focused approach which includes emotional components, creation is worldwide recognized dimension (Morris *et al*., 2002). When consumers buy a product, they compare total cost with the total benefit they obtain. According to Kotler (2001) value is a ratio between what the customer gets (benefits) and what he or she gives (costs). Kotler suggest that the marketer can increase the value of the customer offering by raising benefits, reducing costs, raising benefits and costs, raising benefits by more than the raise in costs, or lowering benefits by less than the reduction in costs. For this reason, taking into account both existing customers and potential customers' demands and needs can be considered important.

4. RESEARCH METHODOLOGY

On the one hand, there are small businesses which have failed to produce appropriate solutions towards their customers, while on the other hand there are businesses which because of their size have lost their dynamism and failed (Muftuoglu, 2002). Whether it is a SME or a large business, all businesses operate on the basis of sustainable profit. However, it can be suggested that because the structure and features of large businesses and SMEs differ, the latter of which being components of the economy with the potential to create leverage, their activities also differ.

Kocak and Ozer (2005) claim that the reason why small businesses' marketing applications are insufficient is the incongruity of structure of a small business with the traditional marketing and because the use of techniques used in traditional marketing serve a different purpose. In this respect, it can be offered that entrepreneurial marketing has the qualifications to remove this incompatibility. Most SMEs do not have a separate marketing department where marketing experts are normally employed.

Due to this insufficiency in monetary terms, marketing tools are underutilized. This aspect is one of the main features which differentiate SMEs from large businesses. In general, SMEs experience problems such as the high cost of entry into foreign markets, language issues and lack of information on the laws and regulations of other countries (Muftuoglu, 2002). However, due to the scarcity of customers, the cordiality as a result of the face to face relationship can positively affect customer loyalty. On the other hand, SMEs can utilize the advantages offered by internet and in so doing can make up the difference between them and large business. In this respect SMEs can make use of their flexible structure as an advantage factor in marketing.

4.1. Purpose and Importance of the Research

Businesses face an external environment where a large number of interacting components operate together. Above all, being able to compete in external environment where they are involved is made harder every passing day because of global actors. The changes and developments in the environment, even if they offer threats, also offer opportunities. Events that SMEs may presently encounter, such as uncontrollable environmental variables, the speed of technological developments, quick changes in customer desires and needs, time constraints, limited resources and limited market experience, establish the necessity for entrepreneurial marketing. In this context, entrepreneurial marketing can be thought of as fitting especially for small scale businesses.

SMEs, which comprise a 99.9% share of the total number of businesses in Turkey, provide 78% of the employment in the country (www.sanayi.gov.tr). Despite limited resources, sector experience and influence, SMEs carry a big importance from the perspective of development, both in Turkey and all developed and developing economies. In Turkey, KOSGEB (A Small and Medium Enterprises Development Organization) was established to meet the resource needs and the other problems of SMEs. SMEs will certainly contribute to the revitalization of the nation's economy, but this is only possible with the entrepreneurial marketing approach. As a result, this work is important in respect to increasing the activity of the important dynamics of the economy.

Being sufficient in the dimensions of entrepreneurial marketing for the owners of future SMEs in Turkey will provide for their expectations for sustainable profitability and growth, and also for the sector's development, and along with it, economic progress. In this context, the purpose of this research is to identify the relationship between the entrepreneurial marketing dimensions of potential entrepreneurs and their socio-demographic characteristics.

4.2. Research Model and Hypotheses

The research model can be seen in Figure 1.

Figure.1. Research Model
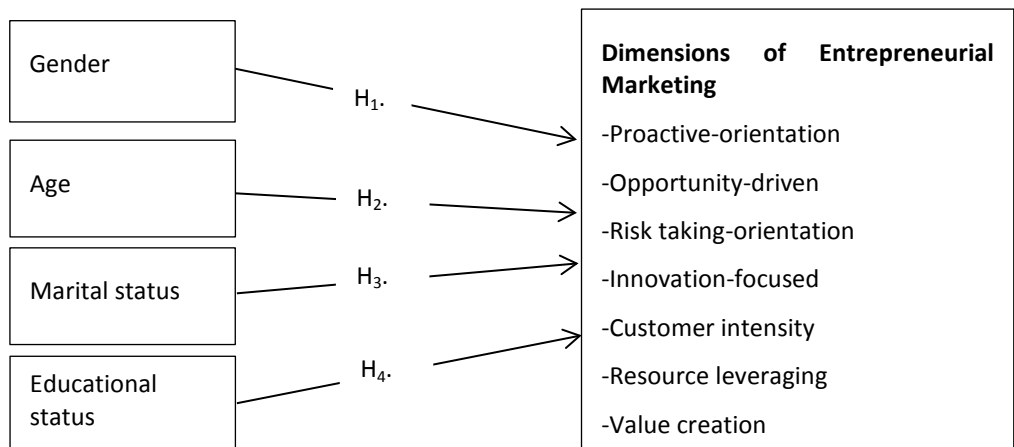
The hypotheses created in the context of the research model are as follows:

H_1. There is a significant relationship in regards to gender and the dimensions of entrepreneurial marketing.

H_2. There is a significant relationship in regards to age and the dimensions of entrepreneurial marketing.

H_3. There is a significant relationship in regards to marital status and the dimensions of entrepreneurial marketing.

H_4. There is a significant relationship in regards to educational status and the dimensions of entrepreneurial marketing.

4.3. Data Collection and Criteria Used in Research

As a method of data collection in the research, the "survey questionnaire" was selected, using a face-to-face interview technique with a total of two interviewers. The survey consists of two parts. In the first part, 42 questions were designed to determine the dimensions of entrepreneurial marketing possessed by the participants. The questions which were designed utilized the work of Becherer *et al.* (2008); there were 7 items for proactive-orientation, there were 5 items for opportunity-driven, there were three 3 items for risk taking-orientation, there were 4 items for innovation-focused, there were 9 items for customer intensity, there were 7 items for resource leveraging and there were seven statements for value creation, making a total of 42 questions. In the questions developed, participants were asked to measure their agreement with the statement, using the five-point Likert scale. In regards to the measurements, 1 means "I strongly disagree", 2 means "I disagree", 3 means "I am neutral", 4 means "I agree" and 5 means "I strongly agree".

In the second part of the survey, questions directed towards determining the demographic characteristics of the participants were administered. After conversions of the criteria were made to fit the original expressions, a pre-test was done on 30 individuals who would represent the research sample, using the convenience sample method. The pre-test

was administered as a face-to-face interview and using the recommendations of the participants, the survey took its final form, incorporating any necessary changes.

4.4. Population and Sampling

The KOSGEB was established in Turkey in order to increase SMEs' share and activity in meeting the economic and social needs of the country, raise their competitive power and level, and to advance integration in industry in a way which is suitable to economic development (www.kosgeb.gov.tr). Within this scope, it organizes 'Applied Entrepreneurship Trainings' and as such contributes in society to creating an entrepreneurial culture and developing new entrepreneur's basic skills. In this context, the research universe is comprised of participants at the 'Applied Entrepreneurship Trainings' organized by the KOSGEB in Turkey. It was hypothesized that all of those who attended a training session would potentially found a SME, because participants in Turkey are offered incentive opportunities for their new business upon completing the training sessions.

However, because reaching all participants who have participated in all the 'Applied Entrepreneurship Trainings' to date is not feasible from the perspective of time or cost, first a research universe was specified. In this context, the research universe is composed of all participants who attended all of the 'Applied Entrepreneurship Trainings' in 2013. Because the universe carries homogenous characteristics, the convenience sample method was used and a total of 150 surveys were administered and 137 usable surveys were obtained from participants at the six group 'Applied Entrepreneurship Trainings' organized in the context of the memorandum between Adana Science and Technology University-İSKUR and KOSGEB, between December 2 and December 20, 2013.

4.5. Limits of the Research

Constraints were encountered in organizing the field research of the work. Because it was unfeasible from a cost or time perspective in the field work to reach all participants of the 'Applied Entrepreneurship Trainings' ever organized by KOSGEB in Turkey, sampling was preferred. Furthermore, the portion of the total training participants who opened a business was ignored.

4.6. Analysis of Data and Results

Statistical analysis was performed using the SPSS 16. Findings regarding the socio-demographic characteristics of the potential entrepreneurs who participated in the survey are presented in Table.1.

Table.1. Socio-Demographic Variables

Variables		Frequency	Percentage (%)
Gender	Female	79	57.7
	Male	58	42.3
Age	18-25	21	15.3
	26-35	70	51.1
	36-45	33	24.1
	46-55	13	9.5
	56 and above	-	-
Marital Status	Single	65	47.4
	Married	72	52.6
Educational Status	Elementary School	16	11.7
	Middle School	19	13.9
	High School	51	37.2
	Associate	26	19.0
	Bachelor's	23	16.8
	Graduate	2	1.5

57.7% of the participants in the research were women, 51% were between the age of 26 and 35, 52.6% were married and 37.2% were high school graduates. No potential entrepreneurs 56 years or older were encountered.

Before performing multivariate statistical analysis, the reliability of the data was analyzed. Accordingly, the results of the reliability tests can be seen in Table 2.

Table.2. Reliability Analysis Results

Dimensions of Entrepreneurial Marketing	Reliability Analysis Scores
Proactive-orientation	89.9%
Opportunity-driven	77.7%
Risk taking-orientation	70.4%
Innovation-focused	80.2%
Customer intensity	83.3%
Resource leveraging	83.9%
Value creation	75.6%

In the social sciences, 0.70 is accepted as the lower limit for the Alpha coefficient. In order to keep the level of reliability high in the dimensions tested to define the characteristics of entrepreneurial marketing, one variable from the customer intensity dimension and one variable from the value creation dimension, a total of two variables, were removed from the related criteria. The removed variables were not used in any analysis after this stage of the research. As a result, the results of all reliability tests obtained are at an appropriate level. To determine first the relationship between socio-demographic variables and the dimensions of entrepreneurial marketing in the work, ANOVA analysis was performed at a significance level of $α=0.05$ and the significance levels obtained can be seen in Table 3.

Table.3.ANOVA Analysis Results

	Proactive-orientation	Opportunity-driven	Risk taking-orientation	Innovation-focused	Customer Intensity	Resource leveraging	Value creation
Gender	0.851	0.423	0.366	0.003	0.270	0.284	0.707
Age	0.400	0.190	0.920	0.115	0.093	0.823	0.549
Marital status	0.445	0.681	0.412	0.550	0.785	0.828	0.395
Educational status	0.000	0.000	0.011	0.037	0.001	0.000	0.198

As seen in Table 4, there is a significant difference for gender in respect to innovation-focused. In this regard, women possess more innovative characteristics than men. Conversely, it was reached that, in regard to age and marital status, there are no differences within the scope of the dimensions of entrepreneurial marketing. With the exception of value creation, there is a significant difference for educational status among all the dimensions. From the perspective of proactive-orientation, those with only an elementary school education have the lowest level, but the level increases across educational status and those with a Bachelor's degree have the highest level. While those with a middle school educational status have the lowest level in respect to the opportunity-driven and resource leveraging dimensions, this increases across educational level with Bachelor's degree holders having the highest level. While those with a middle school educational status have the lowest level of risk taking-orientation characteristics, those with an Associate's Degree are the highest. The group with the lowest level of innovation-orientation is those with a middle school educational status, while this characteristic increases across educational level and Bachelor's and Graduate degree holders have the highest level of innovativeness.

The participants with the lowest level of customer intensity are those with an elementary school educational status, while the participants with the highest level are those with graduate degrees, with the level increasing across educational status. The individuals with the lowest level of the value creation characteristic are those with a middle school educational status, while the highest are Bachelor's degree holders.

In regards to entrepreneurial marketing dimensions and socio-demographic features, ANOVA analysis was performed at an $a=0.05$ significance level in order to test the H_1., H_2., H_3. and H_4. hypotheses by examining whether they show a significant difference. The significance levels obtained can be seen in Table 4.

Table.4. Entrepreneurial Marketing ANOVA Analysis Results

Socio-demographic variables		Average	F	Significance
Gender	Female	3.70	0.799	0.373
	Male	3.60		
Age	18-25	3.76	1.518	0.213
	26-35	3.62		
	36-45	3.54		
	46-55	3.92		
Marital status	Single	3.68	0.137	0.712
	Married	3.64		
Educational status	Elementary school	3.25	6.684	0.000
	Middle school	3.37		
	High school	3.65		
	Associate's Degree	3.77		
	Bachelor's and Graduate Degree	4.04		

In regard to educational status, because the Graduate degree group contained only 2 people, it was combined with the Bachelor's degree group. As can be seen in Table 4, there is a significant difference in respect to educational status and the dimensions of entrepreneurial marketing. From this perspective, H_1., H_2. and H_3. were rejected while H_4. was accepted. Accordingly, those with the lowest level of entrepreneurial marketing characteristics are those with an elementary school while Bachelor's and Graduate degree holders have the highest level. As educational level increases, so do the entrepreneurial marketing dimensions possessed by individuals.

5. CONCLUSION

SMEs, which possess an important place and weight in the economy, are confronted with continually changing environmental conditions, inadequate resources and other specific problems. SMEs, which come up against both large businesses, local competitors and global actors, can from time to time encounter difficulties in respect to marketing. At the same time, SMEs' relatively small size provides flexibility and other advantages. From this perspective, SMEs' thorough evaluation of their own potentially advantageous characteristics, will affect their strength. Comprising 99.9% of the businesses in Turkey, SMEs are a key point for economic vitality and they can be strengthened through their managers' orientation towards entrepreneurial marketing.

The differences between traditional marketing and entrepreneurial marketing, from the perspective of the dimensions of entrepreneurial marketing, entail different skills. The seven fundamental dimensions which separate entrepreneurial marketing from traditional marketing are: proactive-orientation, opportunity-driven, risk taking-orientation, innovation-focused, customer intensity, resource leveraging and value creation. In the literature generally and in our country specifically, works dealing with entrepreneurial marketing are limited. In this respect, providing a perspective on entrepreneurial marketing, which could create an advantage factor for SMEs, both carries importance and

contributes to the literature. In this context, the purpose of the research is to determine the relationship between the entrepreneurial marketing characteristics possessed by potential entrepreneurs and their socio-demographic characteristics.

In the field research conducted towards this purpose, it was reached that there is a significant difference between individuals' educational status and the entrepreneurial marketing dimensions which they possess. The seven dimensions of entrepreneurial marketing were examined from the perspective socio-demographic features to see whether they showed separate differences. In this context, a relationship between gender and innovation-focused was seen. Women possess, in relation to men, more of the innovative characteristics. Educational status also showed a significant effect on proactive-orientation, opportunity-driven, risk taking-orientation, innovation-focused, customer intensity and resource leveraging. However, from the perspective of age and marital status, there were no significant differences across the dimensions of entrepreneurial marketing.

REFERENCES

- Atik A. H. (2003), "Küresel Ekonomide Küçük ve Orta Büyüklükte İşletmeler ve Rekabet Sorunları", Türkiye Kalkınma Bankası A.S Araştırma Müdürlügü, Ankara.

- Becherer R. C., Helms M. M. and McDonald J. P. (2008), "The Effect of Entrepreneurial Marketing on Outcome Goals in SMEs", New England Journal of Entrepreneurship, Vol.15, No.1-2, pp.7-18.

- Bulut C., Pırnar I., Halac D. S. and Oztürk A. D. (2013), "Girişimsel Pazarlamanın Firma Performansına Etkisi", Dokuz Eylül Üniversitesi Sosyal Bilimler Enstitüsü Dergisi, Vol.15, No.2, pp.209-232.

- Collinson E. M. and Shaw E. (2001)," Entrepreneurial Marketing: A Historical Perspective on Development and Practice", Management Decision, Vol.39, No.2, pp.761-767.
- Hacıoglu G., Eren S. S., Eren M. S. and Celikkan H. (2012), "The Effect of Entrepreneurial Marketing on Firms'Innovative Performance in Turkish SMEs", Procedia- Social and Behavioral Sciences, Vol.58, pp.871-878.

- Hills G. E. and Hultman C. (2013), "Entrepreneurial Marketing: Conceptual and Empirical Research Opportunities", Entepreneurship Reseach Journal, Vol.3, No.4, pp.437-448.

- Ionita D. (2012), "Entrepreneurial Marketing: A New Approach for Challenging Times", Management & Marketing Challenges for the Knowledge Society, Vol.7, No.1, pp.131-150.

- Kocak, A. and Ozer, A. (2005), "Küçük İşletmeler Pazarlamanın Neresinde?: Pazar Odaklılık ve İlişkisel Pazarlama", Pazarlama ve İletişim Kültürü Dergisi, Vol.4, No..14, pp.14-26.

- Kraus S., Harms R. and Fink M. (2010), "Entrepreneurial Marketing: Moving Beyond Marketing in New Ventures", Int. J. Entrepreneurship and Innovation Management, Vol.11, No.1, pp.19-34.

- Kotler P. (2001), Marketing Management, Millenium Edition, Prentice Hall Inc., NJ.

- Lounsbury M. (1998), "Collevtive Entrepreneurship; The Mobilization of College and University Recyeling Coordinators", Journal of Organizational Change Management, Vol.11, No.1, pp.51-60.

- Low, M. B., and MacMillan, I. C. (1988), "Entrepreneurship: past research and future challenges", Journal of Management, Vol.14, pp.139-161.

- Lumpkin G. T. and Dess G. G. (2001), "Linking two dimensions of entrepreneurial orientation to firm performance: the moderating role of environment and industry life cycle", Journal of Business Venturing, Vol.16, No.5, pp.429-451.

- Marangoz M. and Erboy N. (2013), "Pazarlamada Paradigma Değişimi: Girişimci Pazarlama", Ekonomi ve Yönetim Araştırmaları Dergisi, Vol.2, No.1, pp.67-91.

- McGowan P. and Durkin M. G. (2002), "Toward an Understanding of Internet Adoption at the Marketing / Entrepreneurship Interface", Journal of Marketing Management, Vol.18, pp.361-377.

- Morris H. M., Schindehutte M. and LaForge R. W. (2002), "Entrepreneurial Marketing: A Construct for Integrating Emerging Entrepreneurship and Marketing Perspectives", Journal of Marketing Theory and Practice, Vol.10, No.4, pp.1-19.

- Mucuk İ. (1998), Modern İşletmecilik, Türkmen Kitabevi, İstanbul.

- Mueller S. and Thomas A. S. (2000), "Culture and Entrepreneurial Potential: A Nine Country Study of Locus Control and Innovativeness", Journal of Business Venturing, Vol.16, pp.52-62.

- Muftuoglu T. M. (2002), Türkiye'de Küçük ve Orta Ölçekli İşletmeler KOBİ'ler, Ekonomik ve Sosyal Araştırmalar: 10, Turhan Kitapevi, Ankara.

- Muftuoglu T., Urper Y., Basar M. and Tosunoglu B. T. (2005). Girişimcilik (Edt. Odabaşı Yavuz), 2nd Edition, TC Anadolu Üniversitesi Yayını No.1567, Eskişehir.

- Stokes, D. (2000), "Putting Entrepreneurship into Marketing: The Processes of Entrepreneurial Marketing", Journal of Research in Marketing and Entrepreneurship, Vol.2, No. 1, pp.1-16.

- http://www.kosgeb.gov.tr/Pages/UI/Baskanligimiz.aspx?ref=23 (Accessed on January 15, 2014)

- http://www.marketingpower.com/AboutAMA/Pages/DefinitionofMarketing.aspx (Accessed on December 5, 2013)

- http://www.sanayi.gov.tr/Files/Documents/KOSGEB_Katalog.pdf (Accessed on January 15, 2014)

THE IMPACT OF CEO STOCK OPTION EXPENSING AS PER SFAS 123 (R) ON EARNINGS QUALITY

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Keywords:	ABSTRACT
CEO compensation, Stock Options, Earnings Quality, SFAS 123 (R), Executive Compensation	This paper examines the relationship between stock option expensing as per SFAS 123 (R) as a part of CEO compensation and earnings quality. We hypothesize the expensing of CEO stock options as per SFAS 123 (R) positively influences earnings quality. This study contributes to literature by further enhancing our knowledge of CEO compensation and the bonding effect of stock options awarded to CEOs. The ExecuComp database provides the sample for CEO compensation from 2000 to 2009. Estimating earnings quality using multiple regressions, we find empirical support for our hypotheses.

1. INTRODUCTION

Chief Executive Officer (CEO) compensation, earnings, and the stock options of CEOs are coming under additional accounting examination as evidenced by the Statement of Financial Accounting Standards (SFAS) 123 (R) issued by the Financial Accounting Standards Board (FASB). CEOs receive large amounts of compensation in the form of stock options even if companies are not making earning targets. This study investigates the impact of expensing CEO stock options as per SFAS 123 (R) on earnings quality. We expect to find a positive relationship between expensing of CEO stock options as per SFAS 123 (R) and earnings quality. With the expensing of stock options, earnings will be lower due to the additional expense; however, the earnings quality as determined by the valuation of the future cash flows will be higher.

Agency theory has been the primary foundation for research to examine the relationship between firm performance and executive compensation.

This underlying theory applies to the observation that the executive of a firm is acting on behalf of, and in the interest of, absentee owners of the firm. The firm's strategy, developed by the CEO executive, should reflect the objectives of the firm's owners. The agency theory, holds that executive officers of a firm will tend to act in their own self-interest in contrast to the interests of the owners who seek to maximize the value of their investment (Butler and Newman 1989). A compensation structure that aligns agents' interests with those of shareholders' may avoid this conflict of interest (Jensen & Meckling, 1976; Tosi, Werner, Katz, & Gomez-Mejia, 2000). Companies grant CEO stock options to align their interests with those of the owners' creating a bonding effect between CEOs and owners.

Previous accounting treatment for stock options, SFAS No. 123, Accounting for Stock-Based Compensation, firms could account for options using either the fair value or the intrinsic value method prescribed by Accounting Principles Board (APB) No. 25 (FASB, 1995)1. Prior to SFAS 123 (R), SFAS 123 allowed stock options to be valued using the intrinsic value method and not to be expensed. However, under SFAS 123 (R), FASB requires the expensing of stock options.

This study contributes the to literature by providing empirical evidence of the association between expensing CEO stock options as per SFAS 123 (R) and earnings quality, thereby further enhancing our knowledge in this area. We find a positive relationship between earnings quality and expensing of CEO stock options pre and post SFAS 123 (R). SFAS 123 (R) allows compensation to be properly expensed reflecting total compensation transfer to CEOs. Cheng and Warfield (2005) study the effect of equity investments to earnings quality. Their findings suggest that stock based compensation and ownership can provide top executives incentives to manage earnings.

The remainder of the paper follows this structure. Section 2 provides the literature review. Section 3 discusses the research method states hypotheses. Section 4 analyzes the results. Section 5 concludes the paper.

2. LITERATURE REVIEW

This section provides the literature review. We partition this section into three areas: CEO compensation and shareholders, earnings quality, and SFAS 123 (R).

2.1. CEO Compensation and Shareholders

Compensation plans are the payments firm owners make to executives who manage the business. CEO's compensation is comprised of salary, bonus, stock options, restricted stock, and other long-term incentives (Cheng and Farber 2008). CEO salary and bonus represent a major proportion of total compensation (Benston 1985; Lambert and Larcker 1987).

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[1] APB is a former authoritative body to issue pronouncements on accounting standards until it was replaced by FASB in 1973.

The supplementary major components of compensation other than salary and bonus primarily represent compensation related to long-term performance measures or deferred compensation that are not explicitly linked to the firm valuation. Stock options, stock appreciation rights (SARs), performance units and shares, restricted stocks, and phantom stocks provided for compensation based on a firm's valuation over several years (Kumar et al. 1993). Analysis must take into account both the total amount and the mix of compensation (Finkelstein and Hambrick 1989). Hence, a review of the equity compensation of CEOs provides a different variation of a long-term focus.

Optimal contracts for and between management and investors, such as compensation agreements, seek to align the interests of the executives with those of external equity claimants' (Healy and Palepu 2001). Murphy and Zimmerman (1986) in an effort to explain the principle-agent problem, find that the level of managerial effort depends on an executive's incentive contract (Lilling 2006). Proper incentive based compensation contracts decrease the likelihood of CEOs acting in their self-interest. Managerial ownership and stock-based compensation, such as option and stock grants, are important mechanisms designed to align managers' incentives with those of shareholders' (Cheng and Farber 2008; Jensen & Meckling, 1976). Compensation schemes are the primary means of aligning managers' interest with those of owners' (Fama and Jensen 1983; Boyd 1994; Jensen & Meckling, 1976). Core, Guay, and Verrecchia (2003) find that the increase in managerial ownership improves firm performance.

2.2 Earnings Quality

We define earnings as high quality if they are persistent; an attribute based solely on the time series properties of earnings. Some define earnings as high quality if earnings accurately represent the economic implications of underlying transactions and events. Dechow and Dichev (2002) define earnings by relating the accruals from current periods to the operating cash flows from last-period, current-period, and next-period. In terms of CEO compensation contracts, shareholders should not only use earnings to assess firm value, they should also use additional information about the CEO's actions related to cash flow.

Comiskey and Mulford (2000) define earnings as high quality if the contemporaneous cash flows are greater (less) than the recognized revenues or gains (expenses or losses), and low quality if the associated cash flows are less than (greater than) the recognized revenues or gains (expenses or losses). In contrast, Dechow and Dichev (2002) define earnings to be of equal quality for firms with high versus low realizations of the sum of the error terms if the variance of the sum of the errors for the firms is equal. Earnings management allows management or those who have control over the accounting records to administer the outcome of the earnings towards their preference (McNichols 2002). Therefore, less active earnings management suggests higher earnings quality (Yang 2006). In addition, less active earnings management also suggests that CEOs' goals align with shareholders' goals.

CEOs as agents of the firms should be maximizing short-term and long-term shareholders' wealth, as they are now shareholders as well.

Executive compensation reduces shareholders' agency costs which in turn enhances the firm value (Kanagaretnam et al. 2009). CEOs awarded with high equity compensation prefer the higher earnings quality since the higher earnings quality is associated with the lower cost of capital and higher stock prices (Francis et al. 2004, 2005). Huang, Wang, and Zhang (2009) find high CEO ownership is associated with the lower cost of equity capital. The lower the cost of equity capital increases firm valuation and earnings quality. Less expenditures in the form of lower cost of equity, capital improves earnings quality. Attaway (2000) finds a positive relationship between the firm performance and stockholders equity as a part of CEO compensation, which in turn increases the earnings quality. The executive stock options are effective in generating positive future payoffs for the firm in terms of accounting earnings (Erickson et al. 2006). Accounting earnings have a positive impact on earnings quality.

Offering CEOs stock ownership options reduces firms' costs and provides more predictable and persistent earnings. The information gap between CEOs and shareholders decreases when both parties are in alignment. This bond and alignment between two parties leads to persistent earnings, which in turn, can improve earnings quality.

2.3 SFAS 123 (R)

In December 2004, FASB released a revised pronouncement, SFAS No.123 (R), requiring all firms to expense stock options to employees based on the fair value at grant date (Ferri and Sandino 2009; Lin et al. 2011). The revised statement, SFAS No. 123 (R), the Share-Based Payment, completely supersedes APB Opinion No. 25. The revised regulation requires all companies to include the impact of fair value reporting for stock option compensation in their income statements. The fair value of an option is determined by option pricing models that take into account current stock price, exercise price, expected dividend yield, expected risk-free interest rate, expected stock price volatility, and expected life of the option (FASB 2004). Furthermore, SFAS 123 (R) requires stock option expensing at fair value with the transfer of ownership in the form of stock options.

The FASB justified the implementation of SFAS No. 123 (R) by stating that "disclosure is not an adequate substitute for recognition" (FASB, 2004, , p. 20). The FASB believes that the value of stock-based compensation is an expense that should be recognized in net income (Aboody et al. 2004).

Issuing stock options transfers claims on equity from existing stockholders to employees and dilutes existing shareholder interests. Because employees provide services to the firm, the value of the transferred ownerships represents a cost of generating earnings (Lin et al. 2011). Effectively, stock compensation represents a transfer of wealth from stockholders to management.

The revised statement, SFAS 123 (R), became effective for fiscal years, annual or interim periods, beginning June 15, 2005 or later, and requires all firms to expense stock options based on a fair market value (FMV) as determined by the organization (Young 2011).

The revised rule requires the adoption of fair value reporting for stock option compensation leading to greater (more negative) expenses thereby increasing overall conservatism in income (Heltzer 2010).

3. DATA AND METHODOLOGY

This section provides the data and methodology. We partition this section into four areas: Dependent variable, Independent variables and Control variables, Model and Sample Selection.

In an efficient market, a firm value is defined as the present value of expected future net cash flows, discounted at the appropriate risk-adjusted rate of return (Kothari 2001). By expensing stock options, FASB believes that the financial reports provide a more accurate valuation of the firm. Additional costs, such as CEO compensation expense and monitoring costs, could negatively affect earnings quality. Because of this change, additional monitoring costs arise to ensure application of proper accounting methods. These actions improve the earnings quality of the firm, although at a price of additional monitoring costs. Therefore, we propose the following hypotheses:

> **Hypothesis 1a:** The expensing of stock options in CEO compensation, effective by SFAS 123 (R) in 2005, is positively associated with earnings quality as measured before 2005.

> **Hypothesis 1b:** The expensing of stock options in CEO compensation, effective by SFAS 123 (R) in 2005, is positively associated with earnings quality as measured after 2005.

3.1 Dependent Variable

Our dependent variable is earnings quality (EQ). We use Dechow and Dichev (2002) model to measure earnings quality with cash flow from operations (CFO) as a primary variable. ()Earnings predictability and accrual quality, both discretionary and non-discretionary, serve as additional proxies for earnings quality as mentioned by Dechow and Dichev (2002). The following earnings quality model provides the dependent variable:

$$\Delta WC = \beta_0 + \beta_1\, CFO_{t-1} + \beta_2\, CFO_t + \beta_3\, CFO_{t+1} + \varepsilon_t \qquad (1)$$

The change in working capital through the sum of past, present, and future cash flows from operations, with estimation error represented by the residual of regression serves as the definition of earnings. The change in working capital and the proxy for CFO is cash flow from operations for cash flow related to accruals. Where, CFO_{t-1}, CFO_t, and CFO_{t+1} represent past, present, and future cash flows from operations, respectively. Residuals from the regression equation reflect the error term.

The residual represents the portion of the change in working capital accruals not explained by lagged, current, and future cash flows. The residuals from the regression reflect the accruals that are unrelated to cash flow (Dechow and Dichev 2002). Prior research demonstrates that the cash flow component of earnings is more persistent than the accrual component (Sloan 1996; Fairfield et al. 2003). Prior research indicates that non-current accruals are given a lower weight in determining annual management compensation than cash flows from operations and current accruals (Kumar et al. 1993). Therefore, we incorporate cash flow from operations to test the earnings quality.

We include an error term as the residual of the regression with the change in working capital as the change of working capital from previous year to current year. The regression produces residuals for each case, which in turn functions as the error term. We estimate the final regression for all the terms mentioned above including the estimation error, which yields the earnings quality proxy.

3.2 Independent Variables and Control Variables

The CEO compensation data exists in the Wharton Research Data Services (WRDS) Executive Compensation (ExecuComp) Database. CEO Compensation consists of the following components: salary, cash bonus, stock options, restricted stocks, and others. Following extant literature, we define cash as the sum of salary and annual bonus (Duru and Reeb 2002; Nourayi and Daroca 2008; Rajagopalan and Prescott 1990; Core, et al., 2003; Attaway, 1997; Jensen and Murphy 1990). Stock based compensation is the sum of the value of stock options and other stock based compensation. Other stock based compensation is comprised of SARs, phantom stocks, and restricted stocks. Total Compensation is the sum of all of these components. To obtain the aggregate of CEO compensation, we add salary (SALARY), Bonus (BONUS), Black Scholes dollar value of stock options awarded (STK_OPT), other stock based compensation (OTHER), and long-term incentive plan (LTIP) payouts. Following Finkelstein and Hambrick (1989) and Boyd (1994), we estimate CEO stock options awards as compensation by taking the natural log and dividing by total compensation (TDC1). Other stock based compensation is the sum of SARs, the value of any phantom stocks (PHANTOM), and the value of any restricted stock options (RSTSTK). The summation equation below equals total CEO Compensation:

$$TDC1 = \Sigma \text{ (SALARY + BONUS + STK\_OPT + OTHER + LTIP Payouts + All Other + Value of Option Grants)} \quad (2)$$

The different components of CEO compensation represent a continuum of shared risk between shareholders and agents, (Finkelstein and Hambrick 1989) and serves as an alignment of the CEO to the shareholders. The percentage of insider stock ownership (%STKOWN) functions as an independent variable. The variable total compensation (TDC1) in this study, serves as the deflator of the individual salary components.

CEO cash compensation, namely salary and bonus, should be positively linked to firm valuation assessed from a shareholder perspective (Agarwal 1981; Ashley and Yang 2004; Attaway, 2000; Gaver and Gaver 1993, 1995; Lewellen & Huntsman, 1970; Sanders and Mason 1998).

Financial Leverage (LEV) predicts firm performance and behaves as an independent variable in this study. Leveraged firms are risky and result in mangers seeking safe investments at the expense of shareholders. Financial leverage can be positively or negatively related to firm performance. Financial leverage is the ratio of total long-term debt divided by total assets.

Prior studies use return on equity (ROE) as the measure of accounting earnings (Baber et al. 1996; Baber et al. 1998; Lambert and Larcker 1987; 1999). Return on equity as the annual stock market return on the shares of common stock serves as a control and independent variable for this regression model (Core, Holthausen & Lacker, 1999). In addition, the independent variable, total assets (TA), calculates as the natural log of total assets.

We also include HIGH_TEC as the dummy variable in the regression. This indicator variable is set equal to 1 for firms belonging to high tech industries, such as Drugs with SIC codes from 2833 to 2836, Computers with SIC codes from 3570 to 3577, Electronics with SIC codes from 3620 to 3674, Programming with SIC codes from 7370 to 7374, and Research and Development with SIC codes from 8731 to 8734. For all other industries, the variable is set to 0.

We use an additional dummy variable (DUMMY_YEAR) in the model to test H1. The dummy variable is set to 0 for periods before SFAS 123 (R) implementation to test H1a. The years prior to SFAS 123 (R) implementation include 2001, 2002, 2003, and 2004. The variable is set to 1 after SFAS 123 (R) implementation date effective June 15, 2005 for H1b. The years post SFAS 123 (R) implementation includes 2006, 2007, 2008, and 2009.

Implied Option Expense (IMPLIED_OPT_EXP) obtained from CompuStat deflated by TA serves as an additional independent variable. We postulate using the period after 2005, that the expensing of stock options incentives of the CEO is positively associated with earnings quality. Stock options increase expense; and therefore, increase earnings quality post adoption of SFAS 123 (R). TA deflates the control variable stock compensation expense (STOCK_COMP_EXP). We use STOCK_COMP_EXP to test period's post 2005 in H1b.

3.3 Model

Ordinary least square regression tests the hypotheses using the following regression model:

$EQ_t = \beta_0 + \beta_1 \, SALARY_t + \beta_2 \, BONUS + \beta_3 \, STK\_OPT_t + \beta_4 \, OTHER_t + \beta_5 \, LEV_t + \beta_6 \, ROE_t + \beta_7 \, HIGH\_TEC_t$

$\qquad + \beta_8 \, DUMMY\_YEAR_t + \beta_9 \, IMPLIED\_OPT\_EXP_t + \varepsilon_t$ \hfill (3)

Each regression equation is at time $_t$, where β_0 is the intercept, and β_1 and β_9 are the coefficients for each variable.

3.4 Sample Selection

The Standard and Poor's (S&P) ExecuComp Database provides the CEO compensation data mainly from the ExecuComp Annual Compensation and Company Financial and Director Compensation databases. CompuStat provides access to the company specific data such as firms' leverage, total assets, return on equity, and implied option expense. If ExecuComp and/or CompuStat, information for any company in the population is missing or incomplete that company is not included in the sample and not replaced. The firms in this study operate within several different industries. We segment the sample by industry classification SIC code and year. Consistent with prior research, firms with SIC codes 4900 (utilities) and firms with SIC codes ranging from 6000 to 6999 (financial services) were eliminated from the sample. These firms are in regulated industries and experience an added degree of monitoring that differentiates their corporate structure from those of other industries.

The study uses firm year observations from 2001 to 2009. This study omits the year 2005 as the effective date of SFAS 123 (R) is June 15, 2005, for publicly traded companies. This study looks at four years before (2001 to 2004) and four years after (2006 to 2009) SFAS 123 (R) implementation to evaluate the immediate response to the standards implementation.

This effort produced 8,231 observations in the sample. The screening process described reduced the sample to 3,599 observations for years 2001 through 2004 to test H1a and 4,632 observations for years 2006 through 2009 to test H1b. The year 2007 represents the largest proportion of the sample with 15.2%. All years in the sample represent between 10.7% and 15.2% of the entire sample. Consumer durables represent the largest industry in the sample with 20.1%. Other industries are only representative of .03% of the sample. Furniture and fixtures comprise only .09% of the sample. We classify industries following Durnev and Kim (2005). This research tests the impact post SFAS 123 (R) implementation (H1b) by removing years 2006 through 2009 and years 2001 through 2004 are separated to test the impact pre SFAS 123 (R) implementation (H1a).

4. RESULTS

4.1 Descriptive Statistics

Table 1 provides the descriptive statistics for the variables in this study including the minimum value, maximum value, mean, standard deviations, kurtosis, and skewness.

In addition, Table 1 also provides information on CEO compensation elements as deflated by TDC1. CEO compensation data include salary, bonus, stock options, and other forms of compensation.

Table 1: Descriptive Statistics

Variables	n	Minimum	*Maximum*	*Mean*	*Standard Deviation*	Kurtosis	Skewness
EQ	8231	.00001	22.162	.12327	.39749	1351.74	29.510
SALARY	8231	.00000	2.0681	.26091	.19073	3.505	1.644
BONUS	8231	.00000	1.0000	.09149	.13285	3.979	1.802
STK_OPT	8231	.00000	4.9204	.13319	.22823	42.253	3.839
OTHER	8231	.00000	1.0000	.04549	.09696	34.102	5.311
%STKOWN	8209	.00000	99.853	12.341	19.076	4.364	2.123
LEV	8231	.00000	3.3873	.18104	.18273	21.807	2.540
ROE	8231	-3942.51	1726.79	2.8804	117.561	608.413	-19.259
TA	8231	1.6963	12.3970	7.30429	1.53288	-.052	.224
HIGH_TEC	8231	0	1	.26	.438	-.789	1.100
DUMMY_YEAR	8231	0	1	.56	.496	-1.936	-.253
IMPLIEDOPTEXP	7409	-.1037	.6659	.007159	.023649	164.396	9.928

The data from Table 1 suggests the mean earnings quality for all firms in the study is 12.3%. The mean salary for CEOs in the study is 26.1% of total compensation (TDC1) with an average bonus of 9.1%. CEO stock options as a percentage of total CEO compensation (TDC1) represent 13.3% percent.

4.2 Univariate Tests

Table 2 reports the Pearson bivariate correlations among dependent and independent variables. As shown in the table, the correlations between earnings quality and the control variables are in line with existing theories. None of the reported correlations is great than 0.50; therefore, multicollinearity is not an issue.

Table 2: Pearson Bivariate Correlations

Variable	EQ	SALARY	BONUS	STKOPT	OTHER	% STKOWN	LEV	ROE
EQ	1.000							
SALARY	.113	1.000						
BONUS	-.008	-.047	1.000					
STK_OPT	-.044	-.079	-.267	1.000				
OTHER	-.009	-.016	-.073	-.007	1.000			
%STKOWN	.003	-.201	.175	-.340	-.087	1.000		
LEV	-.026	-.045	.012	.035	.039	-.022	1.000	
ROE	-.086	-.061	.054	.006	-.010	.005	-0.37	1.000

Note:
p<.05

The highest correlation coefficient between any two variables is 0.37 as displayed in Table 2. The correlation between SALARY and %STKOWN displays low correlation. Results indicating a low negative correlation suggest inverse relations between two variables.

4.3 Regression Analysis

The research design is a multiple regression model examining the relationship between earnings quality and stock options as a part of CEO compensation, with other independent control variables. Hypothesis 1 tests for the positive association of earnings quality with the expensing of stock options in CEO compensation as measured before and after 2005, the effective date of SFAS 123 (R). The hypotheses testing uses a data set that consists of data collected for the dependent and independent variables including years from 2001 to 2009. Table A (Appendix) displays the data for all sample years, data with implied option expense utilized for years 2001-2004 for H1a, and data with stock option expense utilized for years 2006 to 2009 post SFAS 123 (R) implementation for H1b.

Hypothesis 1a tests the dependent change in earnings quality before 2005, whereas hypothesis 1b tests the dependent change in earnings quality after 2005. The Financial Accounting Standards Board instituted SFAS 123 (R) to mandate the expensing of stock options for more informative, transparent, and comparable earnings quality. Increase in stock options increases expenses. Hence, the precision of earnings improves with the adoption of SFAS 123 (R). Utilizing the period post 2005, we postulate that the expensing of stock options incentives of the CEO compensation package positively improves earnings quality. The hypotheses test the more the value of stock options awarded to CEOs as part of the compensation package, the better the impact on Earnings Quality (EQ).

A (Appendix) reflects the R^2 value of .128 for the implied option expense sample 2001-2004. This result suggests that the independent variable for all sample years prior to SFAS 123 (R) implementation explains 12.8% of the variation in the earnings. This low percentage suggests that earnings quality is not dependent on these control variables. The correlation coefficient for these variables is 0.358. Moreover, the F statistic of 72.104 is greater than the critical value. Given that, the significance level (0.000) is less than alpha (.01), we reject the null hypothesis. Therefore, there is support for H1a supports the expensing of stock options in CEO compensation, effective by SFAS 123 (R) in 2005, is positively associated with earnings quality as measured before 2005.

Regression analysis shows that the following variables are statistically significant at the .01 level for sample years 2001-2004: SALARY, BONUS, LEV, HIGH_TEC, and IMPLIED_OPTION_EXPENSE. Therefore, the evidence supports H1a stating the expensing of stock options in CEO compensation, effective by SFAS 123 (R) in 2005, is positively associated with earnings quality as measured before 2005.

Table A (Appendix) reflects the R^2 value of .078 for the sample after SFAS 123 (R) implementation for years 2006-2009.

This represents the proportion of the total variation or 7.8% of the value of earnings quality explained by the independent variables after implementation of SFAS 123 (R). The findings suggest that earnings quality is not dependent on these control variables. The correlation coefficient for these variables is 0.280. Furthermore, F statistic of 48.669 is greater than the critical value. Given that the significance level (0.000) is less than alpha (.01), we reject the null hypothesis. Therefore, there is support for H1b that the expensing of stock options in CEO compensation, effective by SFAS 123 (R) in 2005, is positively associated with earnings quality as measured after 2005.

A regression analysis of earnings quality as the dependent variable shows statistical significance for SALARY, STK_OPT, OTHER, LEV, ROE, HIGH_TEC, and IMPLIED_OPT_EXP. IMPLIED_OPTION_EXP from 2006-2009 is positively related to earnings quality (EQ) suggesting expensing of stock options as mandated by SFAS 123 (R) and earnings quality have an association. Therefore, these results support H1b stating that the expensing of stock options in CEO compensation, effective by SFAS 123 (R) in 2005, is positively associated with earnings quality as measured after 2005. These findings augment the agency theory providing evidence of the mitigation of these conflicts by bonding and alignment of CEO's interest to shareholders interests.

5. CONCLUSION

This study presents a framework for the understanding of stock options as a part of CEO compensation expense as prescribed by FASB 123 (R). By examining earnings quality and expensing of stock options, we find support for the bonding effect. The results support all hypotheses. A positive association exists between the expensing of stock options in CEO compensation, effective by SFAS 123 (R) in 2005, and earnings quality. Not one predictor variable had an advantage over the other variables in predicting earnings quality. We find a statistically significant difference in earnings quality and the expensing of CEO stock options as part of CEO compensation tested before and after 2005.

With the majority of the publically traded firms using stock options and other forms of long-term compensation to align the interests of the CEO and owners, there is a hope and need for continued efforts in improving the transparency and comparability of financial statements as prescribed by the FASB. Compensation committees should continue to monitor CEO incentives to reduce agency costs and thus improve EQ. An objective of this study was to direct attention to these results whereby the actions proposed may increase the global comparability and transparency among financial statements. Business education and management training of CEOs are the groups targeted for such recommendations.

This study makes significant contributions to the research on earnings quality and stock options as part of CEO compensation. This study contributes to the literature in the area of executive compensation by examining stock options expensing as part of CEO compensation   and   its   relationship   to   earnings   quality.

However, suggestions for future research indicate, there is a great deal yet to be learned about the nature of CEO compensation and its relationship to earnings quality. We hope that future researchers will address some of these issues in further investigations. All of these contributions to the literature are positive and help further the study of earnings quality and expensing of stock options.

As a result of this study, several additional interesting research questions arise. With the enactment of Sarbanes-Oxley Act passed in 2002 the impact on the relationship between CEO stock option compensation and earnings quality might require additional exploration. This study focuses on CEO compensation; future studies might include research on executive and employee compensation, which may provide more objective information on compensation. Stock options granted to all employees not just the CEO can be an interesting future study. To see if other long term compensation components affect earnings quality such as restricted stock and phantom stock for example, might be a future investigation.

Additionally, reviewing the compensation committee characteristics may be a future research opportunity. Compensation committee characteristics such as independence, existence, experience, and educational background may affect the components of the CEO Compensation. To study the compensation committee's impact on earnings quality could be a future exploratory study.

Appendix

Table A: Ordinary Least Square Regression Analysis

Variable	All Sample Years 2001-2009			Implied Option Expense 2001-2004			Stock Compensation Expense 2006-2009		
	Coefficient	*t-value*	Significance	Coefficient	*t-value*	Significance	Coefficient	*t-value*	Significance
Constant	.025**	2.013	.044	-.120***	-5.378	.000	.052***	4.443	.000
SALARY	.219***	9.393	.000	.322***	6.757	.000	.200***	8.796	.000
BONUS	.040	1.127	.260	.250***	4.053	.000	.026	.635	.526
STK_OPT	-.029	-1.302	.193				-.035**	-1.991	.047
OTHER	.076*	1.728	.084	.138	1.465	.143	.110***	2.566	.010
LEV	.007	.280	.780	.151***	3.290	.001	-.064***	-2.654	.008
ROE	.000***	-6.298	.000	.000	-1.322	.186	.000***	-6.791	.000
HIGH_TEC	.175***	17.089	.000	.085***	4.178	.000	.138***	13.060	.000
DUMMY_YEAR	.000	.028	.978						
IMPLIED_OPT_EXP	.000***	-5.064	.000	4.835***	18.005	.000	.000***	-4.007	.000
R			.234			.358			.280
R²			.055			.128			.078
F			53.077			72.104**			48.669
Significance			.000***			.000***			.000***

Note: For both samples before and after SFAS 123 (R)

* p<.10; **p<.05; ***p <.01

REFERENCES

- Aboody, D., M. E. Barth, and R. Kasznik. 2004. SFAS No. 123 Stock-Based Compensation Expense and Equity Market Values. *The Accounting Review* 79 (2):251-275.

- Agarwal, N. C. 1981. Determinants of Executive Compensation. In *Industrial Relations*: Wiley-Blackwell, 36-46.

- Ashley, A. S., and S. S. M. Yang. 2004. Executive Compensation and Earnings Persistence. *Journal of Business Ethics* 50 (4):369-382.

- Attaway, M. C. 1997. A study of the relationship between firm performance and CEO compensation. Doctoral Dissertation.

- ———. 2000. A study of the relationship between company performance and CEO compensation. In *American Business Review*, 77-85.

- Baber, W. R., S. N. Janakiraman, and S. H. Kang. 1996. Investment opportunities and the structure of executive compensation. *Journal of Accounting and Economics* 21 (3):297-318.

- Baber, W. R., S.-H. Kang, and K. R. Kumar. 1998. Accounting earnings and executive compensation: The role of earnings persistence. *Journal of Accounting and Economics* 25 (2):169-193.

- Baber, W. R., S. H. Kang, and K. R. Kumar. 1999. The explanatory power of earnings levels vs. earnings changes in the context of executive compensation. *The Accounting Review* 74 (4):459-472.

- Benston, G. J. 1985. The Self-Serving Management Hypothesis: Some Evidence. *Journal of Accounting & Economics* 7 (1-3):67-84.

- Boyd, B. K. 1994. Board control and CEO compensation. *Strategic Management Journal* 15 (5):335-344.

- Butler, S., and N. Newman. 1989. Agency control mechanisms, effectiveness and decision making in an executive's final year with a firm. *Journal of Institutional and Theoritical Economics* 145:451-464.

- Cheng, Q., and D. B. Farber. 2008. Earnings Restatements, Changes in CEO Compensation, and Firm Performance. *Accounting Review* 83 (5):1217-1250.

- Cheng, Q., and T. D. Warfield. 2005. Equity Incentives and Earnings Management. In *Accounting Review*: American Accounting Association, 441-476.

- Comiskey, E., and C. W. Mulford. 2000. *Guide to Financial Reporting and Analysis* New York, New York: John Wiley & Sons.

- Core, J. E., W. R. Guay, and R. E. Verrecchia. 2003. Price versus non-price performance measures in optimal CEO compensation contracts. *Accounting Review* 78 (4):957-981.

- Core, J. E., R. W. Holthausen, and D. F. Larcker. 1999. Corporate governance, chief executive officer compensation, and firm performance. *Journal of Financial Economics* 51 (3):371-406.

- Dechow, P. M., and I. D. Dichev. 2002. The Quality of Accruals and Earnings: The Role of Accrual Estimation Errors *The Accounting Review* 77:35-69.

- Durnev, A., and E. H. Kim. 2005. To Steal or Not to Steal: Firm Attributes, Legal Environment, and Valuation. In *The Journal of Finance*: Blackwell Publishing for the American Finance Association, 1461-1493.

- Duru, A., and D. M. Reeb. 2002. International diversification and analysts' forecast accuracy and bias. *The Accounting Review* 77 (2):415-433.

- Erickson, M., M. Hanlon, and E. L. Maydew. 2006. Is There a Link between Executive Equity Incentives and Accounting Fraud? *Journal of Accounting Research* 44 (1):113-143.

- Fairfield, P. M., S. Whisenant, and T. L. Yohn. 2003. The Differential Persistence of Accruals and Cash Flows for Future Operating Income versus Future Profitability. *Review of Accounting Studies* 8 (2-3):221-243.

- Fama, E. F., and M. C. Jensen. 1983. Agency Problems and Residual Claims. *Journal of Law and Economics* 26 (2):327-349.

- FASB. 1995. Statement of Financial Accounting Standards No 123 Accounting for Stock-Based Compensation. Retrieved from http://www.fasb.org/cs/BlobServer?blobcol=urldata&blobtable=MungoBlobs&blobkey=id&blobwhere=1175820923312&blobheader=application%2Fpdf.

- ———. 2004. Statement of Financial Accounting Standards No 123 (Revised) Share-Based Payment: Retrieved from http://www.fasb.org/cs/BlobServer?blobcol=urldata&blobtable=MungoBlobs&blobkey=id&blobwhere=1175823287357&blobheader=application%2Fpdf.

- Ferri, F., and T. Sandino. 2009. The Impact of Shareholder Activism on Financial Reporting and Compensation: The Case of Employee Stock Options Expensing. In *The Accounting Review*. United States, Sarasota: American Accounting Association, 433-466.

- Finkelstein, S., and D. C. Hambrick. 1989. Chief Executive Compensation: A Study of the Intersection of Markets and Political Proesses. *Strategic Management Journal* 10 (2):121-134.

- Francis, J., R. LaFond, P. Olsson, and K. Schipper. 2004. Costs of Equity and Earnings Attributes. *The Accounting Review* 79 (4):967-1010.

- ———. 2005. The market pricing of accruals quality. *Journal of Accounting and Economics* 39 (2):295-327.

- Gaver, J. J., and K. M. Gaver. 1993. Additional evidence on the association between the investment opportunity set and corporate financing, dividend, and compensation policies. *Journal of Accounting and Economics* 16 (1-3):125-160.

- ———. 1995. Compensation policy and the investment opportunity set. *Financial Management* 24 (1):19-33.

- Healy, P. M., and K. G. Palepu. 2001. Information asymmetry, corporate disclosure, and the capital markets: A review of the empirical disclosure literature. *Journal of Accounting and Economics* 31 (1-3):405-440.

- Heltzer, W. 2010. The Impact of SFAS No. 123(R) on Financial Statement Conservatism. *Advances in Accounting* 26 (2):227-260.

- Huang, H., Q. Wang, and X. Zhang. 2009. The effect of CEO ownership and shareholder rights on cost of equity capital. *Corporate Governance* 9 (3):255-270.

- Jensen, M. C., and W. H. Meckling. 1976. Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics* 3 (4):305-360.

- Jensen, M. C., and K. J. Murphy. 1990. Performance Pay and Top-Management Incentives. *The Journal of Political Economy* 98 (2):225-264.

- Kanagaretnam, K., R. Mathieu, and R. Ramanan. 2009. Stock Option Grants, Current Operating Performance and Deferral of Earnings. In *International Journal of Management*, 26-32.

- Kothari, S. P. 2001. Capital markets research in accounting. *Journal of Accounting and Economics* 31 (1-3):105-231.

- Kumar, K. R., D. Ghicas, and V. S. Pastena. 1993. Earnings, cash flows and executive compensation: An exploratory analysis. *Managerial Finance* 19 (2):55-75.

- Lambert, R. A., and D. F. Larcker. 1987. An Analysis of the use of Accounting and Market Measures of Performance in Executive Compensation Contracts. *Journal of Accounting Research* 25:85-125.

- Lewellen, W., and B. Huntsman. 1970. Managerial Pay and Corporate Performance. In *The American Economic Review*: American Economic Association, 710-720.

- Lilling, M. S. 2006. The Link Between CEO Compensation and Firm Performance: Does Simultaneity Matter? *Atlantic Economic Journal* 34 (1):101-114.

- Lin, C. C., C. Y. Hua, S. H. Lee, and W. C. Lee. 2011. The policy consequence of expensing stock-based compensation. *International Journal of Accounting and Information Management* 19 (1):80-93.

- McNichols, M. F. 2002. DISCUSSION OF The Quality of Accruals and Earnings: The Role of Accrual Estimation Errors. *The Accounting Review* 77:61-69.

- Murphy, K. J., and J. L. Zimmerman. 1986. Financial performance surrounding CEO turnover. *Journal of Accounting and Economics* 16 (1-3):273-315.

- Nourayi, M. M., and F. P. Daroca. 2008. CEO compensation, firm performance and operational characteristics. *Managerial Finance* 34 (8):562-584.

- Rajagopalan, N., and J. E. Prescott. 1990. Determinants of Top Management Compensation: Explaining the Impact of Economic, Behavioral, and Strategic Constructs and the Moderating Effects of Industry. *Journal of Management* 16 (3):515-538.

- Sanders, W. M. G., and A. C. Mason. 1998. Internationalization and Firm Governance: The Roles of CEO Compensation, Top Team Composition, and Board Structure. *The Academy of Management Journal* 41 (2):158-178.

- Sloan, R. G. 1996. Do Stock Prices Fully Reflect Information in Accruals and Cash Flows about Future Earnings? In *The Accounting Review*: American Accounting Association, 289-315.

- Tosi, H. L., S. Werner, J. P. Katz, and L. R. Gomez-Mejia. 2000. How much does performance matter? A meta-analysis of CEO pay studies. *Journal of Management* 26 (2):301-339.

- Yang, Q. 2006. CEO equity compensation, external monitoring and earnings quality.

- Young, B. 2011. Employee Stock Option Exercise Behavior and Firms' Claims about Employee Stock Option Expense. Doctoral Dissertation.

INNOVATION IN THE COOPERATION OF UNIVERSITY – INDUSTRY

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ABSTRACT

Innovation became an important element in acquiring knowledge, in increasing the sustainable and a potent economic growth, global competitive power, and social welfare. The developed countries largely give importance the cooperation of university- industry – government, in order to be able to produce the high value added technologies, and to transfer the studies conducted in university and the practical knowledge in industry to university. Cooperation of university - industry expresses a process, in which the university and industry with the innovative studies they carried out, increasing the employment opportunities, provided the economic advantages, and thus supported to each other. The increase in the global competition makes unavoidable the development of university –industry cooperation and fortification of the entrepreneurship activities in the developing regions. The successes in cooperation become very effective in the developedness of nations: Therefore, among the issues most discussed by the academic, administrative, and political circles, university –industry cooperation is the leading one. From now on, on the point arrived, by adding the research activities to the educational activity, main mission of universities, making a contribution to the social development, moves the concept of entrepreneur university to the agenda and one mentions about giving an active role to the universities in the national innovation system.

1. INTRODUCTION

In today's technology, while the foreign dependency is tried to be impeded, developing the research, technology developing, and innovation culture, a transition process to the information society is focused. This cooperation consists of the interdependences of University, as an institute producing knowledge that is the most important instrument of the cooperation of university-industry and, of industry, as an institute transforming this into the application (Akdoğan, 2007: 86). The concept of university –industry cooperation, as old as that human beings began to live in a society, forms with working of the institutes having the distinct aims and targets in harmony, coming together for a common aim. Carrying out the scientific and technological studies, and that the government prepares organizations provide the social welfare to develop (Yücel, 1997: 69).

With the changes experienced in the production of knowledge, linear innovation model, known as network of indirect relationships that is sequential and takes long time and that has its effect on the world until 1970s, replaced with non – linear innovation model that rapidly gets result and where, all parts are in interaction. Together with non-linear innovation model, the structures, traditionalized for hundreds years, entered the new searches. These searches also brought together the clustering, innovative environment regional innovation systems, new industrial focuses, learning regions, Triple Helix, networks, and in-region and out –region interactions . Upon globalization period in the world, policies, applications and theories of University-industry cooperation showed change with new approaches. Understanding importance of innovation in this period activated internal dynamics of development. Beside development of models that use innovation as an important tool at university-industry cooperation, innovation became a part of global economy and countries have been assessed subject to their performances. In this regard roles of the actors in the countries have been determined; integration of education, research and innovation triple has taken its place in the agenda. The Concept of university –industry cooperation , The concept of Innovation ,Innovation in university – industry cooperation, Linear and non-linear Innovation Models, compared Triple Helix Characteristics and Trends in Japan, USA(United States Of America) and EU(European Union) will be examined at the study. Innovation that is key of economical development today will be considered and importance of innovation at university –industry cooperation and The Global Competitiveness Index in Detail will be mentioned in this study.

2. THE CONCEPT OF UNIVERSITY –INDUSTRY COOPERATION

University- industry cooperation is a cooperation area that expresses the activities of the education and instruction, R & D, and the other activities carried out by combining the existent resources of universities with the existent resources of industry in systematic way so that it can provide benefit to both parts (Dura, 1994: 101). Science, or scientific approach is a requirement of university –industry cooperation. University –industry cooperation plays important role in identifying the tasks of information transfer partnership and conceptualizing the information transfer between universities and industry. Besides that university-industry cooperation is an important actor in presenting the qualified technology and buying the industrial instruments, it also provides a competitive advantage, affecting the rantability, productivity, economy, and continuity and reducing the risks. (Gertner, et al., 2011:625-647). R&D activities, a part of university-industry cooperation is very important in developing the achievement factors such as rapidity, competition, and productivity in terms of business enterprises. In business enterprises, the density of R&D emphasizes that the efforts of university-industry cooperation should be accelerated (Rasiah and Govindaraju, 2009: 529-550). It is claimed by sciences historians that the first examples of university –industry cooperation initiated with the studies the European companies carried out together with the researchers in universities in 1880s (Etzkowitz,1998: 823-833). However, the history of university –industry cooperation first began in England in 17th century.

In 17th centuries, "History Of Trades" program, shaped by Francis Bacon's views, enabling the producers to benefit from each other, targeted on facilitating the scholars to produce solution for the problems emerging in the production and formed an product catalogue transferring to the paper how the main products were produced in detail. This thought was evaluated in "Royal Society of London", one of academic organizations (out of university) emerging in the second half of 17th century. Royal Society of London, laying the foundation of university- industry relationships, embraced "History of Trades" program and pioneered industry revolution that will start in England (Erdil, et al., 2013: 98). In the mid-19th century, in England, Cambridge university, thanks to licensing the inventions and structuring the companies, became one of the first scientific research centers. (Meyer-Krahmer and Schmoch, 1998: 835-851).

Toward the late 19th century, USA universities, transforming into the large research agencies, the entrepreneur universities stood out. In USA, the first examples of university-industry cooperation was seen in Harvard University and MIT(Massahusetts Institute of Technology) (Etzkowitz, 1998: 823-833). Also, the other European University, being under the influence of the change in England and USA, went toward the cooperation with industry.

Germans, in the mid-19th century, transferring the important resources to the universities improving the research aiming at industrialization and national development, first acquired the mission that the research is an inseparable function of universities (Meyer-Krahmer and Schmoch, 1998: 835-851). The beginning of an important change in university -industry cooperation is expressed with the development in the areas of science and technology during 2nd World War. In this period, between the academic and industrial sectors, the new agreements and cooperation were proceeded. (Atik,2007:361). The governments of Germany, England, and Canada benefited from the competency of the research university for the technology they used during the war. Thanks to the academic research, the new technologies such as nuclear energy and radar were further developed. After 2nd World War, it revealed that the academic research was an important factor in the national development. In this period, it clearly emerged that university research was a "basic research" and that industrial research was applied research (Srevatsan, 2011: 13).

The changes experienced after the 2nd World War influenced the research programs of universities and their structures and fund resources changed. In this period, university research was carried out by the funds of private companies, instead of public resources. This situation caused the subjects of research to shift to the different fields, planning and decision to pass to the private sector and, especially, the discussions and regulations related to intellectual property rights.

The cooperation between the universities, independent research agencies, and the firms of private sector increased. The importance given to the education and courses, initiated by universities, increased (Uysal, 2012: 64). "University originated research" approach that became successful throughout 2nd World War also continued after war until 1980s. The main pillar of this process caused the mere science to be shaped best and the conducted basic research to be shaped in the direction of improving the social life.

After 2nd World War, the report titled "Science-The Endless Frontier, written by Vannevar Bush, the head of scientific R&D institutes and consultant of US president in 1945, became one of the most important documents in the scope of the research dimensions of university that are increasingly institutionalized, the contributions of research outputs to the economic welfare and development, and applications of university –industry cooperation all over the world in terms of developing the idea and model (Kiper, 2010: 21).

In 1970s, the rises experienced in oil prices caused the recession in the industrial branches all over the world and decrease in the production. The countries, such as USA and Japan, going toward R&D activities in the industrial sectors, went to a close cooperation between universities and research institutes. Depending on the cooperation, in the areas such as space technologies, automation and robotics, new energy resources, and biotechnology, technological developments were experienced (http://www.pdfio.com/u/ stradigma_com/,30.09.2013).

In 1980s, the changing world balances resulted in reshaping of R&D activities, increase of customer satisfaction, growing importance of technology, and being to be focused on the firms that produce products meeting the demands of customer. In these years, the role of Fareast countries, particularly Japan, in the world market increased and USA also started to move about making a new university -industry cooperation. New cooperation model was termed as "competitive approach". Commercializing of universities, expected them to support the development in the local, regional, and national level, except for the education and research stood out (Uysal, 2012: 63). In these years, the importance of cooperation between university and industry was considered as a driving force of economy for the regional development. In 1980s, the policies supporting the university – industry cooperation had three aims. Among these, the first was university research supporting the technological developments in the sectors that are important to the local industry; the second was facilitating the cooperation research in university –industry centers; and the last was identifying the programs for university research to enter the small sized firms (Srevatsan, 2011: 14).

When arrived to 1990s, universities, adding the cooperation with the government and industry to their missions, obtained growth in this area. The developing countries encouraged the universities to make cooperation for developing strategies. In most of the members of Organization for Economic Cooperation and Development, this relationship was intensified (Martin, 2000:35). Toward the end of 90s, hese developments, together with them, caused the formation of the institutional; legal, administrative, and behavioral patterns. From instructional point of view, as a result of university research, spin off companies were established In the legal area, particularly the studies toward intellectual property rights, the positions of parts in the research project of university, and regulations toward financing the research projects by the private sector were carried out. University-industry partnerships, as administrative, independent research institutes, and university research institutes formed (Ranga, 2002: 1-28).

This process accelerated the commercialization process of academic research results and a number of entrepreneur university were founded. But the issuers such as that the resources are increasingly in the different groups; that university research projects consist of the projects that are short termed and have expectation of trade achievement; the interest confliction increasingly growing between social classes; the constrictions experienced in the funding possibilities of scientific research, and that the results are not adopted by public opinion became a current issue.

In the developed countries, the requirement that university-*industry* cooperation is reconsidered emerged (Ranga, 2002: 1-28). Today, in the framework of university-industry cooperation in the world, there are a number of institutes and research center. The best example of cooperation in the world are Silicon Valley, MIT, and Stanford University in USA.

3. THE CONCEPT OF INNOVATION

Innovation, a word coined from "innovatus" in Latin, refers to, in respect with its origin, "beginning to use the new methods in the social, cultural, and administrative environment" (Elçi et al., 2008: 25). Due to the definition of innovation and meanings it holds, from time to time, ambiguity can be experienced. Innovation, as a concept, tells both the renewal that is a process and novelty that is a result. According to EU and OECD (Organization for Economic Cooperation and Development) literature, innovation, as process, "expresses to transform an idea into a marketable product or service, into a new or developed distribution method, or into a method of a new social service" (Yağcı and Yavuz, 2010: 597). Innovation that acquires a place in Turkish and in the languages of world as a technical term, as also expressed in its lexical meaning, puts into words the result of novelty rather than it itself and the economic and social process depending on differentiating and modifying (Elçi et al., 2008: 25).Innovation was first defined by Schumpeter as a "driving force of development" and then this concept was considered by the different schools of economics in different forms (Mercan and Tünen, 2010: 614).

According to Schumpeter, innovation includes the activities such as inventing a new product, developing a new production method, establishing a new market, developing the new resources, and forming a new organization in any industry (http://www.lib.hit-u.ac.jp/service/tenji/amjas/Kurz.pdf. ,10.10.2013)According to Lowe and Marriott (2006:18-21), even though innovation is an ability to learn and apply, it includes, changing the opportunities to the opinions and using them in the common applications, the new methods and technologies in producing the new products. Thus, the firms can provide their competitive advantages through the movements of innovation. According to Mytelka and Smith (2001:8-11), the data on innovation in EU present that it is also commonly used in the service sector. The firms, beside R& D activities such as education, capital, market research, and design development, spend money on many input. Although the innovation made by firm is not only a decision independently made at the level of firm, but also it is also defined as a process shaping the behaviors of firm and showing its effect in the social and cultural context and the theoretical and organizational framework.

According to Kasza (2004:5), innovation is a research activity including discovery, experiment, development, imitation, and new products; new production systems; and new organizational installations. Dosi notes the features of ambiguity and cumulativeness of innovation. Cumulativeness reveals as a result of learning process of innovation. In terms of product and production process, innovative activities include the unknown discoveries. There is always risk in innovation.

3.1. Innovation in University –Industry Cooperation

The concept of university – industry cooperation, beginning from 17th century it became a current issue, was considered in the framework of the innovation and innovation models. Innovation models consist of the connections and cooperation between the various institutes such as academy, government, private sectors, markets, and cultural and political systems Even though the interactions between institutes lead to the new learning process and new information, also cause the increase of regional and technological innovation (Srevatsan, 2011: 3). The change in the innovation approach, after 19752, showed a parallelism with the policies of science, technology and industry.

Especially, from the linear models, in which disciplinary approaches are dominant, the non-linear models, in which interdisciplinary approaches are based on, stood out (Kiper, 2010: 23). During and after 2nd World War, as a result of successful technological developments, linear innovation model gained importance. Linear innovation model considers the effect of a single variable in novelty.

Figure 1: Linear Innovation Model
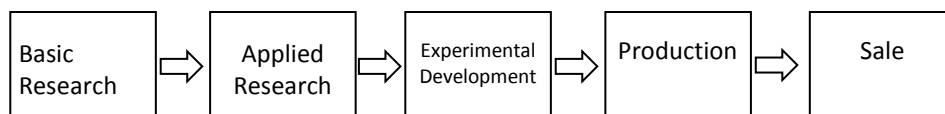
Source: Kiper, 2007: 147, Godin, 2006: 639-667.

As seen in Figure 1, this innovation model starts, first of all, with a basic research being carried out by the universities, government, research institutes, and laboratory of some large firms and innovation activities and with applied research, experimental development, production, introduction of product, and realization of sale

Figure 2: In linear Innovation Model, Classical Relationship between University, Industry, and Government

Government   Social Expectation

Financial Resources   Tax

University   Industry

Scientific Research

Source: Kiper, 2007: 151.

According to Figure 2, in linear innovation model, the relationships of university, industry and government reflect a process in the form of that in the frame of social expectation, the government transfers resources to university; that university makes scientific research with this; that it delivers the results of research and industry makes production with this.
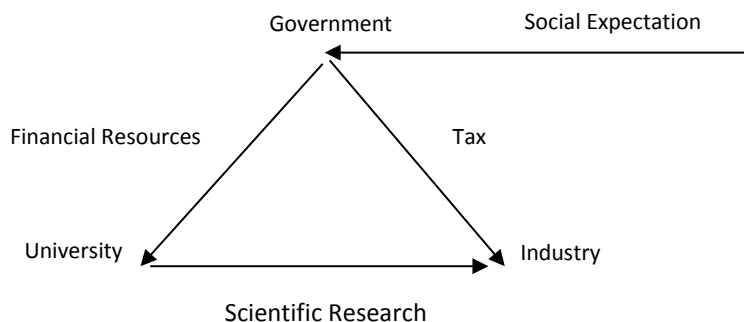
Non-linear models depend on the interactions between different variables rather than a single variable and include, as a result of the complex and continuous interaction in many people, institute, and environment; the feedback of research, technological and scientific information, production process, market toward the future, and invention (Srevatsan, 2011: 29).

Interactive innovation model explains that developing the cooperation between university and industry, the economic growth, renewals in technology, and science and technology occur through social responsibility (Harayama, 2003: 1-9). Non-linear innovation models, through feedbacks, considers the interactive and repetitive terms (Etzkowitz and Leydesdorff 2000: 109-123). 1970s and 1980s proved that the model considering the innovation process as linear remained insufficient.

Following Cold War, in the industrialized countries not carrying out a basic study in a large scale, the achievement in developing of technology became widespread the opinion that the linear model did not work. Introducing, spreading and applying the information, and focusing on the cooperation between institutes increased the importance of nonlinear innovation models. This situation caused the cooperation models of university –industry that are very complicated and multi-actor to become a current issue. Nonlinear innovation models were used in the studies carried out, policies, and structuring as follows:

1- National Innovation System

2- The approach of new "Mode 2" in the production of scientific information

3-Triple Helix" Model

Besides these models, the cooperation networks such as the regional innovation strategies, clear innovation, and clustering, the concepts and applications internalization etc. are also considered in the frame of innovation models.

3.2. National Innovation Model

National innovation system, evaluated an important element in the developments of countries, considers the necessary knowledge and experiences about being able to produce the various products in the quality that is associated with each other and supportive to each other. Also, the system of interest, in such a way that it will broaden horizon of the development and growth, it enables the groups of products and production process to be dentified (Soyak, 2007: 1-5). The effect of deficiencies in institutionalism on the development has an importance as large as technology deficit in the developing countries On this point, the institutes arranging the innovation activity serves as executive and holder of the competitive development programs. Economic development and institutionalism of innovation system are evaluated together. When regarding from a developmental perspective, national innovation system that is existent as a subsystem in contemporary nation-state scope goes toward the targets of national competition and national development simultaneously. For this purpose, about supporting the innovation activity, it provides the use of the institutes, and firms of R&D,; agencies supporting innovation, and innovation infrastructures effectively in national dimension (Arıkan et al., 2003: 215).

In 1990s, national innovation system approach, developed in different places of USA and EU, today, also continues to spread academics as well as policy makers (Işık and Kılınç, 2012: 175). In 1990s, the concept of national innovation model attracted a highly interest in the process of forming the science, technology, and innovative policies. National innovation model, besides it includes the agencies affecting the technological improvement, in terms of that it emphasizes the position of countries in the competition and jıb division, also became highly effective on the science and technology policies implemented (Saatçioğlu, 2005: 181).

The concept of national innovation model was introduced by Frederich List, German philosopher. List criticized the classical economists, because they did not give sufficient place the science, technology, and skill in the development of nations. List, suggesting that the dominance of England in the world market was resulted from its technological dominance, considers that, even though many English economist argue free trade, in practice, the English governments follow the policies that are protective and try to prevent the technology transfer abroad (Saatçioğu, 2005 181).

A general definition of National innovation system, again made a current issue by Freeman and developed by the contribution of a number economists, could not be made. Freeman suggested that its success depended on the educational system between and within the firms, managements, and sub –systems. Freeman argues that these interactions initiated, imported, modified, and spread the new technologies (Freeman, 1995: 5-24). The concept of national innovation system is considered as important institute for examining the technology by interactional organizations and policy maker in many places of the world. In order to be able to measure the success of national innovation system and to be able to compare the systems of countries to each other, systems are also developed. In this scope, collecting the statistical information pertinent to the countries by the agencies whose competencies are known, for the inputs and outputs of innovations, the measurable analyses are tried to be conducted. Among these, innovation ration card, provided by EU, gives an idea about the success of country innovation systems (Kiper, 2010: 25).

4. "MODE 2" INFORMATION PRODUCTION MODEL

Globalization is that the world economically becomes a great market and expresses the effect of technological developments on the human life, popular culture, culture, and similar concepts. Globalization affect each area and each institute. One of these institutes is education, and, depending on this, universities, because universities, together with modernism, are seen as one of the most important instruments (Yılmaz and Horzum, 2005:104). The change of social structures in universities caused, in time, the understanding of information producing to change. That information productions systems in universities themselves do not hold time concern and indifference to the problems experienced in practice reveals that a new road map should be drawn (Kiper, 2007: 148). Mowing away from introverted information production approach, stated as "Mode 1", in which academic concerns are dominant, one began to be worked with "Mode 2" approach, i.e. in daily life and in closer contact among the other information managers. "Mode 1" is defined as information production approach that stands out the disciplinary structure of universities and in which, the information produced by this approach are published in academic magazines and, generally with this way, shared with all academic community (Hahendahl, 2005: 1-21). While quality measurement of information outputs of Mode 1 is mostly realities, information output of Mode 2, is the "performance of employees". Via cooperation organizations such as clusters and networks, information terms are the important factors of "Mode 2".

5. "TRIPLE HELIX" MODEL

The increasing role of information from the view point of society, and of university from the view point of economy stood out the relationships of university-industry and the institutional relationships between government, private sector, and university toward innovation were analyzed by Triple Helix model (Etzkowizt, 2002: 1-18) This model, described by Etzkowitz nad developed by Leydesdorff, in contrast to linear innovation model, represent the instructional relationships between public, private sectors and academy world by Triple Helix and fix these relationships at the different levels of the structure under consideration and try to explain the use of information as capital (Kiper, 2007:153). Triple Helix model, introduced by Etzkowitz and Leydesdorff, inspiring from the similarity in double helix of DNA structure, with the motivation to encourage the academic research and economic development, as interweaved rings, was formed in the axis of university, industry and government.

Model attempts to explain the management of science and technology world, information spread; social responsibility and acceptability of science; and the relationship level of each actor in the innovation process (Çetin, 2009: 54). In 19th and 20th centuries, the different helixes formed by university-industry-government effectively occurred. However, In the exchange relationships between them and internal events in each of them, with historically examining three helixes in a single way, Triple Helix model appeared (Etzkowitz and Leydesdorff, 2000: 109-123; Shinn, 2002: 599-614).

The world now shifts to this model, in which it overlapped the roles of three actors on this model; the solidarity and cooperation, and continuous interaction are effective: Helix model evaluates the function of universities in the formation of new companies, and in facilitating the regional growth in the other projects such as science parka, incubation plants, universities, and Technology transfer offices (Etzkowitz, 2002: 1-18).

Triple Helix model is an important model for innovation structure of university –industry interaction in information based society (Etzkowitz, 2003: 293-337) According to Etzkowitz and Stevens(1995:13-31), "in addition to the connections between university - industry – government, each actor acts the role of the other one". Thus, universities, assuming beside academic dimension, the various studies such as marketing information as tasks related to entrepreneur, provide sharing of information between each other.

Figure 3: Statist University –Industry –Government Cooperation Model
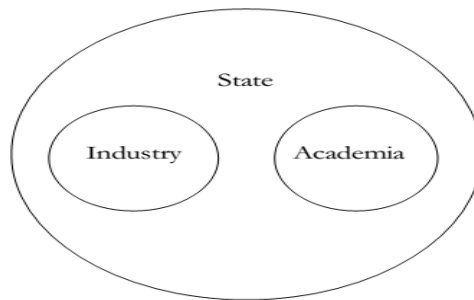
Source: Etzkowitz, 2002: 1-18; Etzkowitz ve Leydesdorff, 2000: 109-123

As seen in Figure 3 statist university – industry -government cooperation model shows a relationship, in which national state includes in academy and industrial sector and manages the relationships between these two sector. This model is related to Soviet Union and East European Countries, where state owned firms prevail.. Model was seen in Latin America, and in European countries such as Norway (Etzkowitz, 2002: 1-18).
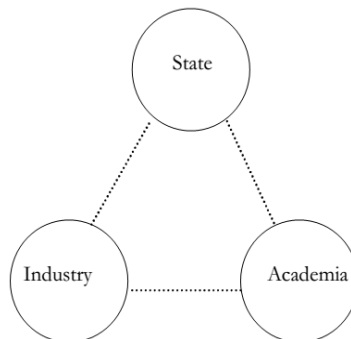
Figure 4: Liberal University –Industry –Government Cooperation Model

Source: Etzkowitz, 2002: 1-18; Etzkowitz ve Leydesdorff, 2000: 109-123

As expressed in Figure 4, liberal university –industry - government cooperation model expresses a system, in which the government are less dominant, the limits of each of institutional area is clearly defined, and the frame of relationship with the others. Swedish policy can be given as an example for this liberal model (Etzkowitz, 2002: 1-18).

Figure 5: Triple Helix Model in University - Industry -Government
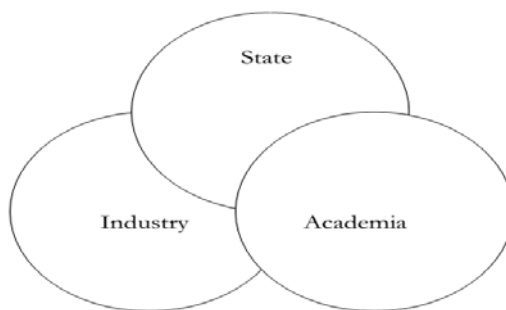
Source: Etzkowitz, 2002:1-18; Etzkowitz ve Leydesdorff, 2000: 109-123

As seen in Figure 5, Triple Helix Model in university –industry- government is a model, in which there are dynamic triple relationships such as academic entrepreneurship, strategic alliances between companies, government –university - industry cooperation, the common use of facilities This model represents a developmental focused and innovative model, in which the three areas (university – industry -government) showing continuous development affects each other and the institutes act not only for realizing their own aims, but also the aims of the other institutes. This method, as known Triple Helix, are very frequently used in Europe (Etzkowitz, 2002:1-18; Lefebvre et al., 2009: 1-13).

In the framework of Triple Helix model, in the regional development, university undertakes roles such as regional agglomeration, human capital accumulation, governance, and cultural norms. As a result of establishing the new firm and location of the new or existent firms around university, changing the information into capital, and projects on capital accumulation occur in the framework of the region focused education, research and entrepreneurship activities, and regional agglomeration. Integrating the activities of education and information; establishing the firms; and developing the program that foresee between –institutes communication; developing the educational programs for meeting the regional need; recruiting region focused student and graduate; and forming the learning process that knows the region actualize via human capital accumulation. By examining the weakness and strength, bringing the industry and government into together, the capitalization of information; motivating the regional innovation strategy; again by making a contribution to the social and cultural base of the region, increasing the effectiveness of governance; shaping the regional networking and institutional capacity with the participation of the employees of agency in the relevant entities; and the service of information and examination to support making decision and networking and networking between the national cultural and international actors comply with governance.

The traditional university- industry – government jointing related to the information occurs in the framework of the cultural norms. The role of university in the regional development occurs by linking the region focused activity to the local environment of university. University getting close to its region, with the resources of human, skill, and information, increasingly makes more important contributions to regional networking, and developing the institutional capacity. Beside its scientific and technologic roles, university, contributing to the social and cultural base of the region, increases the effectiveness of governance. The concept of learning economy relates the economic success to the capacity to acquire the new information and talents; does not limit the instruction with high technology sectors; and takes place in all parts of society. In the learning region, individual skills, as a result of inter-groups information transfer, learning systems emerge (Durgut, 2007: 14-15).

Triple Helix model consists of actors at micro level, institutional structures at meso – level, and "codes and regulations " at macro level ((Viale and Ghiglione, 1998: 1-8; ; Kiper, 2007: 153-154).

Actors; Actors consisting of the sectors of academy, government and industry, play at micro level. In the framework of this model, the public researchers are asked to work in a company; private entrepreneurs to work in a laboratory or TTO of a university; academics to be small sized private entrepreneurs of the projects they developed; and the researchers of academic and industrial sector to serve in a public project or in management of the regional technology transfer institute.

Institutional structures ; These are, forming the technological information, the structures organizing the production and playing role in macro level. Hybrid innovation structures is hybrid formed structures that are directly responsible for the use of information and production; and that emerge from the interaction between university, industry, and government (For example, high technology based companies emerging from university, spin-offs, risk capital structures established by university).Innovation interfaces are the institutes functioning interface between business world and universities. Innovation coordinators that are kept responsible for coordination and management of the innovation efforts in the different areas.

Codes, rules and guidance; These are elements playing role at macro level. These elements fix the polices and their applications. Actors play their roles according to this framework and regarding to the finance supporting mechanisms. In USA, Code of Risk Capital, enacted to support high technology company with the instruments of the science, technology, and policy and Nasdaq Stock Market, established for these companies to benefit, are the examples of legal framework and institutional mechanisms serving this aim. Code od Risk Capital, enacted to support advance technology companies and some effective instruments such as Nasdaq Stock Market, established for the companies, similar to this, to benefit serve this aim (Kiper, 2007: 153-154).

From historical point of view, the countries suggested the innovation models by Triple Helix model, in which the government earlier largely affected the relationship and performance between the university and industry. In this model, the role of each actor is certain   and   these   roles   do   not   overlap.

Today, most of countries pass to Triple Helix model, in which each innovation structure, like interface and institutes, plays role (Sakınç and Bursalıoğlu, 2012: 97)).In 1970s, against the increasing technological competitive power of Japanese companies, in 1980s, in USA, considering the analyses drawn from the economic achievement of Japanese innovation system (e.g. low cost manufacturing), some reforms such as Code of Intellectual Property Rights are put into operation. In 1990s, the success of American innovation model that develops in the leadership of computer technology made leadership in the reform of national innovation system still continuing in Japan. At the present days, USA, based on some examples in the existent Japan policy strategy, concentrates on the more advance processes in the areas such as education and mobilization of human resources (Jofre and Andersen, 2009: 5).

Table 1: Compared Triple Helix Characteristics and Trends in Japan, USA and EU

	Performing Countries /Regions		
Triple Helix	Japan	US	EU
University	**Trends:** Privatization with corporate status: aiming more administrative autonomy and funding diversification, involvement of faculty staff in entrepreneurship, increasing excellence in education and research, and infrastructure modernization. focusing on attracting and keeping foreign skills, increasing (international) postdoctoral positions, increasing selectiveness of admission, recruitment of young scientist, creation of in-house Technology Licensing Organisations (TLOs); increasing volume, quality and impact of scientific production; increasing collaboration with industry (staff mobility, technology licensing, services and training). Tendency to increase scientific production and research support with industry, and number of patents applications. **Role:** Historically low to Moderate (aiming higher)	**Trends:** Autonomy and decentralization: aiming research and education excellence. Focus on high impact research, funding diversification, intense competition for human and financial resources nationally and internationally, highly selective standards for enrolment and admission, and increasing entrepreneurship capability and effective in-house IPR support. Scientific production rate tending to decrease in proportion to decreasing enrolment of foreign labour and enrolment of national students **Role:** High (aiming to sustain)	**Trends:** Public with focus on national priorities: open admission and low tuition fees schemes, rigidity of funding schemes, low incidence of non-EU foreign skills, recruitment and admission predominantly within nationals. Aiming excellence on education and research, more autonomy and funding diversification, increasing scientific production and international impact, national and international networking, attracting and keeping foreign skills, increasing and diversifying collaboration with industry, optimization of IPR mechanisms, increasing human resource mobility Tendency to: decrease admission and graduation rate, number of aging faculty and decrease labour pool, scientific production and international impact of publications **Role:** Historically high (tends to decrease)
Government	**Trends:** Undergoing reform of administrative bodies (less divisions, more autonomy and power), design of long-term and consensual S&T and R&D plans and strategies, encouraging and mediating industry-academy collaboration, aiming social consensus, aiming less "interference", increasing funding of R&D. **Role:** Historically high (aiming Moderate)	**Trends:** Dictating and keeping "rules of the game" through regulation and Deregulation, facilitating Innovation environment, setting up national priorities, aiming more "presence", aiming more funding to R&D **Role:** Moderate (aiming Higher)	**Trends:** Funding, coordination and basic orientation of communitarian R&D and S&T policies, formation and regulation of the communitarian market, aiming higher R&D investments, aiming higher coherence of communitarian S&T policies and national innovation policies. **Role:** Moderate (aiming Higher)
Industry	**Trends:** Highly organized and localized, nationally-oriented, with high incidence in Government's S&T policies and strategies (tends to sustain); strong "in-house" R&D and High embedded tacit knowledge (sustaining); long-term and large-size networks; low human resource mobility; low Venture Capital formation. Tendency to increase: risk capital, recruitment of foreign skill, international networking, outsourcing of basic research and collaboration with academy **Role:** Historically very High	**Trends:** Independent and competitive, highly localized, and internationally-oriented. Diversified R&D with lower embedded tacit knowledge, high labour mobility and foreign skill dependency, short-term collaboration networks, and active collaborating in Basic research, efficient in-house IPR support, and considerable venture capital formation. Tendency to: decrease foreign labour recruitment, increase networking and collaboration span, and increase outsourcing **Role:** Very High	**Trends:** Highly fragmented, geographically dispersed, and nationally-oriented. Low incidence in the S&T policy design at EU level but higher at national level, dynamic and complex networking structure, highly skilled labour force with low incidence of foreign skills, dynamic but inefficient collaboration with academy due to prevailing IPR structure. Tendency to: increase number and weigh of SMEs, reduce skilled labour pool, aging labour market. Aiming to: increase foreign recruitment and outsourcing, increase global competitiveness, and improve IPR mechanisms **Role:** Historically High
Own source			

Source: Jofre and Andersen, 2009: 5

In Triple Helix model, in the context of university – industry –government, the way and tendencies followed in Japan, USA; and EU are summarized in Table 1 Triple Helix model are still conceptually very fluid. One of the most important reasons of this is the concepts such as national innovation system, techno-economic paradigms, new information society, innovation models, and approach of "Mode 2" information production are closely related to each other (Kiper, 2010: 30-33).

The problems experienced in the world economy in the financial meaning affect the countries. But, in the scope of innovation and R&D, the counties featuring university – industry cooperation can more easily come over these problems experienced.

R&D (Research&Development) and innovation are directly related to the height of the welfare level of countries. Beside the individual capabilities, entrepreneurship, and public supports, it is an important factor for innovation. The firms such as Google, Apple, and Boeing are in USA, because, besides USA is a leader country in the innovation area, it enables the most appropriate environment to form for the innovation of public policies, on ecosystem, cooperation environment, academics, entrepreneur, national market, financial system, and all other components. In Turkey, the inadequacy of national policy, and that ecosystem is not suitable, cause it lags behind in university – industry cooperation (MÜSİAD, 2013: 27-28).

Table 2: The Global Competitiveness Index in Detail

Country	Capacity for innovation	Availability of scientists and engineers	Quality of scientific research institutions	University-industry collaboration in R&D	State of cluster development	Company spending on R&D	PCT patents, applications /million pop.
Switzerland	2	14	2	1	9	1	2
UK	12	12	3	2	10	12	18
USA	7	5	6	3	12	7	12
Japan	1	2	11	16	5	2	5
Germany	3	40	10	11	8	4	7
South Korea	19	23	24	25	22	11	9
Singapore	20	13	12	5	3	8	13
China	23	46	44	35	23	24	38
Finland	4	1	13	4	6	3	3
Israel	6	9	1	8	58	6	4
Puerto Rico	38	3	38	32	32	35	-
Sweden	5	4	9	7	14	5	1
Taiwan	15	7	19	12	1	10	-
Italy	28	45	43	65	2	32	24
Turkey	48	41	88	70	43	56	42

Source: WEF -The Global Competitiveness Report 2012–2013

You will find alignment of some countries subject to their innovation capacities at Table 2. Japan is at the 1st order at innovation capacity among 144 countries in the world, Swiss is at the 2nd order, and Germany is at the 3rd order. Finland is at the 1st order, Japan is at the 2nd order and Puerto rico is at the 3rd order about growing scientist and engineer. Regarding to number of scientific research institution, Israel is at the 1st order, Swiss is at the 2nd and England is at the 3rd order. Swiss is at the 1st order, England is at the 2nd order and USA is at the 3rd order about university-industry cooperation. Taiwan is at the 1st order, Italy is at the 2nd order and Singapore is at the 3rd order about aggregation potential.

Swiss is at the 1st order, Japan is at the 2nd order and Finland is at the 3rd order about private sector and RE&DE expenditures. Sweden is at the 1st order, Swiss is at the 2nd order and Finland is at the 3rd order about usable patent. Turkey is at the 48th order at innovation capacity; at 41st order at growing scientists and engineer; at 88th order about number of scientific research institution; at 70th order about university-industry cooperation; at 43rd order about aggregation potential and at 56th order about private sector and RE&DE expenditures and at 42nd order about usable patent

6. RESULT

Although innovation process is expressed by the harmony of learning national economies with the global system, that the novelty potentials recognize the institutional variations is correlated to the development and competitive stages The process that is desired to be reported with the innovation system, through its making a contribution to realization of rationality action, is to provide the long termed optimal use of resources (Karaçor, 2007: 43). The fact that the decision makers are in mutual interaction reaching the aim function constitutes the main idea of the concept innovation. For the continuous formation off innovation process, while the government is protecting the stability of necessary information network structure of the developmental and competitive formation, the innovative firms, using information infrastructure generating the systems of economic growth and competition that forms and distributes information, establish the network structure. National innovation system forms by this effort of decision makers (Karaçor, 2007: 44). In many studies in the literature, it reveals that there is a linear relationship between innovation system and development. In the economic development that is associated with the institutional and organizational structuring of a country, innovation system is very important. (Işık ve Kılınç, 2012: 170).

Besides innovation is a scientific based structure having importance for universities and industry, it also the needs for market having importance and showing technological development for industry the production of new information, dominated by universities and large scientific based organizations; technological development, dominated by organizations; and that the customers express their needs and desires via the consumption of products constitute the conceptual framework of innovation. As a conclusion, in this study ; it is understood that innovative ability of a country needs one more than actors, such as university and industry, not a single actor; that these actors should act in a certain harmony; and or this, there is also a need for the other actors to provide this harmony.

REFERENCES

- Akdoğan, Asuman (2007). Üniversite-Sanayi İşbirliğinde Tarafların Beklentileri ve Beklentileri Etkileyen Bir Faktör Olarak Yenilik Kültürü.(Editör: Rıfat Yıldız ve Hayriye Atik). *Üniversitelerdeki Araştırma ve Uygulama Merkezlerinin İşlevselliği: Üniversite-Sanayi İşbirliğinin Yeniden Yapılandırılmasının Gereklilikleri.* Ankara: Detay Yayıncılık, 85-104.

- Arıkan, Cemil, Akyos, Müfit, Durgut, Metin ve Göker, Aykut(2003).*Ulusal İnovasyon Sistemi Kavramsal Çerçeve Türkiye İncelemesi ve Ülke Örnekleri.* İstanbul: Türk Sanayici ve İşadamları Derneği Yayınları (TÜSİAD).

- Atik, Hayriye (2007). Bilgi Toplumunun Dinamikleri ve Teknolojik Gelişme.(Editör: Rıfat Yıldız ve Hayriye Atik). *Üniversitelerdeki Araştırma ve Uygulama Merkezlerinin İşlevselliği: Üniversite-Sanayi İşbirliğinin Yeniden Yapılandırılmasının Gereklilikleri.* Ankara: Detay Yayıncılık, 29-51.

- Benoit Godin (2006). The Linear Model Of Innovation: The Historical Construction Of An Analytical Framework. *Science, Technology, & Human Values*, 31(6), 639-667.

- Çetin, Aysun (2009). *İlgili Tarafların Algılarına Göre Üniversite-Sanayi-Devlet İşbirliği Üzerine Bir Alan Araştırması.* Yayınlanmamış Doktora Tezi, Hacettepe Üniversitesi Sosyal Bilimler Enstitüsü, Ankara.

- Dura, Cihan (1994). Üniversite- Sanayi İşbirliği Üzerine Bir Deneme. *Ankara Üniversitesi Siyasal Bilgiler Fakültesi Dergisi*, 49 (3-4), 101-117.

- Durgut, Metin(2007). Üniversite-Sanayi İşbirliğinin Bölgesel İnovasyon Sistemi Çerçevesi. *Erciyes Üniversitesi Kayseri Bilgi ve Araştırma Merkezi Sempozyumu: Ortaklık Esaslı Üniversite Sanayi İşbirliği (ÜSİ) ve Kentsel Yenilik (İnovasyon) Siteminin Altyapısı*, 19-21 Ocak, Kayseri**.**

- Elçi, Şirin, Karataylı, İhsan ve Karaata, Selçuk (2008).*Bölgesel İnovasyon Sistemleri: Türkiye İçin Bir Model Önerisi*(1.Baskı).İstanbul: TÜSİAD-T/2008-12/477.Graphis Matbaa.

- Erdil, Erkan, Pamukçu, M. Teoman, Akçomak, İ.Semih ve Erden, Yelda (2013). Değişen Üniversite-Sanayi İşbirliğinde Üniversite Örgütlenmesi. *Ankara Üniversitesi SBF Dergisi*, 68 (2) 95 – 127.

- Etzkowitz, Henry And Leydesdorff, Loet (2000).The Dynamics Of Innovation: From National Systems and "Mode2" To A Triple Helix Of University–Industry–Government Relations. *Research Policy,* (29) , 109–123.

- Etzkowitz, Henry (1998). The Norms Of Entrepreneurial Science: Cognitive Effects of The New University–İndustry Linkages. *Research Policy* ,(27) 823–833.

- Etzkowitz, Henry (2002). *The Triple Helix Of University - Industry - Government Implications For Policy And Evaluation*. Science Policy Institute Working Paper 2002-11,SSN 1650-3821, Stockholm (11),1-18.

- Etzkowitz, Henry (2003). Innovation In Innovation: The Triple Helix Of University-Industry-Government Relations. *Studies Of Science. Sage Publications,* 42(3), 293-337.

- Etzkowitz, Henry And Stevens, Ashley J.(1995).Inching Toward Industrial Policy: The University's Role İn Government Initivaties To Asist Small, İnnovative Companies İn The USA. *Science Studies*, 8(2),13-31.

- Freeman, Chris(1995). The National System Of Innovation İn Historical Perspective. *Cambridge Journal Of Economics*, (19) ,5-24.

- Gertner, Drew, Roberts, Joanne And Charles David (2011).University-İndustry Collaboration: A Cops Approach To Ktps. *Journal Of Knowledge Management, 15(4),* 625-647.

- Hahendahl, Peter Uwe(2005).The Future Of The Research University And The Fate Of The Humanities. *Cultural Critique,* (61),1-21.

- Harayama, Yuko (2003). *Industry-University Linkage in Japan*. International Conference On New Trends And Challenges Of Science And Technological Innovation İn A Critical Era.Taipei, Roc.

- Işık Nihat Ve Kılınç Efecan (2012).İnovasyon Sistemi Yaklaşımı ve İnovasyonun Coğrafyası: Türkiye Örneği. *Bilgi Ekonomisi Ve Yönetimi Dergisi*, 7(1),169-198.

- Jofre, Sergio And Andersen, Per Dannemand (2009). A Triple Helix Approach To The Future İnnovation Flagship Of Europe: Exploring The Strategic Deployment Of The European Institute Of Innovation And Technology, *7th Triple Helix International Scientific And Organising Committees.*

- Karaçor, Zeynep (2007).*Öğrenen Ekonomi Türkiye Küreselleşme Sürecinde Kriz Aralıklarında*. (1.Baskı). Konya: Çizgi Kitabevi.

- Kasza, Artur (2004). *Innovation Networks, Policy Networks, and Regional Development in Transition Economies: A Conceptual Review and Research Perspectives.* Paper For EPSNET Conference, 18-19 June, Prague.

- Kiper, Mahmut (2007). Bilgi Ve Teknoloji Üretimindeki Yeni Yaklaşımlar ve Bu Kapsamda Üniversite-Sanayi İşbirliği (Editör: Rıfat Yıldız Ve Hayriye Atik).*Üniversitelerdeki Araştırma ve Uygulama Merkezlerinin İşlevselliği: Üniversite-Sanayi İşbirliğinin Yeniden Yapılandırılmasının Gereklilikleri.* Ankara: Detay Yayıncılık, 143-164.

- Kiper, Mahmut (2010). *Dünyada ve Türkiye'de Üniversite-Sanayi İşbirliği ve Bu Kapsamda Üniversite-Sanayi Ortak Araştırma Merkezleri Programı (ÜSAMP),* (1.Baskı). Ankara: Türkiye Teknoloji Geliştirme Vakfı (TTGV).

- Lefebvre, Philippe, Pallez, Frédérique And Fixari Daniel(2009). *Competitiveness Clusters And New Approaches To Public Research: Uncertainties İn The Development Of The Triple Helix İn France.* Colloque International Regional Competitiveness Clusters And Economic Development- Hecmanagement School, Liège : Belgium.

- Lowe, R. Ve Marriott, S. (2006). *Innovation Management: Entreprise, Entrepreneurship And Innovation, Concepts, Contexts And Commercialization*. USA: Elsevier Ltd.

- Martin, Micheale (2000). *Managing University-İndustry Relations: A Study Of İnstitutional Practices From 12 Different Countries.* Research And Studies Programme. Improving The Managerial Effectiveness Of Higher Education İnstitutions Paris: UNESCO-International Institute For Educational Planning.

- Mercan, Birol ve Tünen Tuba(2010).KOBİ lerde Yenilikçi Ağlar. (Editörler: Emine Yavuz, Fahri Şeker, Fatih Çiftçi Ve Yunus Emre Akdoğan).*Uluslararası Bölgesel Kalkınma Sempozyumu Bildiriler Kitabı.* Yozgat:Yozgat Gazetecilik Matbaacılık A.Ş, 614-628.

- Meyer-Krahmer, Frieder And Schmoch, Ulrich(1998). Science- Based Technologies: University – Industry Interactions In Four Fields. *Research Policy*, (27), 835–851.

- MÜSİAD (Müstakil Sanayici Ve İşadamları Derneği)(2013).Küresel Rekabet İçin Ar-Ge Ve İnovasyon Araştırma Raporları.İstanbul: MÜSİAD.

- Mytelka, Lyn K Ve Smith Keith (2001). *Innovation Theory And Innovation Policy: Bridging The Gap.* Paper Presented To DRUID Conference, Aalborg.

- Ranga, Marina (2002). *Enterpreneurial Universities And The Impact Of University Industry Collaboration On Academic Research Performance And Management Of Academic Research Groups*. DRUID 2002 Phd Conference Paper. Sussex University. Brighton.

- Rasiah, Rajah And Govindaraju Chandran (2009).University-Industry Collaboration İn The Automotive, Biotechnology And Electronics Firms İn Malaysia. *Seoul Journal Of Economics*, 22 (4) , 529-550.

- Saatçioğlu, Cem(2005). Ulusal Yenilik Sistemi Çerçevesinde Uygulanan Bilim Ve Teknoloji Politikaları: İsrail, AB ve Türkiye Örneği. *Anadolu Üniversitesi Sosyal Bilimler Dergisi*, (1), 179-198.

- Sakınç, Süreyya ve Bursalıoğlu, Sibel Aybarç (2012). Yükseköğretimde Küresel Bir Değişim: Girişimci Üniversite Modeli. *Yükseköğretim Ve Bilim Dergisi,* 2(2), 92-99.

- Shinn, Terry (2002).The Triple Helix And New Production Of Knowledge: Prepackaged Thinking On Science and Technology**.** *Social Studies Of Science*, 32 (4), 599-614.

- Soyak, Alkan (2007). Ulusal Yenilik Sistemi Ve Kurumsal Arayışlar: 'Teknoekonomi Enstitüleri'. *Bilim Ve Ütopya Dergisi*, (154), 1-5.

- Srevatsan Ranjana(2011). *The Role Of University –Industry Collbaration In Regional Eceonomic Development*. Unpublished Doctoral Dissertation, The University Of Southern Mississippi: Mississippi.

- Uysal, Özgür(2012). *Ekonomik Gelişmede Ordu-Üniversite Sanayi İşbirliği ve Türkiye İçin Bir Model Önerisi.* Yayınlanmamış Doktora Tezi, T.C.Dokuz Eylül Üniversitesi Sosyal Bilimler Enstitüsü, İzmir.

- Viale, Riccardo And Ghiglione, Beatrice (1998). The Triple Helix Model: A Tool For The Study Of European Regional Socio-Economics Systems, *The IPTS Report*,(29),1-8.

- WEF (World Economic Forum). *The Global Competitiveness Report 2012-2013.*

- Yağcı, Mehmet İsmail ve Yavuz, Gülser (2010). Mersin'de Üniversite-Sanayi İşbirliği Ve Bölgesel Kalkınmaya Etkisi. (Editörler: Emine Yavuz, Fahri Şeker, Fatih Çiftçi ve Yunus Emre Akdoğan). *Uluslararası Bölgesel Kalkınma Sempozyumu Bildiriler Kitabı.* Yozgat: Yozgat Gazetecilik Matbaacılık A.Ş, 593-612.

- Yılmaz, Kürşad ve Horzum, M. Barış(2005).Kürselleşme, Bilgi Teknolojileri ve Üniversite*. İnönü Üniversitesi Eğitim Fakültesi Dergisi*, 6(10), 103-121.

- Yücel, İsmail Hakkı (1997).*Bilim - Teknoloji Politikaları ve 21. Yüzyılın Toplumu*. Sosyal Sektörler ve Koordinasyon Genel Müdürlüğü Araştırma Dairesi Başkanlığı. Ankara.

- Ay, Mustafa (2003) Bölgesel ve Ulusal Kalkınmada Etkili Mekanizma Teknoparklar, http://www.pdfio.com/u/ stradigma_com/, Erişim Tarihi 30.09.2013.

- Kurz, H. D. (2006*).* Schumpeter On Innovations And Profits The Classical Heritage. http://www.lib.hit-u.ac.jp/service/tenji/amjas/Kurz.pdf. Erişim Tarihi: 10.10.2013.

THE EFFECTS OF WEATHER ON INVESTOR BEHAVIOR: A STUDY ON INDIVIDUAL TURKISH STOCK MARKET INVESTORS

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ABSTRACT

This study aimed at revealing the effects of weather on the investment behaviors of individual investors transacting at BIST (Borsa Istanbul) in the 2009-2011 period, and determining whether the socio-economic and demographic characteristics of investors created any significant difference in those effects. Unlike other studies conducted on this subject, the present study employed real stock purchase and sales data belonging to investors. The analyses conducted demonstrated that the level of cloudiness and temperature were influential on investor behaviors, and the socio-economic and demographic characteristics of investors created certain differences in those effects. The number of sunny days, the number of overcast days, and sunshine duration were seen to have no effect on investor behaviors.

1. INTRODUCTION

The traditional finance literature suggests that financial markets operate rationally and completely based on economic fundamentals. However, many recent popular studies have argued that psychological factors have an effect on investment decisions. Examining investment decisions from a broader perspective and through an interdisciplinary approach, these studies make an attempt to explain the dynamic financial markets of the present time. Thanks to such broad perspective, many variables that are deemed "non-economic" variables by the traditional finance literature are not ignored anymore. As a result, the number of studies investigating the probable effects of these variables on investment decisions is increasing rapidly. The behavioral financiers investigating the psychological factors influential on investment decisions suggest that the mood of people significantly affects the decisions they make (Saunders, 1993; Hirshleifer and Shumway, 2003).

The mood of people and the factors influential on their mood affect investment assessments in the "investment decision making process", which starts with information gathering, continues with the analysis of the obtained information, and ends with making a decision based on such analysis. Shwarz (1990) and Loewenstein et al. (2001) developed the first theories that associated the mood and feelings with the general decision making process.

According to Cao and Wei (2005), the mood, emotions, and feelings play essential roles in the decisions made by people. Watson (2000) argues that the mood is affected by situational and environmental factors. The only environmental factor that has a potential to have a simultaneous impact on all investors in general is weather conditions. According to psychologists, the weather conditions affect the mood and emotional states of individuals, thereby disrupting optimal decision-making process (Min Yoon and Kang, 2009). The literature contains many studies examining the relationships between the weather variables and human behaviors (Wyndham, 1969; Bell and Baron, 1976; Allen and Fisher, 1978; Bell, 1981; Howarth and Hoffman, 1984; Watson, 2000). Howarth and Hoffman (1984) argued that, humidity rate, temperature, and sunshine amount are the weather variables having the highest influence on the mood of people.

Saunders (1993) was the first person to investigate the relationship between weather and investment behaviors. In his pioneering study conducted on New York Stock Exchange, Saunders obtained hard evidences implying the existence of a negative relationship between the level of cloudiness and stock returns. Later on, similar studies were carried out based on a greater variety of weather variables. Different periods of time were covered in the studies conducted at the stock exchanges of various countries.

The phenomena of globalization and financialization have broadened the profile of investors transacting in financial markets, and have increased their number. At the present time, millions of women and men from every age group, every income group, and every educational level make investments in various markets across the world. Given the potential effect of such a specific variable as weather on investment decisions, important information may be obtained for interpreting financial markets if such effect is revealed.

This study aimed at revealing the effects of weather on the investment decisions of 100 individual investors transacting at Borsa Istanbul (BIST) in the 2009-2011 period. Moreover, considering the expansion in the profile of investors in financial markets, it was investigated what sorts of differences were created by socio-economic and demographic factors in such effects, which was a first in the literature. Real data belonging to 100 individual investors were used in the present study. Such data were extracted from the intermediary. The results of T-tests showed that certain weather variables were influential on investment decisions, and the level of such influence varied by the socio-economic and demographic characteristics of investors.

2. ENVIRONMENTAL PSYCHOLOGY: WEATHER, MOOD, AND DECISION MAKING

Studying the relationship between environment and human behavior, environmental psychology explains many phenomena on this subject. Environment contains many factors including weather, sound, color, buildings, crowd, etc. (Chang et al., 2006, p. 344).

At decision making stage, people are affected by the environmental conditions they face, which disrupts optimal decision making mechanisms. From this perspective, it can be argued that the weather has a large influence area as an environmental factor.

According to Cao and Wei (2000), mood is affected by situational and environmental factors. Hirshleifer and Shumway (2003) state that the mood bears valuable information about the environment. All in all, from a psychological perspective, weather is not regarded as a neutral variable in terms of human behavior, and any changes in this variable have important effect on the mood of people (Dowling and Lucey, 2005, p. 338). Similarly, Min Yoon and Hoon Kang (2009) say that weather conditions are influential on the emotional states/mood of individuals, which disrupts optimal decision making process by affecting behaviors.

Loewenstein (2000) argues that the emotions and feelings experienced at decision making stage generally direct people to display behaviors different from those set through the evaluation of long-term benefits and costs. In 2001, Loewenstein analyzed how making decisions under the influence of feelings diverged from rational decision making process, and argued that one of the significant factors for such divergence was mood. Positive aspects are more apparent than negative aspects in individuals who are in a good mood. The general behavioral effects of good mood can be summarized as follows (Hirshleifer and Shumway, 2003; Chang et al., 2006; Wright and Bower, 1992):

- Optimistic thoughts prevail.
- People are driven to establish unusual relations (innovativeness).
- It improves problem solving performance.
- It makes people to make more positive evaluations on many subjects including life satisfaction, past events, people and products.
- It brings mental flexibility.
- It increases the use of simplifying heuristics at decision making stage.

On the other hand, bad mood causes people to make negative evaluations and attempt to make detailed analytical analyses.

The weather variables found to be influential on the mood of people are sunshine/cloudiness, wind speed, rainfall, humidity rate, temperature, and barometric pressure (Dowling and Lucey, 2005; Pardo and Valor, 2003). According to Bell et al. (2003), people display different behaviors in very hot or very cold weathers. It is argued that violence increases in community in very hot weathers, which is referred to as "long and hot summer effect" by psychologists. As showed by evidences, while low temperature leads to aggression, high temperature causes both slackness and aggression (Cao and Wei, 2005, p. 1559).

While aggression causes people to take more risks, slackness prevents taking the risks. According to Bell (2003), when temperature is over 84.20 F, people feel themselves more impatient and nervous. Similarly, he states that feeling cold also makes people impatient and unhappy. Sunshine is another weather variable influential on human behavior. In his study titled "Environmental Psychology", McAndrew (1993) claims that lack of sunshine makes people melancholic and unhappy, thus people generally feel themselves melancholic in autumn and winter months, and radiotherapy is conducted as a treatment for seasonal depression. As showed by many evidences, when people are exposed to sunshine a lot, they feel themselves better. For example, they become more generous for giving tips (Cunningham, 1979; Rind, 1996), answer research questions more willingly (Cunningham, 1979), and become more voluntary for supporting those people who are in need (Lockard et al., 1976).

2.1. Weather and Investor Behavior

Being the first researcher investigating the relationship between weather and investor behaviors, Saunders (1993) states that weather is influential on stock returns because weather affects the mood of investors. Examining the relationship between the weather of New York and stock returns, Saunders determined a negative relationship between stock returns at New York Stock Exchange and the level of cloudiness. Hırshleifer and Shumway (2003) conducted a study by using stock index returns for 26 stock exchanges belonging to the 1982-1997 period, and obtained findings supporting those of Saunders (1993). Kamstra et al. (2003) investigated the effect of seasonal depression on stock returns. Based on the clinical and psychological evidences showing that longer nights lead to depression, the authors put forward that longer nights are associated with lower stock returns. This relationship has also proven to be true in many international markets.

Pardo and Valor (2003) examined the relationship between the weather and Madrid Stock Exchange Index (MSEI) for the 1981-2000 period, but did not find any relationship between the number of sunny days and humidity rate and index returns. Dowling and Lucey (2005) investigated the relationships between the Irish Stock Exchange index and rainfall, the level of cloudiness, and humidity rate for the 1988-2000 period, and found out that those variables had an effect on returns. In their study on Istanbul Stock Exchange (BIST), Tufan and Hamarat (2004) argued that the number of cloudy days did not have any effect on BIST 100 index.

Cao and Wei (2005) investigated the relationships between temperature and nine international stock index returns of eight countries for the 1962-2001 period. Through analyses, they found out a significant negative correlation between temperature and stock returns in general. Chang et al. (2006) examined the relationships between the Taiwan Stock Exchange index and temperature, cloudiness, and humidity rate for the 1997-2003 period. Based on analyses, they determined that temperature and cloudiness were two important weather variables for the Taiwan Stock Exchange returns (i.e. returns fell when either the temperature became too high or the cloudiness increased).

Keef and Roush (2007) investigated the relationships between daily weather variables and the Australian Securities Exchange stock returns. They found out that stock index returns were not affected by wind speed and the level of cloudiness, but were in a negative relationship with temperature level. Chi Chang et al. (2008) examined the relationships between the weather of New York and New York Stock Exchange daily returns and transactional behaviors for the 1994-2004 period. They determined that stock returns were lower on cloudy days in general, and most of transactions were sales transactions on those days. In addition, they argued that cloudy sky led to high volatility and low transaction volume throughout the day.

In their study on Korea Stock Exchange covering the 1990-2006 period, Min Yoon and Kang (2009) found out that extreme weather conditions had a higher impact on rates of return. Moreover, they stated that extreme low temperature levels had a positive effect on returns in the pre-crisis period, but extreme humidity rates and the level of cloudiness had a negative effect on returns. They stated that weather effect disappeared in the post-1997 crisis period, and told that this might be due to the abolishment of the restrictions imposed on foreign investors and the improvement of electronic purchase and sales systems.

3. THE EFFECTS OF WEATHER ON INVESTOR BEHAVIORS AND THE DIFFERENCES CREATED BY SOCIO-ECONOMIC FACTORS IN THOSE EFFECTS: A STUDY ON INDIVIDUAL BIST INVESTORS

3.1. The Purpose of Study and the Hypotheses Used

This study aimed at revealing the effects of weather on the investment behaviors of 100 individual investors transacting at BIST (Borsa Istanbul) in the 2009-2011 period, and determining whether the socio-economic and demographic characteristics of investors created any significant difference in those effects. The hypotheses tested in the study are as follows:

H_1= There is a significant difference between the months in which the number of sunny days is above the seasonal average and the months in which the number of sunny days is below the seasonal average in terms of the ratios of fixed income securities in the portfolios of investors.

H_2= There is a significant difference between the months in which the number of sunny days is above the seasonal average and the months in which the number of sunny days is below the seasonal average in terms of the ratios of purchase transaction.

H_3= There is a significant difference between the months in which the number of sunny days is above the seasonal average and the months in which the number of sunny days is below the seasonal average in terms of the ratios of sales transaction.

H_4= There is a significant difference between the months in which the number of overcast days is above the seasonal average and the months in which the number of sunny days is below the seasonal average in terms of the ratios of fixed income securities in the portfolios of investors.

H_5= There is a significant difference between the months in which the number of overcast days is above the seasonal average and the months in which the number of sunny days is below the seasonal average in terms of the ratios of purchase transaction.

H_6= There is a significant difference between the months in which the number of overcast days is above the seasonal average and the months in which the number of sunny days is below the seasonal average in terms of the ratios of sales transaction.

H_7= There is a significant difference between the months in which the number of cloudy days is above the seasonal average and the months in which the number of sunny days is below the seasonal average in terms of the ratios of fixed income securities in the portfolios of investors.

H_8= There is a significant difference between the months in which the number of cloudy days is above the seasonal average and the months in which the number of sunny days is below the seasonal average in terms of the ratios of purchase transaction.

H_9= There is a significant difference between the months in which the number of cloudy days is above the seasonal average and the months in which the number of sunny days is below the seasonal average in terms of the ratios of sales transaction.

H_{10}= There is a significant difference between the months in which the number of monthly sunshine duration is above the seasonal average and the months in which the number of sunny days is below the seasonal average in terms of the ratios of fixed income securities in the portfolios of investors.

H_{11}= There is a significant difference between the months in which the number of monthly sunshine duration is above the seasonal average and the months in which the number of sunny days is below the seasonal average in terms of the ratios of purchase transaction.

H_{12}= There is a significant difference between the months in which the number of monthly sunshine duration is above the seasonal average and the months in which the number of sunny days is below the seasonal average in terms of the ratios of sales transaction.

H_{13}= There is a significant difference between the months in which the number of average temperature is above the seasonal average and the months in which the number of sunny days is below the seasonal average in terms of the ratios of fixed income securities in the portfolios of investors.

H_{14}= There is a significant difference between the months in which the number of average temperature is above the seasonal average and the months in which the number of sunny days is below the seasonal average in terms of the ratios of purchase transaction.

H_{15}= There is a significant difference between the months in which the number of average temperature is above the seasonal average and the months in which the number of sunny days is below the seasonal average in terms of the ratios of sales transaction.

In addition to these basic hypotheses, the study also investigated whether the socio-economic and demographic characteristics of investors created any difference in the effects of weather on investor behaviors. Therefore, the above-mentioned hypotheses were repeated for each socio-economic and demographic group.

3.2. Research Method and Data

T-test analyses were conducted in order to test the above-mentioned hypotheses. The study employed real data concerning stock purchase and sales transactions carried out by 100 individual investors at BIST between the 4th of January 2009 and the 31st of December 2011. Since the effect of weather was to be investigated, it was deemed suitable to use real data. The data extracted from the intermediary of a bank contained the residential city, gender, age, educational status, and monthly income of any investor as well as such details as date, hour, price, day, amount, and session concerning stock purchase and sales transactions carried out by him/her.

Random sampling method was used for determining the investors whose data would be included in the present study. Those investors whose data were included within the scope of the study resided in different regions of Turkey.

Table 1 presents frequency and percentage distribution concerning the research sample. The review of the frequency and percentage distribution of the research sample shows that it is consistent with the findings of Ede (2007), Dom (2003), and Dogukanli and Onal (2000) on this subject. In other words, the research sample strongly represents the BIST investors.

Based on the data concerning stock purchase and sales transactions extracted from the intermediary, the data about the ratios of fixed income securities in the portfolios of investors, the ratios of purchase transactions, and the ratios of sales transactions were calculated and derived on a monthly basis. Data about the number of sunny days, the number of overcast days, the number of cloudy days, monthly sunshine duration, and average temperature belonging to the cities where investors resided were obtained from the General Directorate of Meteorology (GDM) of Turkey. The reason for the arrangement of data on a monthly basis was that GDM had made out weather data on a monthly basis.

Table 1. Sampling Frequency and Percentage Distributions

Age	Frequency	%
18-25	1	0,01
26-39	27	0,27
40-55	55	0,55
55-	17	0,17
Total	100	100
Education	**Frequency**	**%**
Primary Education	9	0,09
Senior High School	21	0,21
Undergraduate	43	0,43
Post Graduate	3	0,03
Unknown	24	0,24
Total	100	100
Monthly Income	**Frequency**	**%**
0-999 TL	28	0,28
1.000 TL-2.499 TL	30	0,3
2.500 TL-3999 TL	26	0,26
4.000 TL-	14	0,14
Total	100	100
Gender	**Frequency**	**%**
Female	16	0,16
Male	84	0,84
Total	100	100
Living Region	**Frequency**	**%**
Marmara	35	0,35
Aegean	18	0,18
Mediterranean	13	0,13
Black Sea	10	0,10
Central Anatolia	16	0,16
East Anatolia	6	0,04
S. East Anatolia	4	0,02
Total	100	100

The average monthly ratio of fixed income securities (RFIS) in the portfolio of an investor refers to the part of the portfolio of the investor that consists of fixed income securities (e.g. bonds and bills) on a monthly basis. As is known, investors head for fixed income securities to reduce the portfolio risk when their risk perceptions increase. In this respect, investors may be more pessimistic in months when the number of cloudy days is above the seasonal average and this pessimism may lead to an increase in the ratios of fixed income securities in their portfolios. SGMKO was formulated as follows:

$$RFIS_{it} = \frac{FIS_{it}}{FIS_{it}+VS_{it}}$$

RFISit = the ratio of fixed income securities in the portfolio of the investor number i at t time.

FIS it = the total amount of the fixed income securities held by the investor number i at t time

The total amount of the fixed income securities held by the investor (FISit) and the total values of securities (VSit) were calculated as follows:

$$FIS_{it} = \sum_{h=1}^{n} FIST_{th}$$

FISTth = total amount invested in the fixed income securities h of the investor number i at t time.

$$VS_{it} = \sum_{h=1}^{n} CA_{iht} * WAP_{iht}$$

CAİht = the amount held in the securities h by the investor number i at t time

WAPİht = the weighted average price of the securities h of the investor number i at t time

Since investors purchased the same securities at different prices at different periods, weighted average price (WAP) was used for calculating the value of relevant securities. For example, let's assume that the investor purchased five A securities at t time for TL 4. Then, the investor purchased five more A securities at t+1 time for TL 8. In this case, the weighted average price is calculated as follows:

$$\left(\frac{5}{10} * 4\right) + \left(\frac{5}{10} * 8\right) = 6 \text{ TL} .$$

The ratio of purchase/sales transactions refers to the purchase/sales transactions-related part of total transactional volume achieved by an investor in one-month time period. When weather is fine and sunny, investors can purchase more as a result of the optimism emerging. On the contrary, pessimism emerging on cloudy and overcast days may drive investors to get a sales oriented position.

3.3. Findings and Discussion

Within the scope of the present study, t-tests were carried out in order to determine the differences created by weather in the behaviors of investors. Since seven different geographical regions of Turkey had unique weather conditions, the differences among geographical regions for each weather variable were determined through t-tests in the first place. Table 2 shows the differences found out. It was seen that there were quite significant differences among regions in terms of the weather variables included in the study.

Table 2. Geographical Regions Differ in Terms Of Weather

	Lower	Medium	Upper
Sunny Days	4	1-5	2-3-7
Overcast Days	2-3	1-5-6	4
Cloudy Days	1	2-7-5	3-4
Monthly Sunshine Duration	1-4	6	2-3-5-7
Average Temperature	5-6	1-4-7-2	3

1: Marmara Region, 2: Aegean Region, 3:Mediterranean Region, 4: Black sea Region, 5: Central Anatolia Region, 6: East Anatolia Region, 7: Southeastern Anatolia Region.

Another issue about the effect of weather on human behaviors is seasonality. As is known, weather variables in Turkey considerably differ by seasons. Therefore, seasonal average values were calculated for each weather variable.

These values are indicated in appendix 1. People evaluate any weather condition based on their habits. For instance, while average temperature is 28.08 degrees in summer months in the Mediterranean Region, it is 24.2 degrees in the Marmara region. While a temperature of 24.2 degrees may be perceived to be low for people living in the Mediterranean Region, a temperature of 28.08 degrees may be perceived to be high for people living in the Marmara Region.

Groups related to weather variables were formed according to those average values. When the value of relevant weather variable was lower than the average value indicated in the appendix 1, it was given the group number 1. However, when such value was higher than the average value indicated in the appendix 1, it was given the group number 2. Here, the assumption was that since people were familiar with the weather of the region they lived in, only those values which were above the average could have behavioral impacts. In this way, the reactions of investors living in different geographical regions to seasonal weather changes could be interpreted more soundly.

Table 4 shows the differences in the ratios of fixed income securities in the portfolios of investors, the ratios of purchase transactions, and the ratios of sales transactions by the number of sunny days, the number of overcast days, the number of cloudy days, sunshine duration, and average temperature. The table shows only statistically significant differences.

Based on the examination of table 3, it can be argued that the ratios of fixed income securities in the portfolios of investors increased because investors evaluated the data related to market from a pessimistic perspective in months when the number of cloudy days was above the seasonal average. These findings support the findings of Saunders (1993), Cao and Wei (2005), Chang et al. (2006), Keff and Roush (2007), and Min Yoon and Kang (2009) obtained on this subject. In addition, it is seen that investors carried out fewer purchase transactions, and more sales transactions in months when the monthly average temperature was above the seasonal average. These findings support the findings of Chang et al. (2006) and Chi Chang et al. (2008). At the end of analyses, the hypotheses of H_7, H_{14} and H_{15} were accepted, while the hypotheses of H_1, H_2, H_3, H_4, H_5, H_6, H_8, H_9, H_{10}, H_{11}, H_{12}, and H_{13} were rejected.

Table 3. Differences In Investors Behavior According to The Weather

Group (Cloudy Days)		N	Mean	Std. Dev.	Std. Err. Mean.	F	Sig.	Sig. (2tail)
RFIS	1*	572	0,0078	0,031	0,001	24,556	0,00	0,00
	2*	583	0,0181	0,082	0,003			
Group (Average Temperature)		N	Mean	Std. Dev.	Std. Err. Mean.	F	Sig.	Sig. (2tail)
Ratio of Purchase	1*	585	0,5844	0,203	0,008	13,912	0,00	0,01
	2*	546	0,5550	0,182	0,007			
Ratio of Sales	1*	585	0,4156	0,203	0,008	13,912	0,00	0,01
	2*	546	0,4450	0,182	0,007			

* No. 1 group, the average and below-average weather of conditions.

* No. 2 group, on-average (extreme) weather of conditions.

Then, data were filtered by gender, age, monthly income level, and educational status. As a result, 8 different data sets were obtained. T-test analyses were repeated, and the effects of socio-economic and demographic factors were investigated. Table 4 contains only the differences found to be statistically significant at the confidence interval of %10.

Table 4. Differences In Investors Behavior According to The Weather (Female Investors)

Group (Cloudy Days)		N	Mean	Std. Dev.	Std. Err. Mean.	F	Sig.	Sig. (2tail)
RFIS	1*	716	0,0119	0,552	0,002	22,005	0,00	0,00
	2*	684	0,0227	0,936	0,003			
Group (Average Temperature)		N	Mean	Std. Dev.	Std. Err. Mean.	F	Sig.	Sig. (2tail)
Ratio of Purchase	1*	712	0,5479	0,248	0,009	6,000	0,01	0,06
	2*	740	0,5239	0,236	0,008			
Ratio of Sales	1*	712	0,4521	0,248	0,009	6,000	0,01	0,06
	2*	740	0,4761	0,236	0,008			

* No. 1 group, the average and below-average weather of conditions.
* No. 2 group, on-average (extreme) weather of conditions.

As is seen in table 4, the ratios of fixed income securities in the portfolios of male investors increased in the months when the number of cloudy days was above the average. In addition, the ratios of purchase transactions decreased among male investors in the months when temperature was above the average. Among female investors, no statistically significant difference was found in any investment behavior according to any weather variable. Based on the above-mentioned findings, it can be argued that gender is a significant demographic variable in the context of the effect of weather on investor behaviors.

According to the behavioral finance literature, another socio-economic parameter influential on investment behaviors is income status. Table 5 and Table 6 demonstrate the differences occurring in the investment behaviors of low income group and high income group due to the changes in weather conditions.

Table 5: Differences In Low-income Investors Behavior According to The Weather

Group (Cloudy Days)		N	Mean	Std. Dev.	Std. Err. Mean.	F	Sig.	Sig. (2tail)
RFIS	1*	292	0,0061	0,028	0,001	15,614	0,00	0,03
	2*	286	0,0163	0,075	0,004			
Group (Average Temperature)		N	Mean	Std. Dev.	Std. Err. Mean.	F	Sig.	Sig. (2tail)
Ratio of Purchase	1*	282	0,5641	0,186	0,011	6,153	0,01	0,09
	2*	259	0,5387	0,167	0,010			
Ratio of Sales	1*	282	0,4359	0,186	0,011	6,153	0,01	0,09
	2*	259	0,4613	0,167	0,010			

* No. 1 group, the average and below-average weather of conditions.
* No. 2 group, on-average (extreme) weather of conditions.
* Low-income investors, which includes the monthly income of less than 2,499 TL.

Table 6: Differences In High-income Investors Behavior According to The Weather

Group (Cloudy Days)		N	Mean	Std. Dev.	Std. Err. Mean	F	Sig.	Sig. (2tail)
RFIS	1*	282	0,0096	0,034	0,002	12,539	0,00	0,04
	2*	298	0,0215	0,093	0,005			

* No. 1 group, the average and below-average weather of conditions.
* No. 2 group, on-average (extreme) weather of conditions.
* High-income investors, which includes the monthly income of more than 2,500 TL.

According to Table 5 and Table 6, the ratios of fixed income securities in the portfolios of both low income group investors and high income group investors increased in the months when the number of cloudy days was above the average. On the other hand, while the ratios of purchasing transactions increased among low income group investors in the months when temperature was above the average, no change was seen in the investment behaviors of high income group investors in those months when the temperature was above the average. This may be attributed to the fact it is very probable that the areas where high income group investors transacted had ventilation systems (e.g. air-conditioner). In such a case, suffocating weather effect would not influence the investors in that group. The level of cloudiness and temperature affect human behaviors through different channels. While high level of cloudiness leads to pessimistic feelings by preventing being exposed to sunlight, high temperature level has physiological effects including sweating, etc.

Therefore, while ventilation systems alleviate the effect of temperature for high income group investments, they cannot prevent the effect of cloudiness. Age is another important demographic variable argued to be influential on investor behaviors. Table 7 and Table 8 demonstrate the differences occurring in investor behaviors of low age group and high age group due to the changes in weather conditions. According to Table 7 and Table 8, the ratios of fixed income securities in the portfolios of both low age group investors and high age group investors increased in the months when the number of cloudy days was above the average. On the other hand, while the ratios of purchasing transactions increased among high age group investors in the months when temperature was above the average, no change was seen in the investment behaviors of low age group investors in those months when the temperature was above the average. This may be attributed to the fact that as age increases, sensitivity to air temperature rises. Finally, no statistically significant difference was found out in the investment behaviors of low educational level (middle school-high school) group and high educational level group undergraduate-postgraduate) group in the months when the number of sunny days, the number of overcast days, the number of cloudy days, sunshine duration, and average temperature were above the seasonal averages.

Table 7: Differences In Investors Behavior According to The Weather (low-age)

Group (Cloudy Days)		N	Mean	Std. Dev.	Std. Err. Mean.	F	Sig.	Sig. (2tail)
RFIS	1*	180	0,0090	0,033	0,002	16,050	0,00	0,02
	2*	159	0,0263	0,099	0,007			

* No. 1 group, the average and below-average weather of conditions.

* No. 2 group, on-average (extreme) weather of conditions.

* Low age group, which includes the 18-40 years of age.

Table 8: Differences In Investors Behavior According to The Weather (high-age)

Group (Cloudy Days)		N	Mean	Std. Dev.	Std. Err. Mean.	F	Sig.	Sig. (2tail)
RFIS	1	619	0,0124	0,058	0,002	11,595	0,01	0,04
	2	654	0,0206	0,088	0,003			
Group (Average Temperature)		**N**	**Mean**	**Std. Dev.**	**Std. Err. Mean.**	**F**	**Sig.**	**Sig. (2tail)**
Ratio of Purchase	1	632	0,5470	0,249	0,009	6,758	0,00	0,07
	2	681	0,5228	0,232	0,008			
Ratio of Sales	1	199	0,4530	0,249	0,009	6,758	0,00	0,07
	2	164	0,4772	0,232	0,008			

* No. 1 group, the average and below-average weather of conditions.

* No. 2 group, on-average (extreme) weather of conditions.

* High-age group, includes the at the age of 41 and above.

4. CONCLUSION

In recent years, the number of multi-discipline studies on investment decision making process has increased rapidly. Behavioral finance is one of the important fields on this subject. An attempt is made to understand the abnormalities in the financial markets through these studies where the effects of such variables as feelings, weather, psychological factors and personality characteristics, which are regarded as non-economic variables by the traditional finance theory, on investment decisions are investigated. This study aimed at revealing the effects of weather on the investment behaviors of 100 individual investors transacting at BIST in the 2009-2011 period, and determining whether the socio-economic and demographic characteristics of investors created any significant difference in the potential effects of the weather. To this end, real data belonging to investors were used. In this study, a negative relationship was found out between the level of cloudiness and the ratio of fixed income securities in the portfolio of an investor – which represented the risk level perceived by the investor. Likewise, a negative relationship was determined between average temperature level and the ratio of purchase transactions while a positive relationship was found out between average temperature level and the ratio of sales transactions. Furthermore, the socio-economic and demographic characteristics of the investors were found to be influential on the level of being affected by weather.

REFERENCES

- Allen, A. M. and Fisher, G. J. (1978), Ambient Temperature Effects on Paired Associate Learning, Ergonomics *21, 2,* pp. 95-101.

- Bell, P. A. (1981), Physiological Comfort, Performance And Social Effects Oh Heat Stress, Journal of Social Issues*, 37,* pp. 71-94.

- Bell, P. A. and Baron, R. A. (1976), Aggression And Heat: The Mediating Role of Negative Affect, Journal of Applied Social Psychology*, 6,* pp. 18-30.

- Bell, P. A., Greene, T. C., Fisher, J. D. & Baum, A. (2003), Environmental psychology, Publisher Belmont*,* Wadsworth.

- Cao, M. and Wei, J. (2005), Stock Market Returns: A Note on Temperature Anomaly, Journal of Banking and Finance*, 29,* pp. 1559-73.

- Chang, S. C., Chen, S. S., Chou, R. K. & Lin, Y. H. (2008), Weather and Intraday Patterns in Stock Returns and Trading Activity, Journal of Banking and Finance*, 32,* pp. 1754-1766.

- Chang, T., Nieh, C.C., Yang, M. J. & Yang, T. (2006), Are Stock Market Returns Related to the Weather Effects? Empirical Evidence From Taiwan, Physica *A, 364,* pp. 343-354.

- Cunningham, M. R. (1979), Weather, Mood, And Helping Behavior: Quasi Experiments With The Sunshine Samaritan, Journal of Personality and Social Behavior, *37,* pp. 1947-56.

- Dowling, M. and Lucey, B. M. (2005), Weather, Biorhythms, Beliefs and Stock Returns: Some Preliminary Irish Evidence, International Review of Financial Analysis*, 14,* pp. 337-355.

- Hirshleifer, D. and Shumway, T. (2003), Good Day Sunshine: Stock Returns and The Weather, Journal of Finance, *58,* pp. 1009-32,

- Howarth, E. and Hoffman, M. S. (1984), A Multidimensional Approach to the Relationship Between Mood and Weather, British Journal of Psychology, *75,* pp. 15-23.

- Kamstra, M. J., Kramer, L. A. & Levi, M. D. (2003), Winter Blues: A Sad Stock Market Cycle, American Economic Review*, 93***,** pp. 324-343.

- Keef, P. and Roush, M. L. (2007), Daily Weather Effects on the Returns of Australian Stock Indices, Applied Financial Economics*, 17***,** pp. 173-184.

- Lockard, J. S., McDonald, L. L., Clifford, D. A. & Martinez, R. (1976), Panhandling: Sharing of Resources, Science*, 191*, pp. 406-408.

- Loewenstein, G. (2000), Emotions in Economic Theory and Economic Behavior, American Economic Review*, 65*, pp. 426-432.

- Loewenstein, G., Weber, E. U., Hsee, C. K., & Welch, N. (2001), Risk As Feelings, Psychological Bulletin*, 127*, pp. 267-286.

- McAndrew, F. T. (1993), Environmental Psychology, A Division of International Thompson Publishing Inc*,* Brooks/Cole.

- Pardo, A. and Valor, E. (2003), Spanish Stock Returns: Where is the Weather Effect, European Financial Management*, 9*, pp. 117-126.

- Rind, B. (1996), Effects of Beliefs About Weather Conditions on Tipping, Journal of Applied Social Psychology, 26**,** pp. 137-147.

- Saunders, E. M. (1993), Stock Prices and Wall Street Weather, American Economic Review, *83*, pp. 1337-45.

- Schwarz, N. (1990), Feelings as information. Informational and motivational functions of affective states, in R. Sorentino, and E. T. Higgins, eds.: Handbook of Motivation and Cognition (Guilford Press, New York).

- Tufan, E. and Hamarat, B. (2004), Do Cloudy Days Affect Stock Exchange Returns: Evidence From The Istanbul Stock Exchange, Journal of Naval Science and Engineering*, 2***,** pp. 117-126.

- Watson, D. (200), Situational and environmental influence on mood. In: Mood and Temperament. (Guilford Press, New York).

- Wright, W. F. and Bower, G. H. (1992), Mood Effects on Subjective Probability Assessment, Organizational Behavior and Human Decision Process*, 52***,** pp. 276-291.

- Wyndham, H. C. (1969), Adaptation to Heat And Cold, Environmental Research*, 2***,** pp. 442-469.

- Yoon, M. S. and Kang, S. H. (2009), Weather Effects On Returns: Evidence From The Korean Stock Market., Physica A*, 388***,** pp. 682-690.

Appendix 1. Seasonal Averages of Weather Variables by Geographic Region

	SD	OD	CD	MSD	AT
1(F. S.)	7,38	4,96	18,2	115,4	12,6
1(S.)	15,6	3,4	13,4	232,8	24,2
1(L. S.)	10,17	3,68	16,6	112	15,8
1(W.)	5,51	6,94	18,54	54,7	7,8
2(F. S.)	9,74	3,33	18,6	211,2	15,08
2(S.)	23,9	1	7,6	328	27,6
2(L. S.)	16,8	1,58	12,4	218,5	18,3
2(W.)	6,36	4,58	19,3	105,1	9,05
3(F. S.)	7,68	1,79	21,9	231,9	17,2
3(S.)	18,6	1	12,2	319	28,08
3(L. S.)	16,02	2,84	13,5	231,4	21,6
3(W.)	6,47	4,59	19,4	128,4	11,7
4(F. S.)	4,86	7,95	17,9	138,4	11,6
4(S.)	8,8	3,47	19,6	241,8	23,4
4(L. S.)	7,2	6,61	17,1	137,3	16,04
4(W.)	4,11	9,9	16,6	57,7	7,8
5(F. S.)	6,71	3,28	19,9	209,3	15,1
5(S.)	16,7	1,26	13,4	327,9	19,6
5(L. S.)	14,3	4,3	13,6	211,8	10,1
5(W.)	4,22	7,96	17,5	101,3	5,87
6(F. S.)	6,9	5	20,8	180	5,1
6(S.)	17,7	1	13,3	300,4	17,5
6(L. S.)	15,1	2,6	13,6	153,2	7,31
6(W.)	7,2	5,8	15,9	66,7	-5,77
7(F. S.)	7,7	3,8	19,6	205	15,6
7(S.)	23,5	1	7,47	336	31,2
7(L. S.)	17	2,85	12,1	212	19,5
7(W.)	8,52	7	14,2	122,7	6,56

1: Marmara Region, 2: Aegean Region, 3:Mediterranean Region, 4: Blacksea Region, 5: Central Anatolia Region, 6: East Anatolia Region, 7: Southeastern Anatolia Region; SD: sunny days, OD: overcast days, CD: cloudy days, MSD: monthly sunshine duration, AT: average temperature, F.S.:first spring, S.: summer, L.S.: last spring, W.: winter.

MODELLING AND FORECASTING OF TURKEY CURRENT ACCOUNT IMBALANCE WITH THRESHOLD AUTOREGRESSIVE MODELS

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ABSTRACT

The increase in number of countries with current account deficit in recent years, and the emergence of studies analyzing whether these deficits make the economies more vulnerable to external shocks draws attention to current account imbalances. In addition, the significant effect of current account balance on macroeconomic policies requires building econometric models for the mentioned series and making forecast. However, it is seen that the empirical studies on current account balance for Turkey are based on linearity hypothesis and linear models. Moreover in these studies, the possibility of this series can be created with the nonlinear process has been ignored. In this paper it is assumed that if the current account series is nonlinear, then it can be adequately described by a TAR family model. In the case of this series is not linear, the aim is to choose appropriate TAR model and to make out-of-sample forecasts. The findings of this study can be outlined as follows: over the period 1998:01 to 2008:09, the share of current account balance to GDP is nonlinear; the model which best captures the nonlinearity is LSTAR.

1. INTRODUCTION

It is observed that due to the recent crises, the discussions on economic policies among economic commentators, politicians and academicians focus on large current account imbalances that experienced in many countries. One of the common tools used in this subject, balance of payments (BOP) is a statistical report indicating the status of foreign economic and financial relationships of the countries within a specific time period. BOP consists of a total of four items including particularly current accounts, capital and financial accounts, net errors and omissions and reserve assets.

Among the main items, current account includes trade balance, balance of services, balance of income and current transfers.[1] Besides, the BOP methodology uses a double-entry accounting system, which is every transaction is recorded as both a credit and a debit. If the debits exceed credits, in other words if a country spends more than it earns, current account deficit occurs; if credits exceed debits, current account surplus occurs.

According to ranking made by the IMF in 2007, the number of countries with current account deficit doubled the ones with current account surplus; among 181 countries, while number of countries with current account surplus was around 60, number of countries with current account deficit was almost 120.[2] In addition to the high number of countries with current account deficit, particularly the current account imbalances in emerging countries and transition countries increases the importance of the studies investigating whether large deficits can be associated with the crises between the years of 1990 and 2000s, and thus whether the deficit can make the economies more vulnerable to external shocks**.**[3]

As for the causes of financial crises, in recent years, while one group argues that the main reasons are the high current accounts deficits, and this signals a future danger; another group argues that current account deficits are only one of the main determinants. For example, Berg and Patillo (1998), Esquivel and Larrin (1998), Corsetti, Pesenti and Roubini (2000) and Adedeji (2001) find evidence that the rise in current account deficit increases the risk of crises and the large deficits are one of the main determinants of the crises.[4] On one hand, Edwards (2001) reports that whenever the public sector is at balance, current account deficit will not cause any problem for economies. After this evaluation, Edwards (2001) states that the rise of current account deficit will increase the possibility of a crisis; however that depends on how crisis is defined as much as the sample period used in analysis. On the other hand, Frankel and Rose (1996) suggest that both current account deficit and budget deficit of the government does not play an important role in typical crises and that important deficits does not increase the risk of monetary crises. Similarly, Arias and Erlandsson (2004) analyse whether, in addition to numerous variables, current account variable is a leading indicator of crises in South-eastern Asia using switching models. But they don't find a strong and significant correlation between current accounts deficits and financial crises.

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[1] http://www.tcmb.gov.tr/yeni/iletisimgm/Bulten_Turkce13.pdf (March, 2009)

[2] International Monetary Fund, World Economic Outlook Database. (Data and Statistics, 2007-2014)
http://www.imf.org/external/pubs/ft/weo/2009/02/weodata/weoselco.aspx?g=2001&sg=All+countries

[3] In these contexts, the crises experienced by Turkey, Mexico, Thailand, Korea, Malaysia, Russia and Brazil in 1994-1999 and by Turkey and Argentina in 2000 and 2001 can be given as important examples.

[4] In his study for Nigeria, Adedeji (2001) find that current account deficits may cause crises with structural weaknesses and macroeconomic instability; in their studies for 30 countries, Esquivel and Larrain (1998) find that current account imbalances explain the presence of monetary crises. Berg and Pattillo (1998) attempt to forecast 1997 Asia crisis using various models and reports that current account deficit is a precursor of crises. Corsetti, Pesenti and Roubini (2000) analyse Asian countries and finds that crises index which is defined in relation to external imbalance measured with current account deficit and depreciation of exchange rate are significantly correlated.

In addition, it should be considered that current account deficit is inevitable, especially for developing countries. The main reason for this is that these countries have to import goods such as expensive machine and equipment for development and its permanence and that their exports consist of relatively low-price goods. As a result of this, current account deficit based on foreign trade deficit occurs. No matter what reason it is, the fact that number of the countries with current account deficit increases and more importantly, the deficits become permanent and that USA is the country with the largest deficit made current account deficit one of the common main subjects in recent years. In this context, Turkey, which is among the emerging countries, draws attention with its high current account deficit. It is seen in Table 1 that excluding 1998 and 2001, permanent current account deficits occurred since 1999 and that it rapidly increased since 2002.

Table 1: Turkey's current account balance and economic growth data for 1998-2008 periods[5]

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Economic growth	2.31	-3.37	6.77	-5.70	6.16	5.27	9.36	8.40	6.89	4.62	3.71
Current account balance(CAB)	2000	-925	-9920	3760	-626	-7515	-14431	-22088	-32051	-38219	-41866
CAB/GDP	0.007	-0.003	-0.037	0.019	-0.002	-0.024	-0.036	-0.045	-0.060	-0.058	-0.056

For Turkey, it is reported that the concentration of private investments relatively in sectors with high import input share such as automotive, machine equipment, electronics is effective in increased deficits and that the rise of energy import prices particularity in crude oil, also added to the enhancement of current account deficit.[6] In addition to all these, valuation of the exchange rates after some speculative capital or hot money flows, higher increase in import than export with the effect of exchange rate and rapid growth can be listed among the causes of this increase.

The list in Table 2 indicates that in 2008, Turkey ranked the sixth among the countries with the highest deficit.

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[5] Data for the first two variables are taken from the delivery system of CBRT http://evds.tcmb.gov.tr/ and last line calculated by authors.
[6] Central Bank of the Republic of Turkey (CBRT) Annual Report 2007, p.32.

Table 2: Countries with high current account deficit and surplus (*)

	First 10 highest current account deficit countries	*Quantity*		*First 10 highest current account surplus countries*	*Quantity*
1	USA	-568.800	1	Chine	368.200
2	Spain	-152.500	2	Germany	268.100
3	United Kingdom	-72.540	3	Japan	187.800
4	Italy	-68.820	4	Saudi Arabia	151.000
5	France	-58.000	5	Russia	97.600
6	**Turkey**	**-51.680**	6	Norway	84.350
7	Australia	-43.840	7	Kuwait	65.210
8	India	-38.390	8	Venezuela	48.440
9	Greece	-36.260	9	Holland	47.000
10	Portugal	-16.750	10	Singapore	35.580

(*) 1.000.000 USD, 2008 values.[7]

Besides, the facts that current account deficit of Turkey become chronic makes this subject commonly appear in the agenda of economy. The views in this subject in Turkey can be categorized in two groups. The first group points out to the possibility of global financial turmoil which has caused a considerable shrinkage and emphasizes that due to this level of current account deficit, Turkey can face a serious problem. On the other hand, the second group adopts an optimistic point of view emphasizing that Turkish economy will survive with a large current account deficit for long years and that the reserves of the Central Bank of the Republic of Turkey are high (Akkaçar, 2006). In other words, the first group perceive the high rise of the ratio of current account deficit to national income as a signal of crisis, while the second group argue that current account deficit in Turkey is not a problem at all. The official view is similar to the views of the second group. Their claims can be summarized as follows: As long as the current account deficit is financed, there will be no danger; and besides it should be considered as normal on the way of Turkey's European Union (Yeldan, 2005). According to this view, as foreign capital inflow continues, this issue will not be a problem; furthermore the realized high growth will only be sustained with this deficit. However, 2008 current account balance figures point out that, as indicted by the first group, in case of a potential crisis, Turkey can face a serious problem due to current account deficit.

As mentioned above, the analysis whether current account deficit makes the economies of developing countries fragile for shocks requires building econometric models and making forecasts using appropriate models. The forecasts will guide for the preparation of economic programs and this increases the importance of these types of studies.

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[7] https://www.cia.gov/library/publications/the-world-factbook/rankorder/2187rank.html

2. LITERATURE REVIEW

The increasing interest for current account deficit is also reflected in the studies on this subject and fairly increased the number of theoretical and applied studies. It is seen that these studies are made for G7 countries, USA, England, France and Italy which have high levels of current account deficit and fall into first ten in the list and Canada and Latin America which are not included in the list which are also G7 counties.

The studies of Howard (1989), Mann (2002) and Edwards (2005) for the USA; Horne (2001) for Australia, and Hudson and Stennett (2003) for Jamaica can be given as an example of the studies which include theoretical approaches. Besides, a number of previous empirical studies including Tuffle (1996), Ansari (2004) and Matsubayashi (2005) for the USA; Wu, Chen and Lee (2001) and Lee and Chinn (2006) for G7 countries; Nason and Rogers (2002) for Canada; Kano (2008) for Canada and England; Adedeji and Handa (2008) for Nigeria; Bannaga (2004) for Sudan; Apergis, Katrakilidis and Tabakis (2000) for Greece; Gruber and Kamin (2007) for nineteen different countries; Greenidge, Holder and More (2011) for Barbados. Such studies generally use vector autoregressive (VAR) and vector error correction (VEC) models, Granger causality, co-integration analysis and panel data models.

In econometrics literature, there are relatively a few studies using regime switching models for modelling current account balance. These studies include Middendorf and Schmidt (2004) and Engel and Rogers (2006) for the USA; Clarida, Goretti and Taylor (2005) for G7 countries; Chortareas, Kapetanios and Uctum (2004) for Latin America countries; Nickel and Vansteenkiste (2008) for two different industrial countries; Chen (2011) for OECD countries. After explaining the causes of high USA current account deficit, Engel and Rogers (2006) and Middendorf and Schmidt (2004) model current account balance using two-regime and three-regime Markov-switching models, respectively. In the latter study, regimes are distinguished as a regime of a strong increasing deficit, a just slightly increasing deficit and a regime of a deficit reduction. Besides, they find that movements of the deficit are asymmetric. Similarly, for current account deficit, Chortareas et al., (2004), Clarida et al., (2005) and Nickel and Vansteenkiste (2008) conclude that, respectively, SETAR for Latin American countries; GARCH and TAR for G7 countries and TAR for industrialized countries are appropriate models. Chen (2011) examined whether or not the current account deficits for the OECD countries can be characterized by a unit root process with regime switching models. Related to Turkey current account balance, in addition to theoretical studies (Tiryaki, 2002; Uygur, 2004; Özatay, 2006 and Akçay and Üçer, 2008) there are studies which analyse the relationship of current account balance with different variables. A number of studies that include Yücel and Ata (2003), Hashemzadeh and Wilson (2006) and Ümit and Yıldırım (2008) examine the relationship between budget deficit and current account balance; Erbaykal(2007) tests the effect of exchange rate and economic growth on current account deficit; Sekmen(2008) analyses the interaction of current account deficit with macroeconomic and demographic variables; Lebe, Kayhan, Adıgüzel and Yiğit (2009) aim to analyse the effects of economic growth and real effective exchange rate on current account deficit and Kayıkçı (2012) examines the long-run relationship between the export and import ratios.

It is seen that all of these studies are made using VAR, causality and co-integration analyses under the assumption of linearity. Besides, Eken (1990) attempts to model current account balance with using regression model also under the assumption of linearity.

The results of the literature survey reveal that the analysis of Turkey's current account balance are based on linear models and only a few studies attempt to modelling of the current account series. In this context, based on the assumption that nonlinear models will be more appropriate for Turkish current account balance, the purpose of this study is to determine the appropriate model in the case of regime switching and to make predictions using this model. The paper is organized as follows: The following section introduces TAR models which are among the regime switching models. The third section describes the data and gives the empirical results. The final section provides a summary of the study and its major conclusions.

3. METHODOLOGY

In the process that generates time series, due to crises or changes in government policies, breakages and even regime switches might occur. In such cases, the failure of the analysis of the series using linear models has led to the development of nonlinear models and nonlinear estimation methods. These models define the dynamic behaviour of the variables that switch due to different regimes. The differentiation of regime switching models according to the arising regime in time, has led to the classification of these models into two main classes. In the first one of these classes, it is agreed that as the regimes are created in the past, the regimes are determined based on the observable variable and that future can be exactly known using statistical techniques. On the other hand, the second class is based on the assumption that the regimes cannot be observed in reality, they can only be determined under the nonobservable stochastic process.

In Threshold Autoregressive (TAR) model, that fall into the first class and introduced by Tong (1978) and Tong and Lim (1980), the assumption is that the regime formed in t-period can be determined by the observable variable q_t and that the dynamic behaviour of the time series can be defined using the linear autoregressive (AR) model in each regime. Furthermore, in these models, transition between the regimes is determined by threshold value or values, and the threshold principle allows for the analysis of a complicated stochastic system by diving it into smaller sub-systems. Model type is determined by smooth or sharp transition and also by the fact that transition variable is the linear component of endogenous, exogenous or many variables. When q_t which is called as the threshold variable, takes a lagged value of the time series itself, the resulting model is s*elf-exciting TAR* (SETAR). In this model, q_t becomes y_{t-d} for delay parameter $d > 0$ and thus the assumption is that the boundary between the regimes is determined by a certain value of threshold y_{t-d}.

The observations of y_t are generated either from the first regime when y_{t-d} is equal or smaller than the threshold or from the second regime when y_{t-d} is greater than the threshold. In SETAR model, which is introduced by Tong (1978) and again developed by Tong (1983; 1990), there is a sharp transition between the regimes.

SETAR model generated under two regime assumptions for $d = 1$ is written as follows;
$$SETAR(2; p_1, p_2)$$

$$y_t = \begin{cases} \phi_{1,0} + \sum_{i=1}^{p_1} \phi_{1,i} \, y_{t-i} + \varepsilon_{1t} & \text{for } y_{t-1} \le c \\ \phi_{2,0} + \sum_{i=1}^{p_2} \phi_{2,i} \, y_{t-i} + \varepsilon_{2t} & \text{for } y_{t-1} > c \end{cases}$$

$$(1)$$

Where p_1 and p_2 are the lag orders in lower and upper regimes of AR model; c is the threshold value and y_{t-1} is threshold variable. Error term ε_{it} is assumed to be independently and identically distributed white noise process, conditionally depend on the past values of the times series. Considering $\Omega_{t-1} = [y_{t-1}, y_{t-2}, ..., y_{t-p}]$, the mean is $E[\varepsilon_{it} | \Omega_{t-1}] = 0$ and variance is $E[\varepsilon_{it}^2 | \Omega_{t-1}] = \sigma^2$; it is indicated as $\varepsilon_{it} \square \, i.i.d(0, \sigma^2)$.

An alternative SETAR model can be written as

$$y_t = (\phi_{1,0} + \sum_{i=1}^{p_1} \phi_{1,i} y_{t-i})(1 - I[y_{t-1} > c]) + (\phi_{2,0} + \sum_{i=1}^{p_2} \phi_{2,i} y_{t-i})I[y_{t-1} > c] + \varepsilon_t$$

$$(2)$$

where $I[A]$ is an indicator function which takes the value of $I[A] = 1$ when event A is realized; and the value of $I[A] = 0$, in case of other conditions. (Franses and van Dijk, 2003, p.71).

If the indicator function in SETAR model is replaced by a transition function $o < G(z_t) < 1$, the resulting model is called as a *smooth transition autoregressive* (STAR) model. Where z_t is a transition variable similar to the threshold value in TAR model. In STAR model, which was introduced by Chan and Tong (1986) and developed by Teräsvirta (1994), there is a smooth transition between the regimes. General specification of 2-regime STAR model is as follows:

$$y_t = (\phi_{1,0} + \sum_{i=1}^{p_1} \phi_{1,i} y_{t-i})(1 - G(z_t; \gamma, c)) + (\phi_{2,0} + \sum_{i=1}^{p_2} \phi_{2,i} y_{t-i})G(z_t; \gamma, c) + \varepsilon_t$$

$$(3)$$

When $z_t = y_{t-1}$ for $d = 1$, STAR model generated under two-regime assumption can be written as;

$$y_t = (\phi_{1,0} + \sum_{i=1}^{p_1} \phi_{1,i} y_{t-i})(1 - G(y_{t-1}; \gamma, c)) + (\phi_{2,0} + \sum_{i=1}^{p_2} \phi_{2,i} y_{t-i}) G(y_{t-1}; \gamma, c) + \varepsilon_t$$

(4)

(Franses and van Dijk, 2003, p. 77). Where p_1 and p_2 are the lag orders of AR models, y_{t-1} is transition variable, G is the continuous function which slowly switches from 0 to 1 as y_{t-1} increases which yields a non-linear asymmetric adjustment and $\varepsilon_t \square n.i.d(0, \sigma^2)$. Parameter c shows the threshold value between the two regimes corresponding to $G(y_{t-1}; \gamma, c) = 0$ and $G(y_{t-1}; \gamma, c) = 1$ and parameter γ identifies the shape of transition from a regime to another, and it represents the speed of transition. (Teräsvirta, 1994, p.208).

There are two variants of STAR models due to the difference in transition functions; *logistic STAR* (LSTAR) and *exponential STAR* (ESTAR) (Teräsvirta, 1994). In equation 4, for $d = 1$, when transition function is

$$G(y_{t-1}; \gamma, c) = (1 + \exp[-\gamma(y_{t-1} - c)])^{-1}$$

(5)

then the resulting model is LSTAR;

$$G(y_{t-1}; \gamma, c) = (1 + \exp[-\gamma(y_{t-1} - c)^2])$$

(6)

then the resulting model is ESTAR. (Van Dijk, Teräsvirta and Franses, 2000, p.2-3.)

The regime based differences between these models are outlined as follows; the LSTAR model implies that regimes based on low and high current account ratio (i.e. different regimes) have different dynamics whereas the ESTAR model implies that the two regimes have similar dynamics but the transition period can have different dynamics. Besides, in LSTAR model, adjustment takes place in every period but the smoothness of adjustment varies with the extent of the deviation from equilibrium. In LSTAR model, the transition function is monotonically increasing in y_{t-1} and yields asymmetric adjustment toward equilibrium in the model.

In this context, Teräsvirta (1994) denotes difficulties with the estimation of c and γ. When γ is large, the slope of the transition function at c is steep, and a large number of observations in the neighbourhood of c would be needed to estimate γ accurately. Even relatively large changes in γ then have only a minor effect on the shape of *G*. As a result, the sequence of estimates for γ may converge rather slowly. To eliminate this and to find appropriate preliminary/initial value, transition function is divided into the standard deviation of the series, σ_y (Teräsvirta, 1994, p.208-209)

Building of SETAR and STAR models starts with determining p_i, which is the lag order of linear AR model using Akaike information criteria (*AIC*) and continues with determining delay parameter d. In SETAR model, d is selected after separate nonlinearity test for each delay and by non-rejection of nonlinearity hypothesis. Nonlinearity test is made using;

$$\hat{F}(p,d) = \frac{\left(\sum \tilde{e}_t^2 - \sum \hat{\varepsilon}_t^2 \right) / (p+1)}{\sum \hat{\varepsilon}_t^2 / (n-d-b-p-h)}$$

statistics which is calculated based on recursive residuals and arranged autoregressions [8] for SETAR model. In the statistics which has a F distribution, $\tilde{e}_t^2$ refers to the sum of squared residuals obtained by recursive least squares method from the arranged autoregression; $\hat{\varepsilon}_t^2$ refers to the sum of squared residuals obtained by the least squares method from linear regression. The final stage in SETAR model is determining the threshold value/values and estimation of the model (Tsay, 1989, pp. 233, 236). On the other hand, in STAR model, linearity test is performed for different values of d to auxiliary regression;

$$\hat{v}_t = \beta_0 + \beta_1' w_t + \sum_{j=1}^{p} \beta_{2j} y_{t-j} y_{t-d} + \sum_{j=1}^{p} \beta_{3j} y_{t-j} y_{t-d}^2 + \sum_{j=1}^{p} \beta_{4j} y_{t-j} y_{t-d}^3 + u_t$$

(8)

where $\hat{v}_t$ represents the residuals saved from the chosen AR model. Linearity test is applied for each d between the values of $1 \le d \le p$ and if null hypothesis is rejected for more than one d value, then most strongly reject linearity is considered as an appropriate delay for the transition variable.

Considering $w_t = \left(y_{t-1}, \ldots, y_{t-p} \right)'$, STAR model linearity test is made based on LM test under null hypothesis;

$$H_0' : \beta_{2j} = \beta_{3j} = \beta_{4j} = 0, \qquad j = 1, \ldots, p.$$

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[8] For n number of observations, $AR(p)$ model was specified as $y_t = (1, y_{t-1}, \ldots, y_{t-p}) \beta + \varepsilon_t$ for $t = p+1, \ldots, n$. In the model, β refers to $(p+1)$ dimensional coefficients vector, ε_t refers to error terms. Arranged autoregressions are the divided version of the above arranged autoregressions depending on various values. TAR model fulfils its aims if it is arranged according to threshold values.

Test statistic $LM_2 = (SSR_0 - SSR)/\hat{\sigma}^2$ has a distribution of χ^2 with degrees of freedom $(3\mathrm{p})$; SSR_0 refers to sum of squared residuals obtained from the restricted model under $H_0{'}$ hypothesis, while SSR refers to sum of squared residuals obtained from unrestricted model under alternative hypothesis. For STAR model, after the linearity test and finding d , selection of functional form is made under the hypothesis formed by restricting the parameters auxiliary regression (8).

To determine the functional form of STAR model, three different nested hypotheses are generated and F testing is made. (Teräsvirta, 1994, p.211) For this purpose, the following null hypotheses are tested;

$$H_{01}: \beta_{4j} = 0, \quad j = 1,\dots,p \qquad (F_4)$$

$$H_{02}: \beta_{3j} = 0/\beta_{4j} = 0, \quad j = 1,\dots,p \qquad (F_3)$$
$$(9)$$
$$H_{03}: \beta_{2j} = 0/\beta_{3j} = \beta_{4j} = 0, \quad j = 1,\dots,p \quad (F_2)$$

If the probability value (*p*-value) of F_3 (the test of H_{02}) is the smallest of the three, appropriate model is an ESTAR model, otherwise choose a LSTAR model. (Teräsvirta, 1994, p.212). After selecting the functional form, the final stage in STAR model is estimating the model using nonlinear least squares (NLLS) or maximum likelihood (ML) method.

4. DATA AND EMPIRICAL RESULTS

This section of the study attempts to find an answer to the question whether the current account balance over the period 1998:01 to 2008:09 has a regime switching; and in this context whether it can be modelled with regime switching models. The reason for choosing the year 1998 as the starting point is that this year is the start of a variation in general balance, current account, capital and financial accounts and starting from 1998, wave lengths differed and fluctuations increased. 1997 Asian and 1998 Russian crises can be shown as the main reason for this change. In the period following the start of these crises, serious constrictions emerged in world manufacturing and trade. In addition to the reflections of this in Turkey, increased risk caused the outflow of considerable speculative (hot) money, which in turn, increased fluctuations. Also we choose 2008 year-end as the finishing point to examine the forecast performance of the model to capture the global crisis.

Firstly, it is noted that, to compare the results of the studies and to make a significant comparison, instead of current account balance, the share of *current account balance (CAB)* in *GDP,* that is *current account ratio (CAR)* is analysed. Similarly, it is seen that this approach is used in various studies.

For example, in his comments on current account balance, Chairman of the Central Bank of the Republic of Turkey, Yılmaz, uses the ratio of the mentioned series to Gross National Product (GNP)[9]; on the other hand, Edwards (2001), Chortareas, Kapetanios and Uçtum (2004), Tanner and Samake (2006), Togan and Ersel (2007) and Akçay and Üçer (2008) use the ratio to Gross Domestic Product (GDP) in their studies. Furthermore, the data of the present study is analysed without deseasonalization. In some of the previous studies on current accounts are made use of various filters to deseasonalize the series and that the analysis are made on deseasonalized series (For example Lee and Chinn, 2006). However, the findings of the studies particularly of those conducted on business circles and unemployment revealed that deseasonalization can affect the nonlinear properties of time series, it can mask or even totally eliminate the nonlinear process in the time series, it will make the series nonlinear or change the nonlinearity type of the series (Ghysels, Granger and Siklos, 1996; Luginbuhl and de Vos, 2003; Mir and Osborn, 2004). Franses and Paap (1999) and Franses and de Bruin (2000) report that there are variations in the models specified for seasonally adjusted and non-adjusted series. Based on these findings, considering that deseasonalization will disturb the basic dynamics of the series and cause a difference in the regimes in the present study, it is decided that it will be appropriate to make an analysis without deseasonalization.[10]

As mentioned above, *CAR* series used in the study is obtained by dividing *CAB* to *GDP*, and *GDP* and *CAB* data are taken from the CBRT Electronic Data Delivery System.[11] The graph of the series is displayed in Fig. 1 and some statistics of the series are shown in Table 3.

Fig. 1: Time graph of current account ratio series

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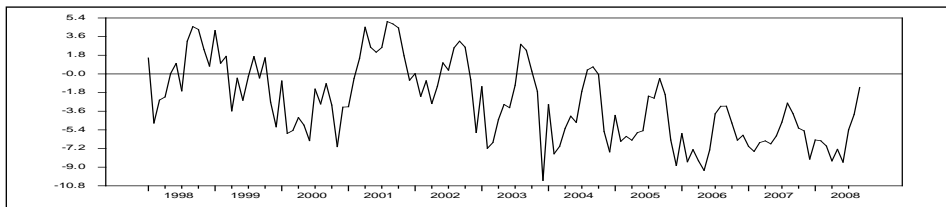
[9] Durmuş Yılmaz, CBRT 75th Regular General Assembly Opening Remarks, April 6th, 2007, Ankara.

[10] Various methods are used in deseasonalization. Since these methods might affect analysis results, selection of the followed approach is important. For example, if we use a filter like X-11, turning points of the regression would be degraded and this would in turn disturb the form of the regime. As a result of this, results which were different from the reality would be obtained. For further information, see Skalin and Teräsvirta (2000), Fattouh (2005) and Mir, Osborn and Lombardi (2005).

[11] http://evds.tcmb.gov.tr/

Table 3: Some descriptive statistics for current account ratio series

Statistics	Value	Critical values for T=100
Sample mean	-2.762	
Standard error	3.742	
Skewness (SK)	-0.236	0.576
Excess kurtosis(EK)	-0.900	LV= -0.80 / HV=1.52
Jarque-Bera (JB)	5.561	5.99
(A)DF (τ -statistics)	-4.680	$\tau_\tau = $ -3.45
KSS Test	-4.342	$t_{NL} = $ -3.40

As seen in Fig. 1, from the beginning 2004:11, current account ratio becomes negative and permanent; Table 3 indicates that the series varies between -10.28% and 5.05%, it is symmetric and platykurtic.[12] Table 3 also reports univariate ADF unit root test and nonlinear KSS unit root test on current account ratio for the full sample. The results for *CAR* series indicate that the null of nonstationarity is rejected at the 5% significance level.

As mentioned above, it is seen that in many studies on various countries and Turkey, after determining that the series are stationary, the models are specified with the assumption of linearity. However, prior to the modelling, the linearity should also be tested.

For this reason, in the first stage of TAR type model building, firstly the series will be specified with linear regression model to determine the lag length, secondly nonlinearity in the series will be tested and the delay parameter will be determined, thirdly in case that the series has nonlinear process, threshold value will be calculated using the method proposed by Tsay (1989).

According to the steps written above, firstly, to determine the lag length appropriate for TAR models, the series is specified with linear regression model and using AIC[13], p is found to be 14. Secondly, to test nonlinearity of the series, nonlinearity test is applied and the results of test are given in Table 4.

Table 4: Results of nonlinearity test

	d=1	d=2	d=3	d=4	d=5	d=6	d=7	d=8	d=9	d=10	d=11	d=12	d=13	d=14
F-stat	1.89	0.85	1.21	1.93	1.05	0.63	0.56	0.53	0.98	0.99	0.83	1.04	0.60	1.19
p-value	0.03	0.61	0.27	**0.03**	0.41	0.83	0.89	0.91	0.47	0.47	0.63	0.41	0.86	0.28

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[12] Since skewness coefficient is $SK = |-0.236| < 0.576$, normality can not be rejected and it is decided that the series is symmetric. As the kurtosis coefficient is $EK = -0.900 \leq -0.80$, normality is rejected and it is decided that the series is platykurtic.

[13] Using the knowledge that Bayesian information criterion (BIC) gives better results when number of observations in below 200 (Strikholm and Teräsvirta, 2005, p.20), in this study lag lengths were calculated using both BIC and AIC, however, it was found that there was no difference between these two for study data and only AIC information was provided. For a similar operation see Arestis, Cipollini and Fettouh (2003), Fattouh (2005), Skalin and Teräsvirta (2000) and Strikholm and Teräsvirta (2005).

According to the p-value in Table 4, linearity is rejected only in delay 1 and 4. However, since linearity is more strongly rejected in delay 4, lag length so delay of the threshold variable is selected as $d = 4$. Then, to determine whether there is a threshold value causing regime switching in the series, threshold testing is performed. For this purpose, using bootstrap method, after 5000 repetitions, F-statistic is calculated as 5.678 and it is decided that there is a threshold value causing regime switching in the model.

Thirdly, threshold value is calculated as -0.033 using the method proposed by Tsay (1989, p.235). This indicates that there are two different regimes in CAR series and it will be appropriate to specify two different regression models which are above and below

-3.3%.

In the second stage, suitable TAR type model will be specified for the series. For this, firstly to find appropriate lag lengths, models with various delays (lags) are tried and in the first regime 1 and 3, in the second regime 2 and 13 are found to be statistically significant delays. Secondly, specified SETAR model is estimated by NLLS, and estimation results of this model are given in Table 5.

Table 5: Estimation results of the SETAR model

$$CDO_{t-4} \leq -0.033$$

$$CDO_t = \underset{(0.005)}{-0.015} + \underset{(0.162)}{0.364}\, CDO_{t-1} + \underset{(0.170)}{0.487}\, CDO_{t-3}$$

$$CDO_{t-4} > -0.033$$

$$CDO_t = \underset{(0.004)}{-0.010} + \underset{(0.124)}{0.405}\, CDO_{t-2} + \underset{(0.101)}{0.321}\, CDO_{t-13}$$

$$LM(12) = 13.367 \quad ARCH(12) = 22.871 \qquad JB = 5.07 \quad SSR = 0.398$$
$$AIC = 0.598$$

It is shown in Table 5 that model parameters are statistically significant, they achieve the sufficiency condition for stationarity[14], and there is no autocorrelation and heteroscedasticity problem. Following this, in-sample forecast success of SETAR model is investigated. Forecast graph obtained at this stage is displayed in Fig. 2, and forecast evaluation criteria are given in Table 6.

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[14] $(0,364 + 0,487) < 1$ and $(0,405 + 0,321) < 1$ are sufficiency conditions for the stationarity of two-regime AR models (Hansen, 1997, p.4. Assumption 1.2)

Fig. 2: In-sample forecast graph of the SETAR model
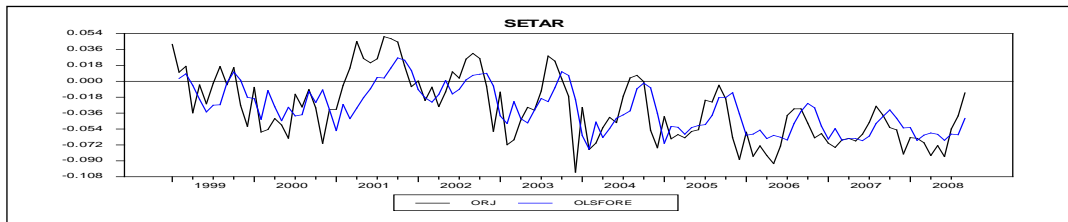
Table 6: Forecast evaluation criteria of the SETAR model

	From 1999:03 to 2008:09
Mean Error (ME)	0.0213
Mean Absolute Error (MAE)	0.0419
Root Mean Square Error (RMSE)	0.0671

Table 6 shows that the forecast evaluation criteria are close to zero, and in Figure 2, it is seen that the turning points is caught with small differences.

These reveal the success of in-sample forecast of the model. In the third stage, it will be investigated to see which STAR model, LSTAR or ESTAR, is appropriate for the *CAR* series. For this purpose, firstly linearity will be tested and delay parameters will be determined. The results of linearity test that is proposed by Terasvirta (1994), for lag length 14 which is determined by AIC, are given in Table 7.

Table 7: Results of nonlinearity test

	d=1	d=2	d=3	d=4	d=5	d=6	D=7	d=8	d=9	D=10	d=11	d=12	d=13	d=14
F-stat.	2.00	0.93	1.74	1.83	0.87	1.03	1.45	1.16	1.51	0.99	1.26	0.75	0.78	1.27
p-value	**0.00**	0.59	0.02	0.015	0.672	0.44	0.09	0.29	0.07	0.49	0.20	0.83	0.79	0.19

The values in Table 7 show that linearity is rejected in delays $1, 3, 4, 7$ and 9 and that the series shows a nonlinear structure. However, since the *p*-value indicates that linearity is more strongly rejected in delay 1, $d = 1$ is selected. Secondly, under three different hypothesis proposed by Teräsvirta (1994), F statistics are calculated and the results are given in Table 8.

Table 8: Results of test for functional form

d =1	F Test	p-values
F_4	1.824	0.056
F_3	1.082	0.387
F_2	2.488	0.005

It is clearly seen in Table 8 that F_2 has the lowest *p*-value. This result indicates that for *CAR* series, LSTAR is the appropriate model. Thirdly, after the selection of appropriate functional form, the model is estimated by ML method and the results are given in Table 9.

Table 9: Estimation results of the LSTAR model

$$CDO_t = \underset{(0.078)}{0.506}\,CDO_{t-2} + \underset{(0.115)}{0.549}\,CDO_{t-12} + (\underset{(0.319)}{0.657}\,CDO_{t-3} - \underset{(0.340)}{1.108}\,CDO_{t-4} - \underset{(0.348)}{0.135}\,CDO_{t-12} - \underset{(0.193)}{1.032}\,CDO_{t-14}) \times$$

$$(1 + \exp[-\underset{(0.084)}{0.220}(CDO_{t-1} + \underset{(0.000)}{0.037})])^{-1}$$

$$LM(12) = 18.337 \quad ARCH(12) = 21.314 \quad JB = 5.87 \quad SSR = 0.278 \quad AIC = 0.425$$

The results in Table 9 show that the LSTAR model parameters are statistically significant, there is no autocorrelation and heteroskedasticity problem in the residuals, and that they are normally distributed. In the same table, it is seen that the values of parameters c and γ are -0.037 and 0.220, respectively.

The fact that the calculated γ value is not high indicates the smoothness in transition from one regime to another, and its statistical significance reveals that LSTAR is the appropriate model for the series. Then, in-sample forecast success of LSTAR model is investigated. Realized values and generated forecast values are shown together in Fig. 3, and forecast evaluation criteria are given in Table 10.
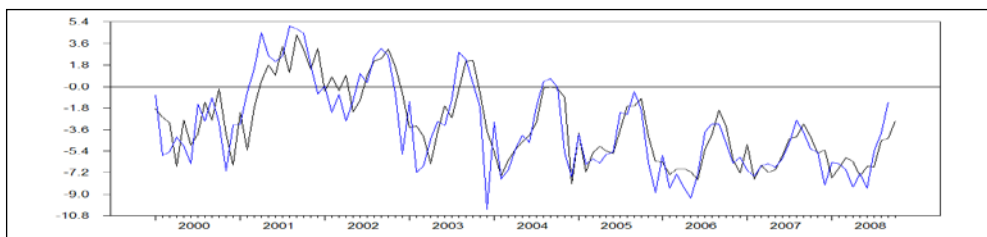
Fig. 3: In-sample forecast graph of the LSTAR model

Table 10: Forecast evaluation criteria of the LSTAR model

	from 1999:06 to 2008:09
Mean Error (ME)	0.0092
Mean Absolute Error (MAE)	0.0278
Root Mean Square Error (RMSE)	0.0402

Forecast evaluation criteria in Table 10 indicate that LSTAR model is also successful in modelling *CAR.* Furthermore, Fig. 3 shows that the success of the in-sample forecast of this model in capturing all turning points of the series is more successful than SETAR model (Fig. 2). To decide which model is better, AIC, SSR, ME and RMSE values are given in Table 11 collectively. Eventually, Table 11 shows that the best model that captures all nonlinearity is LSTAR model.

Table 11: In-sample forecast evaluation criteria of the SETAR and LSTAR models

	AIC	SSR	ME	RMSE
SETAR	0,598	0,398	0.021	0.067
LSTAR	0,425	0,278	0.009	0.040

Another aim of the study is to make out-of-sample forecast for the series after choosing the appropriate model. However, the findings of many previous studies reveal that in-sample forecast success of nonlinear models are high, but their out-of-sample forecasts do not have much advantage than linear models (Diebold and Nason, 1990; De Gooijer and Kumar, 1992; Terasvirta and Anderson, 1992; Tiao and Tsay, 1994; Dacco and Satchell,1999; Sarantis, 1999; Stock and Watson, 1999 and Teräsvirta, van Dijk and Medeiros, 2005). Among these studies, De Gooijer and Kumar (1992) state that better forecasts can be obtained in the case of the short forecast horizon (De Gooijer and Kumar, 1992, p.151, 154). Besides Tiao and Tsay (1994, p.115-116) compare forecast success of two-regime SETAR and AR(2) models (within the context of MSFE criteria) suggest that for the extension period, SETAR model is not more advantageous than the AR model, however, at recession/contradiction period, SETAR's from 2 to 4-step-ahead forecast was more successful.

Unlike these findings, Boero and Marrocu (2002) specify AR, RW, GARCH, STAR and SETAR models for the return of three exchange rates against US Dollar and compare the in-sample and out-of-sample forecast success of these models with different criteria and alternative procedures, and reports that nonlinear models are superior to linear models. Feng and Liu (2003, p.14) also conclude that ARIMA and SETAR models are successful in in-sampling and out-sample forecast of GDP data for Canada, and besides this, the authors conclude that SETAR model yields a better result in the out-sample forecast.

In conclusion, it can be state that there is a common view suggesting that nonlinear models are more successful than linear models in capturing the properties of time series in sampling period, but the models can not show the same success for out-of sampling period.

The main reason for this can be outlined that nonlinearity is found to be quite significant within the analysis period; however it fails to convey this outside the analysis period. In this subject, Diebold and Nason (1990) also report that one of the reasons for weak forecast of nonlinear models lied in the differences between in-sample and out-of-sample characteristics.

When we investigate the forecast approaches applied in the majority of the studies, it is seen that while choosing the forecast method and creating the forecast confidence interval, the fact that forecast density of nonlinear models is multimodal, residuals are asymmetric and these are not taken into consideration in these studies.

Therefore, in the present study, out-of-sample forecast of *CAR* series which is found to be nonlinear is performed by using the Highest-Density Forecast Region (HDR) approach of Hyndman (1995). For the related variable, HDR refers to the region when the density function exceeds the nominal threshold and HDR estimation typically involves determining the regions with high estimated density. [15]

This method, which is agreed to be appropriate for nonlinear series and asymmetric residuals, (van Dijk, Franses and Boswijk, 2000; Blasco, 2001; Niglio and Amendola, 2001 and Arango and Melo, 2006) is used in 20-step-ahead forecast of *CAR* series. Generated forecast graph is given in Fig. 4 and forecast evaluation criteria are displayed in Table 12.

Fig. 4: 20-step-ahead forecast graphics of the LSTAR model

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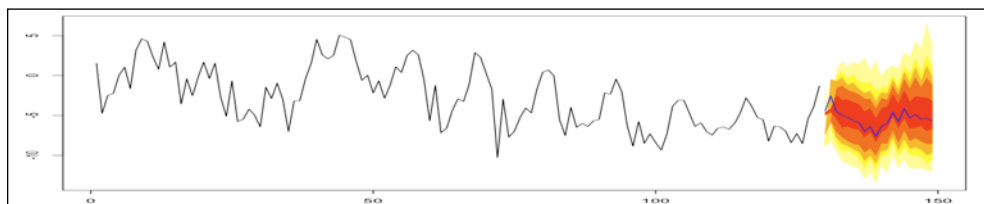
[15] The fact that in linear models, forecast confidence intervals are taken symmetrically around point estimations as forecast density is symmetrical and unimodal, is based on the assumption that conditional distribution of linear time series are normal. However, nonlinear series or non-normal (asymmetrical) residuals make the forecast density asymmetrical or multimodal. In this case, it was thought that symmetrical interval around the mean should not be the appropriate forecast, that the forecast intervals should be formed in such a way to be non-symmetrical.

Table 12: 20-step-ahead forecast evaluation criteria of the LSTAR model

	from 2008:10 to 2010:05
Mean Error (ME)	0.0867
Mean Absolute Error (MAE)	0.0963
Root Mean Square Error (RMSE)	0.1032

Small values of forecast evaluation criteria which are shown in Table 12 indicate the success of 20-step-ahead forecast made for *CAR* series. Besides, Fig. 5 shows point forecast values for the period from 2008.10 to 2010.05 and upper and lower confidence limits with 95% probability.

Fig 5: 20-step-ahead forecast points and upper and lower confidence limits
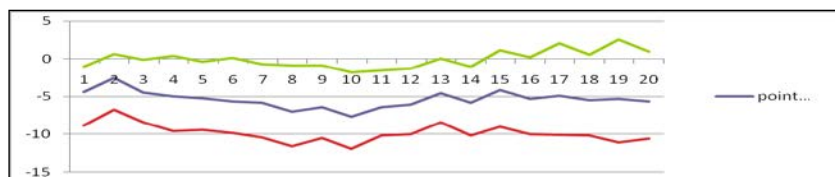
It is seen in Fig. 5 that the *share of current account deficit* which decreases between 2008:10-2008:12 periods in *GDP* increases particularly until 2009:05 and continues at the level of 6% until 2009:09 and then stabilises around 5% in the period until 2010:05.

This suggests that current account deficit ratio will continue around at the level of 5% with slight changes for 20 periods. Forecast findings support the view that global crisis which started in the USA in the final period of 2007 and began to affect world countries as of 2008, started at the end of 2008 in Turkey and caused a gradual increase in *current account GDP ratio* as of 2009. In addition, the results reveal that forecast values will constantly continue over the -3.7% threshold value calculated for CAR.

In this context, Dornbusch (2001, p.3) reports that if *CAD/GDP* ratio is exceeds 4%, it will pass to red zone in terms of crises. Dornbusch also reports that if the exchange rate rapidly gains value (25% and above in a 2 or 3 year period) and if the current account deficit exceeds 4%, without the prospect of a correction, that country will pass to the red zone. On the other hand, Milesi-Ferretti and Razin (1996, p.20) report that the fact that for 3-4 years, a permanent *current account deficit* exceeds a certain threshold like 5% of the *GDP* will not be an indicator that provides adequate information with sustainability.

Based on these findings and Dornbusch's conclusions, considering that the fragility in the economy is increased, it can be stated that crisis will be inevitable even in a mild wind.

In conclusion, the finding of the present study suggesting that the *share of current account balance in GDP* has two different regimes which are above and below -3.7%, indicates that at the ratios over this value, it is difficult to sustain current account deficit. This finding is consistent with the finding of Çakmak and Varlık (2007) where the authors analyse the sustainability of current account deficit for Turkey and using Aristovnik's (2006) formulation, they find the value of 3.6% for a moderate scenario.

5. SUMMARY AND CONCLUSIONS

The chronic current account deficit of Turkey since November 2002 excluding a few months and that Turkey ranked sixth in the list of countries with current account deficit in the year 2008 is the main motive behind the present study. Furthermore, the fact that the previous studies for this issue concentrated on linear models; besides insufficient in number modelling and out-of-forecasting efforts is the other motive of this study.

For this context, the first purpose of this paper is to investigate whether nonlinearities are present in the behaviour of Turkey current account balance and to find the appropriate TAR family model. In this manner, it can be argued that if nonlinearities are present in *CAB/GDP* behaviour then linear models are inappropriate. The second purpose is to generate out-of-sample forecasts with this model.

The main findings of the analysis of current account imbalances which involves the period 1998:01 to 2008:09 can be summarized as follows: firstly, the *ratio of current account balance to GDP* is nonlinear, and SETAR and LSTAR models are found to be successful in defining the nonlinear structure of the mentioned series. As a result of the comparison of the in-sample forecast success of these models, it is decided that LSTAR is the appropriate model and regimes based on low and high current account ratio have different dynamics. According to the empirical results, the series has one threshold and two regimes; the threshold value dividing the series into two regimes is -0.037, and that there are two different regimes below and above this value. Secondly, LSTAR model is used for forecasting purposes due to its in-sample forecast success. Using this model, 20-step-ahed forecast is performed using highest-density forecast region approach. In this context, the finding of the study is that current account deficit will rise towards the middle of 2009, however a less deficit will occur towards the end of the year and at the beginning of 2010, the *share of current account balance in GDP* will continue at the level of -5% and -6%.

When we compare this result with realized values it is seen that LSTAR model is succeed in out-of-sample forecast. Thirdly, the fact that all forecast values are significantly higher than the threshold value suggests that in case of an outbreak of a small crisis, it will be difficult to sustain the current account deficit. Besides, the results of the preset study reveals that nonlinear models are appropriate in modelling current account balance and that using linear model will be inadequate and lead to erroneous results.

In addition, the fact that the use of forecast approaches that are appropriate for nonlinear models increased out-of-sample forecast success and this points to the importance of the suitability of the forecast method to be selected with the nonlinear models. The fact that the forecasts will guide policy makers in economic programs adds to the importance of the present study.

The next step of the study is planned to extend the study by performing impulse-response analyses for the LSTAR model, to determine other variables affecting current account balance and their potential impacts.

REFERENCES

- Adedeji, O. (2001) The size and sustainability of the Nigerian current account deficit, International Monetary Fund Working Paper, No. 01/87.

- Adedeji,O. and Handa, J. (2008) The size and sustainability of the Nigerian current account deficits, The Journal of Developing Areas, 41, 1-25.

- Akçay, C. and Özler, Ş. (1998) Current account position of the Turkish economy: is there any cause for concern?, Boğaziçi Journal Review of Social, Economic and Administrative Studies, 12(1), 39-53.

- Akçay, C. and Üçer, M. (2008) A narrative on the Turkish current account, The Journal of International Trade and Diplomacy, 2(2), 211-238.

- Akkaçar, N. (2006) Cari işlemler açığını nasıl finanse edeceğiz? Net hata noksan tartışmalarına bir katkı. [How does current account deficit will be financed? A contribution to discussion of net error and omissions.] available at http://www.asam.org.tr

- Ansari, M. I. (2004) Sustainability of the US current account deficit: an econometric analysis of the impact of capital inflow on domestic economy, Journal of Applied Economics, 7(2), 249-269.

- Arango, L. E. and Melo, L. F. (2006) Expansions and contractions in Brazil, Colombia and Mexico: a view through nonlinear, Journal of Development Economics, 80(2), 501-517.

- Apergis, N., Katrakilidis, K. P. and Tabakis, N. M. (2000) Current account deficit sustainability: the case of Greece, Applied Economics Letters, 7, 599-603.

- Arestis, P., Cipollini, A., and Fattouh, B. (2003) Threshold effects in the US budget deficit, Centre for International Studies on Economic Growth Research Paper Series, 6, 18.

- Arias, G. and Erlandsson, U. G. (2004) Regime switching as an alternative early warning system of currency crises : an application to South-East Asia, Scandinavian Working Papers in Economics, No. 11.

- Aristovnik, A. (2006) How sustainable are current account deficits in selected transition economies? Available at http://mpra.ub.uni-muenchen.de/485/1/MPRA_paper_485.pdf

- Blasco, N. and Santamaria, R. (2001) Highest-density forecast regions: an essay in the Spanish stock market, Journal of Asset Management, 2(3), 274-283.

- Bannaga, A. A. (2004) Adjustment policies and the current account balance: empirical evidence from Sudan, University of Manchester, Development Economics and Public Policy Working Papers , No. 8.

- Berg A. and Pattillo, C. (1999) What caused the Asian crises: an early warning system approach, Economic Notes, 28, 285-334.

- Boero, G. and Marrocu, E. (2002) The performance of non-linear exchange rate models: a forecasting Comparison, Journal of Forecasting, 21, 513-542.

- Çakmak, U. and Varlık, C. (2007) Türkiye ekonomisinde cari işlemler açığının sürdürülebilirliği: Meksika örneği bağlamında bir değerlendirme [Sustainability of the current account deficits in the Turkish economy: an assessment in the context of the Mexican example], İktisat İşletme ve Finans, 22(259), 114-135.

- Chan, K. S. and Tong, H. (1986) On estimating thresholds in autoregressive models, Journal of Time Series Analysis, 7(3), 179-190.

- Chen, S.W. (2011) Current account deficits and sustainability: Evidence from the OECD countries, Economic Modelling, 28(4), 1455-1464.

- Chortareas, G. E., Kapetanios, G. and Uctum, M. (2004) An investigation of current account solvency in Latin America using nonlinear nonstationarity tests, Studies in Nonlinear Dynamics and Econometrics, 8(1), 1-17.

- Clarida, R. H., Goretti, M. and Taylor, M. P. (2006) Are there thresholds of current account adjustment in the G7?, National Bureau of Economic Research Working Paper, No. 12193

- Corsetti, G., Pesenti, P. and Roubini, N. (1999) The Asian crisis: an overview of the empirical evidence and policy debate, The Asian Financial Crisis: Causes, Contagion, and Consequences, UK, Cambridge, 127-162

- Dacco, R. and Satchell, S. (1999) Why do regime-switching models forecast so badly?, Journal of Forecasting, 18, 1-16.

- Dickey, D. A. and Fuller, W.A. (1979) Distribution of the estimators for autoregressive time series with a unit root, Journal of the American Statistical Association, 74, 427–431.

- De Gooijer, J. G. and Kumar, K. (1992) Some recent developments in non-linear time series modelling, testing and forecasting, International Journal of Forecasting, 8, 135–156.

- Diebold, F. and Nason, J. (1990) Nonparametric exchange rate predictions?, Journal of International Economics, 28, 315-328.

- Dornbusch, R. (2001) A primer on emerging market crises, National Bureau of Economic Research Working Paper, No. 8326.

- Edwards, S. (2001) Does the current account matter?, National Bureau of Economic Research Working Paper, No. 8275.

- Edwards, S. (2005) Is the U.S. current account deficit sustainable? If not, how costly is adjustment likely to be?, Brookings Papers on Economic Activity, 211-271.

- Eken, A. (1990) Cari işlemler dengesi üzerine model çalışması [A modelling study for current account balance], TCMB Araştırmalar, Tartışma Tebliği, No. 9020.

- Engel, C. and Rogers, J. H. (2006) The U.S. current account deficit and the expected share of world output, Journal of Economics, 53(5), 1063-1093.

- Erbaykal, E. (2007) Türkiye'de ekonomik büyüme ve döviz kuru cari açık üzerinde etkili midir? Bir nedensellik analizi [Do economic growth and foreign exchange rates have effects on the current deficit in Turkey? A causality analysis], ZKÜ Sosyal Bilimler Dergisi, 3(6), 81–88.

- Esquivel, G. and Larrain, F. (1998) Explaining currency crises, Harvard Institute for International Development Discussion Paper, No. 666, 1-36.

- Fattouh, B. (2005) Capital mobility and sustainability evidence from U.S. current account data, Empirical Economics, 30, 245-253.

- Feng, H. and Liu, J. (2003) A SETAR model for Canadian GDP: non-linearities and forecast comparisons, Applied Economics, 35(18), 1957-1964.

- Frankel, J. and Rose, A. (1996) Currency crashes in emerging markets: an empirical treatment, Discussion Paper, Board of Governors of the Federal Reserve System International Finance Discussion Papers , No. 534.

- Franses, P. H. and Bruin, P. (2000) Seasonal adjustment and the business cycle in unemployment, Studies in Nonlinear Dynamics and Econometrics, 4(2), 73-84.

- Franses, P. H. And Paap, R. (1999) Does seasonality influence the dating of business cycle turning points?, Journal of Macroeconomics, 21(1), 79-92.

- Franses, P. H. and van Dijk, D. (2003) Non-linear time series models in empirical finance, Cambridge University Press, Cambridge.

- Ghysels, E., Granger, C.W. J. and Siklos, P. (1996) Is seasonal adjustment a linear or nonlinear data filtering process?, Journal of Business and Economic Statistics, 14(3), 374-386.

- Gruber, J. W. and Kamin, S. B. (2007) Explaining the global pattern of current account imbalances, Journal of International Money and Finance, 26, 500-522.

- Hansen, B.E. (1997) Inference in TAR models, Studies in Nonlinear Dynamics and Econometrics, 2(1),1-14.

- Hashemzadeh, N. and Wilson, L. (2006) The dynamics of current account and budget deficits in selected countries if the Middle East and North Africa, International Research Journal of Finance and Economics, 5, 112-129.

- Horne, J. (2001) The current account debate in Australia: changing policy perspectives, Macquarie University, Department of Economics Research Papers, No. 0111.

- Howard, D. H. (1989) Implication of the U.S. current account deficit, The Journal of Economic Perspectives, 3(4), 153-165.

- Hudson, S. and Stennett, R. (2003) Current account sustainability in Jamaica, Bank of Jamaica, Working Paper, No: 02111.

- Hyndman, R. J. (1995) Highest-density forecast regions for nonlinear and non-normal time series models, Journal of Forecasting, 14, 431-441.

- Jarque, C. and Bera, A. (1980) Efficient tests for normality, homoscedasticity, and serial independence of regression residuals, Economics Letters, 6, 255–259.

- Kano, T. (2008) A structural VAR approach to the intertemporal model of the current account, Journal of International Money and Finance, 27(5), 757-779.

- Kayıkçı, F. (2012) Solvency of current account deficit in Turkey, Actual Problems of Economics, 128(2), 387-395.

- Lee, J. and Chinn, M. D. (2006) Current account and real exchange rate dynamics in the G7 countries, Journal of International Money and Finance, 25, 257-274.
- (2009) The empirical analysis of the effects of economic growth and exchange rate on current account deficit: Romania and Turkey samples, Journal of Applied Quantitative Methods, 4(1), 69-81.

- Luginbuhl, R. and De Vos, A. (2003) Seasonality and Markov switching in an unobserved component time series model, Empirical Economics, 28, 365-386.

- Mann, C. L. (2002) Perspectives on the U.S. current account deficit and sustainability, Journal of Economic Perspectives, 16(3), 131-152.

- Matsubayashi, Y. (2005) Are US current account deficits unsustainable? Testing for the private and government intertemporal budget constraints, Japan and the World Economy, 17, 223-237.

- Middendorf, T. and Schmidt, T. (2004) Characterizing movements of the U.S. current account deficit, Discussion Paper, Rheinisch-Westfälisches Institut für Wirtschaftsforschung, No. 0024.

- Milesi-Ferretti, G. M. and Razin, A. (1996) Sustainability of persistent current account deficits, National Bureau of Economic Research Working Paper, No. 5467.

- Mir, A. M. and Osborn, D. R. (2004) Seasonal adjustment and the detection of business cycle phases, European Central Bank, Working Paper, No. 357.

- Mir, A. M., and Osborn, D. R. (2004) Does seasonality change over the business cycle? An investigation using monthly industrial product series, European Economic Review, 48, 1309-1332.

- Mir, A. M., Osborn, D. R. and Lombardi, M. J. (2005) The effects of seasonal adjustment on the properties of business cycle regimes, Universita' degli Studi di Firenze, Dipartimento di Statistica, Econometrics Working Papers, No: 15.

- Nason, J. M. and Rogers, J. H. (2002) Investment and the current account in the short run and the long run, Journal of Money, Credit and Banking, 34(4), 967-86.

- Nickel, C. and Vansteenkiste, I. (2008) Fiscal policies, the current account and Ricardian equivalence, European Central Bank, Working Paper, No. 935.

- Niglio, M. and Amenda, A. (2001) Forecasting density of regime switching conditional heteroskedastic models. Available at http://www.dipstat.unina.it/Quaderni%20di%20statistica/volume%203/amenddef.PDF
- Özatay, F. (2006) Cari işlemler dengesine ilişkin iki yapısal sorun ve mikro reform gerçeği [Two structural problem related to current account balance and the fact that micro reform reality of micro reform], Uluslararası Ekonomi ve Dış Ticaret Politikaları, 1(1), 38-50.
- Sarantis, N. (1999) Modeling non-linearities in real effective exchange rates, Journal of International Money and Finance , 18, 27-45.

- Sekmen, F. (2008) Is current account deficit a message for economic crises for Turkey?, International Journal of Applied Econometrics and Quantitative Studies, 5(1), 49-60.

- Skalin, J. and Teräsvirta, T. (2000) Modelling asymmetries and moving equilibria in unemployment rates, University of Bielefeld Centre for Empirical Macroeconomics, Working Paper, No. 3.

- Stock, J. H. and Watson, M.W. (1999) A comparison of linear and nonlinear univariate models for forecasting macroeconomic time series, in R.F. Engle and H. White (eds.), Cointegration, Causality, and Forecasting: A Festschrift in Honor of Clive W.J. Granger, Oxford: Oxford University Press, 1-44.

- Strikholm, B. and Teräsvirta, T. (2005) Determining the number of regimes in a threshold autoregressive model using smooth transition autoregressions, Stockholm School of Economics, Working Paper, No. 578.

- Tanner, E. and Samake, I. (2006) Probabilistic sustanability of public dept: a vector autoregression approach for Brazil, Mexico, and Turkey, IMF, Working Paper, No. 06/295.

- TCMB Yıllık Rapor [Annual Report] 2007, Ankara, 2008, Available at http://www.tcmb.gov.tr/research/yillik/07turkce/07turkce.pdf

- Teräsvirta, T. (1994) Specification, estimation, and evaluation of smooth transition autoregressive models, Journal of the American Statistical Association, 89, 208-218.

- Terasvirta, T. and Anderson, H. M. (1992) Characterizing nonlinearities in business cycles using smooth transition autoregressive models, Journal of Applied Econometrics, 7, 119-136.

- Terasvirta, T., van Dijk, D. and Medeiros, M. C. (2005) Linear models, smooth transition autoregressions, and neural networks for forecasting macroeconomic time series: A re-examination, International Journal of Forecasting, 21(4), 755-774.

- Tiao, G. C., and Tsay, R. S. (1994) Some advances in non-linear and adaptive modelling in time-series, Journal of Forecasting, 13, 109–131.

- Tiryaki, S. T. (2002) Cari işlemler hesabına çeşitli yaklaşımlar, sürdürülebilirlik ve Türkiye örneği [Various approaches to current account balance, sustainability and Turkey case], TCMB Araştırma, Çalışma Tebliğ, No. 8.

- Togan, S. and Ersel, H. (2007) Current account sustainability: the case of Turkey. Macroeconomic Policies for EU Accession, 268-293. Ed. E.Başçı, S.Togan ve J. Von Hagen, Edward Elgar Pub. İnc., USA.

- Tong, H. (1978) On a threshold model, Pattern Recognition and Signal Processing (C. H. Chen, ed.), 575-586.

- Tong, H. and Lim, K.S. (1980) Threshold autoregression, limit cycles and cyclical data, Journal of Royal Statistical Society Series B, 42(3), 245-292.

- Tong, H. (1983) Threshold models in non-linear time series analysis, Lecture Notes in Statistics, No.21. Springer-Verlag, New York, USA.

- Tong, H. (1990) Nonlinear time series: a dynamical system approach, Clarendon Press, Oxford.

- Tsay, R. S. (1989) Nonlinearity tests for time series, Biometrika, 73(2), 461-466.

- Tsay, R. S. (1989) Testing and modeling threshold autoregressive processes, Journal of the American Statistical Association, 84, 231-240.

- Tuffle, D. (1996) Why is the US current account deficit so large?, Southern Economic Journal, 63(2), 515-525.

- Uygur, E. (2004) Cari açık tartışmaları [The current account debate in Turkey], İktisat, İşletme ve Finans, 19(222), 5-20.

- Ümit, A. Ö. and Yıldırım, K. (2008) İkiz açık hipotezi: Türkiye analizi [Twin deficits hypothesis: An analysis for Turkey], İktisat, İşletme ve Finans, 23(267), 116-132.

- Van Dijk, D., Franses, P. H., and Boswijk, H. P. (2000) Asymmetric and common absorption of shocks in nonlinear autoregressive models, Econometric Institute Research Report, EI2000-01 / A

- Van Dijk, D., Terasvirta, T. and Franses, P. H. (2000) Smooth transition autoregressive models - a survey of recent developments. Econometric Institute Report EI 2000-23/A Revision Dat, Erasmus University, Rotterdam.

- Wu, J. L., Chen, S. L. and Lee, H.Y. (2001) Are current account deficits sustainable? Evidence from panel cointegration, Economics Letters, 72, 219-224.

- Yeldan, E. (2005) Türkiye Ekonomisi'nde Dış Açık Sorunu ve Yapısal Nedenleri [The Problem of Current Account Deficit in Turkish Economy and structural reasons], Çalışma ve Toplum, Available at http://www.calismatoplum.org/sayi7/makale2.pdf

- Yücel, F. and Ata, A.Y. (2003) Eş-bütünleşme ve nedensellik testleri altında ikiz açıklar hipotezi:Türkiye uygulaması [Twin deficits hypothesis under cointegration and causality tests: An application of Turkey], Çukurova Üniversitesi Sosyal Bilimler Enstitüsü Sosyal Bilimler Dergisi, 12, 12.

INFLUENCE OF OPINION LEADERS ON THE DIFFUSION OF INNOVATIVE PRODUCTS: A STUDY ON SMARTPHONE USERS

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ABSTRACT

This study examines the influence of opinion leaders on the innovative product buying decisions of consumers. Opinion leaders have a critical importance in the diffusion of innovative products by the word of mouth marketing method. It is very important in terms of competition that businesses carry out their activities taking this fact into consideration and design their communication systems accordingly. A questionnaire was carried out with smart phone users for this purpose. Results of the study were subjected to regression and correlation analyses, and the relationship among the word of mouth marketing, opinion leaders and efforts of marketing was explored. Results have shown that consumers are influenced by opinion leaders when buying an innovative product, and that opinion leaders, when compared with marketing efforts, have a higher influence on consumers.

1. INTRODUCTION

The world becomes global rapidly, and competition becomes more and more challenging in the globalizing world. While competing only with few rivals around in the past, today the competition is among all the rivals in the world. There are many rivals of the same product with similar features. Especially the products coming from China, India and Far East create a trouble and make profit rates decrease, so to say. Plus, it's getting harder to be realized among other products (Kırım 2007). Even the products that have a good place in consumers' minds and succeed to become a brand are being threatened by their cheap uniforms. At this stage, innovation comes into play. Innovation is all the innovative and value creating activities that protect brands against their rivals and makes their imitation harder.

However, making innovation or putting a new product on the market are not enough. Also, that product has to be known and purchased. None of the products that are unpopular are innovative. Thus, it's necessary to promote the product and ensure its place in the market.

It's impossible for a product that is not liked or recommended to become succesful on the market. With today's communication conditions, it's not so hard for the consumers to talk about products and influence each other's decisions. People believe in the reliability of the information obtained by word of mouth more. According to one research, 40% of American consumer are actively ask for their families' and friends' advices especially before purchasing services such as health, law and automobile repairing (Hogan et al. 2004). According to another research that a market research company has made with over 1000 consumers, almost three American consumers out of four (%70) recommend a new product they purchased to their friends and their families. Also, family and friends as information resources of consumers about new products are at the first place with 55%, followed by 53% of advertisement and 48% of interior advertisement and display (Karaca 2010).

In accordance with the modern marketing mentality of our age, companies have started taking steps to make personal communication channels work for them and developing marketing programs to create favourable word of mouth for their own brands (Kotler and Gary 2005). They have started to create opinion leaders whose opinions are adopted by others by training people to make others use their products or to inform others providing attractive terms.

Opinion leaders are the persons providing both information adn recommendation to others. In addition to giving information sharing their experiences about a product group, they also give advices to other people about not buying any product. Opinion leader generally tend to specialize in a product category (Schiffman 2004).
In 1948, Lazarsfeld and his colleagues have claimed that new opinions and influences first reach to opinion leaders from mass media. Then, in their opinion, the opinions and influences of these opinion leaders are transferred to passive people or the people far away from mass media and other resources by word of mouth (Engel et al. 1990). According to this model, opinion leaders collect and interpret the information from mass media first and then transfer these to other consumers. Model explains how opinion leaders influence consumers and how products spread out from mouth to mouth. The main aim of this study in this context is to analyze the role of opinion leader in spread of innovative products. What kind of an influence opinion leaders and marketing by word of mouth have on consumers to buy a new product? Is the assumption that people considered as opinion leader influence consumers true? Do the factors such as marketing have a more powerful influence on consumers than opinion leadership? Or doesn't it have that much influence? The decision-making process of consumers will be understood better and new points of view will be given to firms about being market and customer oriented through the answers to these questions.

2. LITERATURE REVIEW

2.1 Product Innovation

Dictionaries define 'innovation' as 'introducing something new': the Latin stem 'innovare' refers to altering or renewing, and is derived from 'novus', meaning 'new' (Little et al. 1973). The term innovation, most generally, implies newness (Johannessen et al. 2001).

That is, an innovation is something that is new, is positively different, or is better than what was there before. It is fair to say that an innovation is simply any new implementation whether this be a new product, a method or a completely new invention. Damanpour (1996) defines innovation as "the adoption of an idea or behavior new to the adopting organization" . According to Damanpour (1996) "the adoption of innovation is conceived as a process that includes the generation, development, and implementation of new ideas or behaviors". Camison-Zornoza et al. (2004) claim that what all definitions of innovation share in common is the usefulness of the new idea that is implemented. Product innovation is the introduction of a product that is new or significantly improved with respect to its characteristics or intended uses. This product can include both a new technology and knowledge and also, existing knowledge and technologies. The important point, to call a product as an innovation is it should differ from current products with either its characteristics or usage areas. Addition to that, with minor changes in a product characteristics and/or specifications such as components and materials to gain a new use is also a product innovation. This situation does not include design changes if does not involve a change in characteristics of the product and intending uses (Oslo Manual 2006).

Product innovations may be the result of organizational changes or exploitation of new markets in companies (Avermaete and others 2003). Product innovation is one of the most obvious ways of generating revenues for the companies. Products should be renewed or completely new for the companies to not taking the risk of staying behind of competitors. At that point core product features may be developed with radical changes and also incremental changes may be done as to develop supporting activities. This provides to sell the product to the different customers with different offerings (Johne 1999)

2.2 Word-of-Mouth

Word of mouth (WOM) communication is a process of transferring information from one person to another in a face-to-face situation (Sun et al. 2006). Consumers share their experiences and reactions about any business with other consumers voluntarily (Jansen et al. 2009). Due to the fact that WOM communication involves an opinion exchange with friends and relatives, it is considered as an effective information source and a powerful marketing tool. It is commonly known that consumers intent to seek information from others while deciding a product purchase (Gildin 2003). Lau&Ng (2001) defined WOM as an "oral, person-to-person communication between a perceived non-commercial communicator and a receiver concerning a brand, a product or a service offered for sale". On account of this definition, WOM communication "allows consumers to share information and opinions that direct buyers towards and away from specific products, brands, and services" (Litvin et al. 2005) Thus, people without any commercial connections talk about a product or a brand spontaneously (Davis & Khazanchi 2008). The value of WOM arises from its impact on consumer"s choices (Lau & Ng 2001) and product judgments (Lee &Youn 2009)

WOM can influence decisions either positively (Engel *et al*. 1983) or negatively (Tybout *et al*. 1981). It does appear that negative WOM has a more powerful impact than positive WOM (Arndt 1967). Technical Assistance Research Program, for example, reported that dissatisfied customers are likely to tell twice as many people as satisfied customers. Desatnick (1987), citing research conducted for the White House Office of Consumer Affairs asserted that '90%or more who are dissatisfied with the service they receive will not buy again or come back. Worse still, each of those unhappy customers will tell his or her story to at least 9 other people, and 13%of those unhappy former customers will tell their stories to more than 20 people'. It is not reported to how many these WOM recipients retell the story.

2.3 Opinion Leader

Research on opinion leadership to date can be classified into three distinct cate-gories: (1) involves whether opinion leadership is specific to a product, idea, or issue, or if it is generalized across products, ideas, or issues (Elihu 1957**)**; (2) involves the issue of whether opinion leaders are different from followers Arndt, J. (1967) involves the issue of how opinion leaders are utilized in the flow of communications among people. (Menzel and Katz 1955)

One common thread across studies in these three areas is the measurement and scaling used to identify opinion leaders. (Silk 1971) All three areas through either observation or questioning limit the scaling of opinion leadership to a dyadic interaction with respect to a specific issue, product, or idea. It seems that the identification of opinion leaders may be unnecessarily constrained in terms of research investigation, (Meyers and Robertson 1972) particularly in cross-cultural research. Therefore, an opinion leader was defined, for the purpose of this study, as someone whose opinions are highly re-spected and utilized by the respondents to help in making decisions across a variety of situations such as what types of clothes to wear, where to have major household items repaired, how to discipline children, and for whom to vote in political elections. This person can be someone with whom the respondents have personal contacts (a friend, priest, member of a social group, relative, or someone in public life whose advice is derived from his/her public statements). (Cosmas and Sheth 1980)

Table 1: Characteristics of Opinion Leaders

1. Enjoys life	13. Not afraid to give an opinion
2. Has common sense	14. Has all around knowledge
3. Utilizes you to follow hir or her advice	15. Evaluates you fairly
4. Motivates you to follow his or her advice	16. Is available when you need him or her
5. Does not care what social group you associate with	17. Looks like you
6. Belongs to the same social group as you do	18. Expresses empathy towards others identifies with them
7. Can easily evaluate you for what you are	19. Is wealthy
8. Has high degree of professionalism	20. Is mature
9. Has strong opinions on many things	Makes you follow rules; enforces, norms on you
10. Is not modest	22. Quite experienced about life
11. Is down to earth, pratrical or pragmatic not pretentious	Likes to give advice so others will do those things he or she is afraid to do
12. Gets jealous of other opinion leaders	24. Does not stand out in a crowd

(Chaudhry and Irshad 2013)

2.4 Diffusion of Innovations

Rogers (1983) describes how new ideas (innovations) flow among consumers in the market through diffusion. Diffusion is, as he describes it, the process in which innovations is communicated through channels into networks of members in social systems. Rogers argues that the key channel to effectively communicate innovations is through opinion leaders. How the networks are set up and what roles the opinion leaders have, are what decide the chance of a new idea being adopted. Rogers uses a model to illustrate the flow of communication called; "The two-step flow of communication, which was firstly introduced by Lazarsfeld, Berelson and Gaudet (1944).

Figure1: The Two-Step Flow Communication

Mass media → Opinion leader → Followers
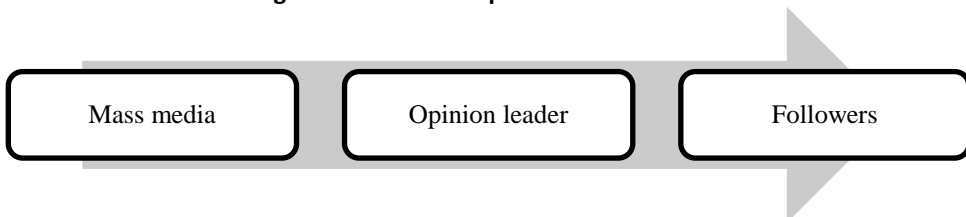
Innovations spread from sources of new ideas via media channels to opinion leaders, who are more exposed and have more potential of absorbing information. Through the opinion leaders by way of personal communication-channels to followers, people who tend to be less active when receiving information which is not personalized. The opinion leaders modified the information as well as they facilitated, so it would be more suitable for the followers to apprehend. (Lerud 2007)

3. METHODOLOGY AND DATA

3.1 Goal and Method of the Study

This study examines how much consumers, when they buy innovative products, are influenced by opinion leaders. The main thesis of the study involves such questions as "When buying a newly launched product, are consumers more influenced by marketing activities or by opinion leaders?" and "Are word of mouth marketers influenced by opinion leaders?", etc. Questionnaires were analyzed using the SPSS software.

In order to measure these questions, a questionnaire study was carried out with users of smart phone, which is accepted as an innovative product (Koç, Yavuz 2011). The questionnaire was carried out in January 2014. Subjects were administered a face to face questionnaire and they were chosen by convenience sampling method. Five Point Likert Scale was used in the study. Twenty two of the questionnaire forms obtained were excluded as they were erroneous or incomplete, and 388 questionnaire forms were taken into consideration. The questionnaire form prepared to be used in the study was administered on a limited audience to test its reliability. Based on the results obtained, the questionnaire form was redesigned and used in the study.

3.2 Hypotheses of the Study

Two basic research questions were set forth when creating the questionnaire form and two hypotheses were set forth based on these study questions. The questions are: (1) What is the relation between word of mouth marketing and suggestion received from opinion leaders? and (2) Are word of mouth marketers influenced more by opinion leaders or by the marketing activities performed by businesses? Answers given to these questions will reveal how much smart phone (accepted as an innovative product) users are influenced by opinion leaders?

H1: The most important factor for word of mouth marketers when they buy innovative products is the opinions of opinion leaders.

H2: Opinion leaders are more influential than marketing activities in the purchase of innovative products.

3.3 Findings Of The Study And Analysis

First a reliability analysis was carried out on the questionnaire and it was found to be reliable (Cronbach's Alpha = 0,844).

Table 2: The Regression Table that Shows the Relationship between the Word of Mouth Marketing and Opinion Leaders
ANOVA[a]

	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	22,643	1	22,643	49,674	,000[b]
	Residual	175,946	386	,456		
	Total	198,589	387			

a. Dependent Variable: Influence Of Leader In The Diffusion Of Innovative Products
b. Predictors: (Constant), Word Of Mouth Marketing

The value in the significance column of the ANOVA table shows that the relationship between the independent variable of word of mouth marketing and the dependent variable which refers to the influence of opinion leader is statistically significant in the level of $p < 0,01$. It is therefore seen statistically that those consumers who, by performing word of mouth marketing, share their opinions with others regarding a product are influenced by opinion leaders.

If the value on that column was above 0,05, we would evaluate that the relationship was insignificant (incidental). To formulate the relationship in the table;
F (1,386) = 49,674; p < 0,01

Table 3. Table Of Coefficients Showing The Relationship Between Opinion Leaders And Word-Of-Mouth Marketing
Coefficients [a]

	Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	1,981	,220		9,017	,000
	word of mouth marketing	,418	,059	,338	7,048	,000

a. Dependent Variable: Leader's Influence In The Diffusion Of Innovative Products

The coefficients table on the other hand shows the regression coefficients used for the regression equation and their significance levels. In our study, the coefficient of the word of mouth marketing variable is 0,418, and the constant value of the equation is 1,981. When we place these values into the equation of *Y = bX + a*, we reach the equation of *Y = 0,418X + 1,981*. Even this equation reveals how the values to be taken by word of mouth marketing influence the level of being influenced by opinion leaders.

Table 4: Correlation Table That Shows the Intensity of the Relationship between Word of Mouth Marketing and Opinion Leaders

Correlations

		Word of Mouth Marketing	Leader's Influence in the Diffusion of Innovative Products
word of mouth marketing	Pearson Correlation	1	,338[**]
	Sig. (2-tailed)		,000
	N	388	388
Leader's influence in the diffusion of innovative products	Pearson Correlation	,338[**]	1
	Sig. (2-tailed)	,000	
	N	388	388

[**]. Correlation is significant at the 0.01 level (2-tailed).

The correlation results obtained show that word of mouth marketers are influenced by opinion leaders by a rate of 0.338. This value shows that there is an average and positive relationship between word of mouth marketing and the influence of leader.

Table 5: Regression Table which Compares the Influence of Marketing Activities and the Influence of an Opinion Leader on Those Who Carry out Word of Mouth Marketing

ANOVA[a]

	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	23,063	1	23,063	29,404	,000[b]
	Residual	302,752	386	,784		
	Total	325,815	387			

a. Dependent Variable: Statements That Opinion Leaders Are More Influential Than Marketing Activities

b. Predictors: (Constant), word of mouth marketing

Purpose of this regression analysis is to reveal whether word of mouth marketers are influenced more by marketing activities or by opinion leaders. As those who talk about products carry out more exchange of ideas and are more outwardly, the regression analysis aimed to test whether they are more influenced by opinion leaders than by marketing activities.

The value in the significance column of the ANOVA table shows that the relationship between the independent variable of word of mouth marketing and the dependent variable of being influenced more by opinion leaders than by marketing activities is statistically significant in the level of $p < 0,01$. It is therefore seen statistically that those who carry out more exchange of opinions with other people around them are influenced more by opinion leaders than by marketing activities.

If the value on that column was above 0,05, we would evaluate that the relationship was insignificant (incidental). To formulate the relationship in the table;
F (1,387) = 29,063; p < 0,01.

Table 6: Table Of Coefficients Showing The Relationship Between The Influence Of Opinion Leaders And The Influence Of Marketing Efforts

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1,638	,288		5,687	,000
	word of mouth marketing	,422	,078	,266	5,423	,000

a. Dependent Variable: Statements That Opinion Leaders Are More Influential Than Marketing Activities

The coefficients table on the other hand shows the regression coefficients used for the regression equation and their significance levels. In our study, the coefficient of the word of mouth marketing variable is 0,422, and the constant value of the equation is 1,638. When we place these values into the equation of *Y = bX + a*, we reach the equation of *Y = 0,422X + 1,638*. Even this equation reveals how the values to be taken by word of mouth marketing influence the level of being influenced by opinion leaders.

Table 7: The Correlation Table which Compares the Influence of Marketing Activities and the Influence of an Opinion Leader on Those Who Carry out Word of Mouth Marketing

Correlations

		Word of Mouth Marketing	Statements that Opinion Leaders are More Influential than Marketing Activities
word of mouth marketing	Pearson Correlation	1	,266[**]
	Sig. (2-tailed)		,000
	N	388	388
statements that opinion leaders are more influential than marketing activities	Pearson Correlation	,266[**]	1
	Sig. (2-tailed)	,000	
	N	388	388

**. Correlation is significant at the 0.01 level (2-tailed).

According to the correlation table in Table 9, word of mouth marketers are influenced 0,266 times more by opinion leaders than by marketing activities. This shows that there is a slightly positive correlation between the two variables.

4. RESULTS AND IMPLICATIONS

4.1 Research Hypotheses and Results

As a statistical measurement method, regression analysis was used to test all the hypotheses. And correlation analysis was utilized to measure the correlative intensity. The behavioral questions previously stated in Tables 2, 3 and 4 were classified into the above mentioned categories, and then they were averaged and reduced to a single variable. The reduced variables were taken as independent variables in the regression analysis.

The regression analysis which was carried out in order to measure whether word of mouth marketing is influenced by opinion leadership produced a statistically significant result (F: 49,674 and P: 0,000).

Thus the resulting regression model is *Y = 0,418X + 1,981* x word of mouth marketing

In this case, the hypothesis H1 is accepted. That is, the most important factor for word of mouth marketers when they purchase innovative products is the thoughts of opinion leaders. There is a positive and intermediate level of correlation in the rate of 0.338.

Based on the regression analysis which shows that word of mouth marketing consumers are influenced more by opinion leaders than by marketing activities, we obtain the following data.

(F: 29,404 and P:0,000) Based on the results, word of mouth marketers attach more importance to the thoughts of opinion leaders than to the marketing efforts.

The regression model is *Y = 0,422X + 1,638* x Influence of opinion leaders.

In this case, the hypothesis H2 is accepted. That is, opinion leaders are more influential than marketing activities in the purchase of innovative products. There is a slightly positive correlation between them in the rate of 0.266.

4.2 Results and Suggestions

Innovation as one of the most important factors of marketing causes many new and different products to be launched. Introduction of new products results in the creation of a resistance in those consumers who do not want to change their old habits. Familiar values and habits have been under the pressure of innovative products. In this case, consumers are forced to change their habits and adapt to the new. As the new generation is born into a world which is already in the process of a continuous change, they feel this pressure less. It is important for each consumer, however, to abandon a previously used product and buy a new product and behave optimally in taking this decision.

Referring to the thoughts of an opinion leader when buying an innovative product decreases the tension that forms in the consumer and makes it easier to take correct steps. In a sense, buying decisions are influenced by the presence of a person who has tried a product and whose knowledge is trusted. Revealing and measuring this influence forms the main axis of the study.

Table 2 reveals that word of mouth marketers who share their thoughts with others are influenced by opinion leaders and that there is a statistically significant relationship between those. It is also seen that word of mouth marketers are influenced more by opinion leaders than by marketing efforts (table 4).

Consequently, when an innovative product is launched, businesses should look to marketing but, at the same time, manage to involve opinion leaders in this process. When buying products, modern consumers do not disregard those highly knowledgeable and credible persons who have tried a product and specialized in that subject matter.

Facilitation of information sharing will guaranty success for a management philosophy which cares for customers and prioritizes their desires. Situated in the middle of this accelerating flow of information, opinion leaders' importance steadily increases by each passing day.

5. CONCLUSION

Importance of the concept of an opinion leader has increased with the spreading of word-of-mouth marketing. Dialogues among consumers have become easier and interaction has increased thanks to the improvement of communication channels. The significance of this can especially be felt in the diffusion of innovative products. In order to adapt to a new product, when such a product is launched, consumers consult those whose opinions they value. This decreases the resistance against innovation. The current study shows that the rate by which people consult opinion leaders when buying an innovative product is about 80 percent. This provides an evidence for the opinion leader influence as explained in the literature section. Another finding of the study is that word-of-mouth marketers are more influenced by opinion leaders. The higher the activity of word-of-mouth marketing people carry out, the more they are influenced by opinion leaders.

Competition accompanies the introduction of new products. With the aim of becoming more prominent than their competitors, businesses have to strengthen their marketing communication. Marketing communication may be carried out by relational communication as well as by means of mass communication. Those businesses which individually communicate with their consumers are always one jump ahead of others. Our study shows that those businesses which, having being influenced by opinion leaders, can carry out word-of-mouth marketing are more successful although advertisement activities also make a significant influence on consumers' preferences. The influence of advertisements, thus, is less than that of opinion leaders.
It is understood, consequently, that opinion leaders are very influential in the preference for innovative products. When making a preference, consumers exchange views with those in whose opinions they trust and share their thoughts with their contacts. The basic condition for businesses in order for them to be successful and gain a competitive edge is to extend positive messages which can influence this one-to-one communication and create suitable products. Success appears to be impossible for those businesses which, in this age of global competition, do not influence their customers and make an impression.

REFERENCES

- Arndt,   J. (1967). Word of Mouth Advertising and Informal Communication, Boston: Harvard University Press Avermaete, T. and Others, (2003). Determinants of Innovation Is Small Food Firms, European Journal of Innovation Management, Vol: 6, p. 8-17.

- Camison   Z, C., Lapiedra-A, R., Segerra C, M., & Boronat N, M,(2004). "A Meta-Analysis Of Innovation And Organizational Size" Organization Studies, Vol: 25, p. 331-361.

- Cosmas   C. Stephen and Sheth N.Jagdish, (1980). Identification Of Opinion Leaders Across Cultures: An Assessment For Use In The Diffusion Of Innovations And Ideas Source, Journal of International Business Studies, Vol: 11, p. 66-73

- Chaudhry S, A, Irshad, W, (2013). Opinion Leadership and Its Role in Buyer Decision Making Academy of Contemporary, Research Journa, Vol: 1, p.17

- Davis A,   Khazanchi, D (2008). An Empirical Study Of Online Word Of Mouth As A Predictor For Multi Product Category E-Commerce Sales, Internet Marketing. Vol: 18(2), p.130-141

- Damanpour, F. (1996). Organizational Complexity And Innovation: Developing And Testing Multiple Contingency Models, Management Science. Vol: 42(5), p. 693-716.

- Desatnick, R.L. (1987). Managing to Keep the Customer. San Francisco: CA: Jossey-Bass

- Elihu K. (1957). The Two-Step Flow of Communications: An Up-to-Date Report on a Hypothesis, Public Opinion Quarterly Vol: (21), p. 61-78.

- Engel, J. F., Roger D. & Paul W. M. (1990). Consumer Behavior, New York: Chernow Editioral Services, Inc.
- Gildin, S. (2003).Understanding the Power of Word of Mouth, Revısta De Admınıstração Mackenzıe , Vol: 4(1): p.91-106

- Hogan, J. E., Lemon, K. N. & Lıbaı, B. (2004). Quantifying the Ripple: Word of Mouth and Advertising Effectiveness, Journal of Advertising Research, Vol: 44(3): p. 35-42.

- Johannessen, J. A., Olsen, B., & Lumpkin, G. T.(2001). Innovation As Newness: What Is New, How New And New To Whom?, European Journal of Innovation Management Vol: 4(1), p.0-31.

- Johne, A. (1999). Successful Market Innovation, European Journal of Innovation Management Vol: (1), p. 6-11.

- Jansen, B, J., Zhang, M., Sobel, K. & Chowdury, A. (2009). Twitter Power: Tweets as Electronic Word of Mouth, Journal of American Society for Information Science and Technology. Vol: 60(11), p. 2169-2188

- Karaca, Y. (2010). Tüketici Satın Alma Karar Sürecinde Ağızdan Ağıza Pazarlama, İstanbul: Beta Yayınları.

- Koç, O. Ve Yavuz, Ç. (2011). İnovasyon ve Rekabet Açısından Kızıl Kraliçe Etkisi, Kahramanmaraş Sütçü İmam Üniversitesi İİBF Dergisi. Vol: 01(02), p. 65-79

- Kotler, P. & Amstrong, G. (2005). Principles of Marketing, New Jersey: Prentice Hall.

- Kırım, A. (2007). İnovasyon: Para Kazandıran Yenilikçilik, İstanbul: Sistem Yayıncılık

- Lau, G, T & Ng, S. (2001). Individual And Situational Factors Influencing Negative Word Of Mouth Behavior. Canadian Journal of Administrative Sciences. Vol: 18(3), p. 163-178

- Lazarsfeld, P. F., Berelson, B. & Gaudet, H. (1944). The People´s Choice: How The Voters Makes Up His Mind In A Presidential Campaign. New York: Columbia University Press.

- Lazarsfeld, P. F., Berelson, B. & Gaudet, H. (1948). The People´s Choice: How The Voters Makes Up His Mind In A Presidential Campaign. New York: Columbia University Press.

- Lee, M. & Youn, S. (2009). Electronic Word Of Mouth: How E-WOM Platforms Influence Consumer   Product Judgement, International Journal of Advertising Vol: 28(3), p. 473-499

- Lerud, P. (2007). Opinion Leaders And Word-Of Mouth, Master Thesis, Lund University, Lund.

- Little, W., Onions, C. & Friedrichsen, G. (1973). The Shorter Oxford English Dictionary, Oxford: Oxford at the Clarendon Press.

- Litvin, S,W., Goldsmith, R. E. & Pan, B. (2005). Electronic Word Of Mouth İn Hospitality And Tourism Management, Tourism Management, Vol: (1), p.1-30

- Menzel, H. & Katz, E. (1995). Social Relations and Innovation in the Medical Profession: The Epidemiology of a New Drug, Public Opinion Quarterly Vol: 1(9), p. 337-52

- Meyers, H. J. & Robertson S. T. (1972). Dimensions of Opinion Leadership, Journal of Marketing Research Vol: (9), p. 41-46

- Oslo Klavuzu.(2006). Yenilik Verilerinin Toplanması ve Yorumlanması için İlkeler, Ekonomik İşbirliği ve Kalkınma Örgütü Avrupa Birliği İstatistik Ofisi. http://www.tubitak.gov.tr/tubitak_content_files/BTYPD/kilavuzlar/Oslo_3_TR.pdf, (Access Date :11. 12. 2013)

- Rogers, E. (1983). Diffusion of Innovations. New York: The Free Press.

- Schıffman, G. L. & Kanuk. L. L.(2004). Consumer Behavior. New Jersey: Pearson Education International Prentice Hall

- Silk, J A. (1971). Response Set and the Measurement of Self-Designated Opinion Leadership,Public Opinion Quarterly Vol: (13), p. 383-97.

- Sun, T., Youn, S., Wu, G. & Kuntaraporn, M.(2006). Online Word Of Mouth: An Exploration Of Its Antecedents And Consequences, Journal of Computer-Mediated Communication Vol: (11), p.1104-1127

- Tybout, A.M., Calder, B.J. & Sternthal, B. (1981). Using Information Processing Theory To Design Marketing Strategies, Journal of Marketing Research Vol: (23), p. 73–9.

A MULTIFACTOR PRICING MODEL FOR CAT BONDS IN THE SECONDARY MARKET

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ABSTRACT
Given the relevance that Cat Bonds are taking in the financial markets, as well as their appeal for different types of investors, it becomes pertinent to understand the price dynamics of these securities in the secondary market. Several authors have developed and proposed different valuation approaches, focusing on the probability of occurrence of catastrophic events, as the main variable impacting the pricing of Cat bonds in the secondary market. However, the lack of inclusion of other factors considered relevant for investors, narrows the range of pricing driver's of Cat Bonds. This paper seeks to address the former need, presenting a panel data approach of a multifactor spread model, which comprehends 5 relevant variables. The results proved an adequate fitness and show that the model can be applied to both the P&C and, the Life market.

1. INTRODUCTION

Insurance Linked Securities (ILS) have been gaining force over the last decade, becoming a relevant mechanism in providing capacity and additional resources to the reinsurance industry. According to Aon Benfield (2014), in 2013 the total capital of the reinsurance industry was US$540 billion, out of which 9.3% was considered as *Alternative capital* coming from ILS, and other Alternative Risk Transfer vehicles. The high cost of claims derived from catastrophic events was the leading reason motivating the insurance industry to transfer part of their risk into the financial markets.

According to Cummins (2008), Cat Bonds have been the most successful ILS so far, with a total capital outstanding of US$18.6 billion (Guy Carpenter, 2013) reported at the end of 2013.These securities are defined as "fully collateralized instruments that pay off on the occurrence of a defined catastrophic event" (Cummins 2008). Their success derives from its innovative structure, being attractive to the sponsors as an alternative to reinsurance protection against catastrophic losses, and to investors as a high yield asset, which is uncorrelated to other financial securities

Therefore, given the relevance that Cat Bonds are taking in the financial markets, as well as their appeal for different types of investors, it becomes important to understand the price dynamics of these securities.

This research aims to address this need by developing a multifactor spread model, in which the most relevant variables affecting the spread of Cat Bonds trading in the secondary market are identified.

The remainder of this paper is organized as follows: In section 2 we include a literature review, followed by section 3 in which we present a description of the data used for the construction of our proposed model. Section 4 describes a preliminary analysis of both the data and the methodology. Furthermore, section 5 presents the methodology applied, the empirical analysis and the statistical assessment of the results found. Finally in section 6 we summarize our main results and draw our conclusions.

2. LITERATURE REVIEW

Since Cat Bonds are considered to be "one of the more recent financial derivatives to be traded on the world markets" (Baryshnikov et al 2001), and since their success has been widely spread on a world-wide scale; over the last decades, it has been a boom of authors developing and proposing numerous valuation approaches for these type of securities.

Previous authors exploring the pricing of Cat Bonds in the secondary market, have focused on the occurrence of catastrophic events in order to value the bond as a function of the expected probability of loss. Cox and Pedersen (1997) propose a model in which the catastrophe reinsurance premium is expressed as a high-yield bond, depending on the risk free rate, the probability of a catastrophe (default) and an amount to be reinsured. The authors use stochastic processes and devise a binomial tree approach for pricing them. Their methodology is supported by an intuitive approach and a theoretical basis; no empirical results were contrasted.

Other authors have used the Poisson distribution to explain the behavior of a catastrophic event. That is the case of Baryshnikov et al (2001), who affirm that some catastrophic events have a power law distribution, for which they develop a model using the Poisson distribution. Jin-Ping and Min-Teh (2002), also use a Poisson distribution to model catastrophe probabilities. Additionally, they provide an assessment of how interest rates affect the Cat Bond price, and offer a solution by modeling them stochastically.

Loubergé et al (1999), on the other hand, proposed a valuation based on the resemblance of Cat bonds with financial options. They develop a valuation methodology exclusively for those Cat Bonds with an Industry Loss Index. They analyze these securities as financial portfolios combining a bond and a catastrophe options. "Using option pricing theory and simulation analysis in a stochastic interest rate environment, we show that investors attracted by the potential for diversification benefits should not overlook the optional features when including these securities in an asset portfolio."

As previously mentioned, authors have focused on the probability of occurrence of catastrophic events, as the exclusive variable in determining the pricing of Cat bonds in the secondary market. Therefore, the lack of inclusion of other factors that are priced by investors, narrows the range of the price drivers for Cat bonds. This fact led us to seek alternative approaches for the pricing process. We propose a multifactor model and prove that several factors are relevant to the bond's spread in the secondary market.

3. DATA

Due to the recent appearance of Cat Bonds as tradable instruments, and the fact that all investors that currently invest in them are institutional, the liquidity of these kind of assets is rather low. There is not a price marked to the market, as there are for other high liquid assets. Instead, financial agencies and reinsurance brokers, gather information from the transactions made, to create an indicative market price for every cat bond outstanding.

The information used in this research was taken from the information provided by Lane Financial L.L.C in their Annual Review for the four quarters, Q2 2012 to Q1 2013. They provide secondary market prices of Cat bonds, in a quarterly basis. Every public outstanding Cat bond has an average market indication of its spread for each of the 4 quarters taken.

Information from Lane Financial L.L.C was used to construct a data base with 324 observations, corresponding to 81 Cat Bonds outstanding from June 2012, through March 2013. Each Cat bond has an indicative market spread for 4 periods, being the database a temporal sample of the secondary market of Cat bonds.

From the observations in the database, one markedly outlier was identified, corresponding to Successor X-Class V F4, a Swiss Re Cat Bond issued in November 2011. This bond was issued with an expected Loss of 6.7% and Spread of 16.25%, which is a value within normal ranges compared to other Cat Bonds with similar Expected Loss. However, in the secondary market the Bond experienced a high volatility in its indicative spread, being 19.6% in June 2012, 17.3% in September 2012, followed by a steep rise of 26.8% in December 2012 and an outstanding 35.3% in March 2013.

This bond's volatility was caused by the occurrence of Hurricane Sandy in October 2012, threatening the trigger to be set. The Cat Bond covers Wind in the United States and Europe, for which after the Hurricane Sandy, investors speculated on whether the losses incurred would be high enough to set the trigger, losing the principal and remaining coupons. Such speculative period cause investors to perceive a higher risk, causing the spread in the secondary market to trade above twice its initial spread only 16 months later. This observation was removed from the database

3.1. Methodology

Panel data consist of multi-dimensional data arrays in which certain variables are observed for an individual, through several periods of time. Therefore, it allows assessing the impact of the variables in a dynamic setting. Some of the advantages of working under a panel data approach, is to better identify effects in variables, and to construct and test more complicated behavioral models than purely cross-section or time-series data.

According to the literature we reviewed, there is very narrow number of authors who have previously assessed Cat Bonds under a panel data approach. Tao (2011), and Cummins and Weiss (2009), proved that Cat Bonds are zero beta securities, by developing a comparative analysis with other financial securities, using panel data. Also, Gürtler et al (2012) explores the impact of the financial crisis on Cat bonds, in a dynamic stage using panel   data.

However, to the best of our knowledge, panel data for assessing the spread of Cat bonds in the secondary market has not been explored yet, for which it becomes relevant to develop an approach under a multi-dimensional framework in order to understand the complex dynamics of Cat bonds spread traded in the market.

The variable we will be modeling is the average market indicative spread in the secondary market (Indicative spread), which is the spread to maturity as a function of the built-in price of market agents, according to their appreciation of the Cat Bond price. The price of a bond in the secondary market can trade at premium or at discount, and in either case such price can be reflected in an indicative spread rate. Since Cat bonds usually have a floating coupon rate, the price movements of such bonds are reflected into the fixed component of the rate (spread). Therefore, the average market indicative spread of Cat bonds reflects the price perception of investors over that security.

3.2. Explanatory variables

There has not been a wide exploration of variables affecting the spread in the secondary market. Our initial hypothesis is based on the inclusion of several internal and external variables as significantly explaining the spread movements in the market. Those variables are the following:

1. **Spread at Issue:** A previous research on the primary spread of Cat Bonds (Gomez and Carcamo 2014) proved that the initial spread depends on several factors, all of which ultimately reflect the risk of the Cat Bond, translated into the spread of the security. Therefore, we expect investors to value this factor along the life of the bond, affecting its price on the secondary market.

2. **Expected Loss:** Empirical evidence in proving this factor as relevant for the spread of Cat Bonds in the primary market, has already been provided in several studies (Bodoff and Gan 2009, Lane and Mahul, 2008; Dieckmann, 2009; Galeotti et al., 2012). The expected loss is proved to be one of the most relevant factors in a Cat Bond price, since it represents the risk undertaken by investors, for which in return they expect compensation translated on the spread. We expect it to remain a relevant factor for investors when pricing Cat Bonds in the secondary market.

3. **Credit Rating:** "Obtaining a financial rating is a critical step in issuing a Cat Bond because buyers use ratings to compare yields on Cat Bonds with other corporate securities. Consequently, almost all bonds are issued with financial ratings." (Cummins 2008). Most Cat Bonds are rated below investment grade, since the rating rationale focuses on likelihood of losing the investment, rather than on the financial creditworthiness of the sponsor. We will assess whether this factor is important in the pricing of these securities in the secondary market.

We converted all ratings to the S&P's scale, and used a dummy variable for those bonds lying above and below the investment grade. We have defined 3 types of credit ratings: Investment grade (rated above or on BBB-), non-investment grade (rated below or on BB+) and not rated.

4. **Time to Maturity Factor:** Since bonds are sensitive to time, knowing that the longer the term the higher its risk, we have defined a proxy for reflecting the time to maturity each bond has in every period of time assessed, which under the bonds dynamics should be relevant in the indicative spread.

   Our proxy is represented by the following Factor, based on the reciprocal of time to maturity:

   $$\frac{1}{(T-t)}$$

   Being T the expiration date and t the date of assessment.

   One of the methods for pricing securities consists in discounting to time zero, the security's future cash flows. For example the price of a Bond is the present value of its coupons and principal. The notion of Present Value is a function of time and interest rate in the market, and is the foundation of pricing. Following the role of a bond's maturity as a discount factor, we have defined the above mentioned proxy for measuring the impact of the number of days remaining to maturity over the indicative spread, by resembling a discount factor.

5. **BB- Bonds Index:** We have chosen the *Credit Suisse's high yield II Index* as a good proxy for evaluating the benchmark that investors use when comparing the spread of Cat Bonds against other low rated securities. Following Braun (2012), who explains the importance of capturing the influence of the corporate bond market in the Cat Bonds behavior, since "the vast majority of Cat Bonds exhibit a BB rating" we expect this index to be a relevant driver of the spread of Cat Bonds in the secondary market.

6. **Interest Rate: T**he general notion of interest rate that affects the price of bonds, and the direct impact on Cat bonds coupons of floating rate securities, lead us to consider a risk free interest rate as a price determinant in the secondary market. Our proxy is the 3-month US dollar denominated Libor correspondent to every quarter under assessment.

7. **Swiss Re Cat Bond Total Return Index (SCATTRR):** The reinsurer Swiss Re has develop an index to track the total rate of return for a basket of outstanding USD denominated Cat Bonds, priced by them. It is one of the most used proxies to understand the performance of Cat bonds price movements in the secondary market.

By definition of the former variables, the indicative spread has no influence on them, meeting one of the assumptions of panel data analysis: Strict Exogeneity.

4. PRELIMINARY ASSESSMENTS

Some of the explanatory variables previously defined (i.e. Spread at issue, Expected Loss, and Credit Rating) are time invariant. The other variables are time variant, for which it becomes relevant to evaluate whether any of those is integrated, since our approach is developed for stationary series.

We use the Levin, Lin & Chu Unit Root test for panel data, in order to evaluate stationarity. The test was run for the Indicative spread, Time to Maturity Factor, BB- Bond Index, Libor and SCATTRR, for which all p-values where smaller than 0.05, concluding all former series are stationary.

Additionally, we made a prior assessment of Breusch-Pagan test, in order to determine whether there is unobserved heterogeneity, which would imply working with Panel Data instead of Ordinary least Squares (OLS). The F-statistic from the test yielded a p-value of 0.000, and this allows us to conclude that Panel Data is the most convenient methodological approach.

Now that we have concluded Panel Data is the best methodology for assessing our data, and after meeting its assumptions, we must now define which of the models (fixed Effects, Random Effects) will better suit our data. We use a Hausman test, which p-value resulted in 0.9993, leading us to conclude Random Effects as the preferred model for working the data.

5. MULTIFACTOR SPREAD MODEL

We run a Generalized Least Squares (GLS) regression for the data base constructed form 81 registers. The 324 observations are set as panel data. We use a 5% confidence interval for identifying those variables with a significant impact in the spread of Cat Bonds. Later, we make an evaluation on whether the model is static or dynamic, in order to draw more accurate conclusions from the results obtained through the methodology applied under a hypothesis of static conditions. Finally, results are evaluated against the original values in order to conclude about the model fitness. We used the *Stata* software to run the regressions and perform further analysis.

5.1. Model Specification

The final expression for calculating the spread according to the results from the regressions is:

$$Spread_{it} = \alpha + \beta_{Spread} * Spread_i + \beta_{EL} * EL_i + \beta_{Maturity} * TTM\ Fatcor_{it} + \beta_{HY} * HY_{it} + \beta_{SCATTRR} * SCATTRR_{it} + C_i + U_{it}$$

Where:

α = Constant

$Spread_i$= Initial spread at time of issuance of every bond

EL_i = Expected loss probability attached to every bond.

$TTM\ Factor_{it}$ = Time to maturity factor for every bond in every period of time.

HY_{it} = High Yield Index corresponding to every observation

$SCATTRR_{it}$ = Swiss Re Cat Bond index return for every observation

C_i = Unobserved heterogeneity

U_{it} = Error

Table 1: Determinants of the Spread for Cat Bonds in the Secondary Market

Indicative Spread	Coefficient	Standard Error	t-statistic	Prob.
Constant	0.1679	0.0728	2.3100	0.0210
Spread at Issue	0.8669	0.0780	11.1200	0.0000
Expected Loss	0.3800	0.1595	2.3800	0.0170
Time to Maturity Factor	-1.6966	0.5711	-2.9700	0.0030
High_Yield	0.0003	0.0001	2.4100	0.0160
SCATTRR	-0.0023	0.0007	-3.1400	0.0020

Source: Stata regressions results.

The results in table 1 show 5 specific factors contributing to the indicative spread given by the market in any moment of the secondary market. The variable with the highest coefficient is the time to maturity factor, since as explained before; it has a direct relation in the pricing of Bonds. The coefficient is negative because of the definition of the factor (1/(T-t)), in which our proxy represents the reciprocal of time to maturity. Therefore, the lower the factor, the longer days remain for the bond to expire, being higher the risk (maturity risk) and rising the spread.

Regarding internal factors, the Initial Spread and Expected Loss are both significant with positive coefficients. Initial Spread is positive, since as mentioned, the higher the issuance rate, the higher the risk embedded by the bond, for which a higher perception of risk persists. Similarly, the higher the expected loss defined for every Cat Bond, the higher the spread in the secondary market.

Credit rating and interest rate (i.e Libor) proved to be not significant in the secondary market. On a research led by Gomez and Carcamo (2014) in regards to the factors influencing the spread of Cat Bonds when first issued in the market, both of those factors proved to be relevant. Therefore, we conclude that factors like the Credit rating and interest rate only have a relevant role in the primary market, after which that risk information becomes reflected in the initial spread.

In regards to the external factors, both the High Yield index and Cat Bond Index proved to be relevant in the indicative spread. High Yield Index has an inverse effect in the primary and secondary market, having a negative effect for the spread in the primary market

(Gomez   and   Carcamo   2014),   and   positive   for   the   secondary   market.

In the former it worked as a benchmark for other securities with non-investment grade, for which a rise in the index (price) was translated in a fall in the interest rate for such securities. Therefore, following the resemblance to Cat Bonds, the spread at issue from these securities fell as well. In the secondary market the index also works as a benchmark, for comparing the attractiveness of Cat Bonds against other non-investment grade securities. Therefore, a rise in the index (price) reflects a fall in the indicative spread of these securities, which reflects a higher demand for those securities. Now, according to the definition of substitute goods, investors would be demanding less Cat Bonds, which will lower the price of Cat Bonds, raising their spread to maturity.

Finally, the Swiss re Cat Bond total return index (SCARRTT) used as a proxy for the development of the secondary market of Cat Bonds, has a negative effect proving the lower the index (price), the higher the interest rate, which must be directly reflected on the yield of Cat Bonds.

5.2. Fitness of the Regression Model

The multifactor spread model for secondary spreads is now evaluated against the original indicative spreads, in order to conclude about the accuracy of the model and fit with the real data. Results proved and average absolute deviation of 1.75%.

Figure 1: Original Indicative Spread Vs Estimated Spread
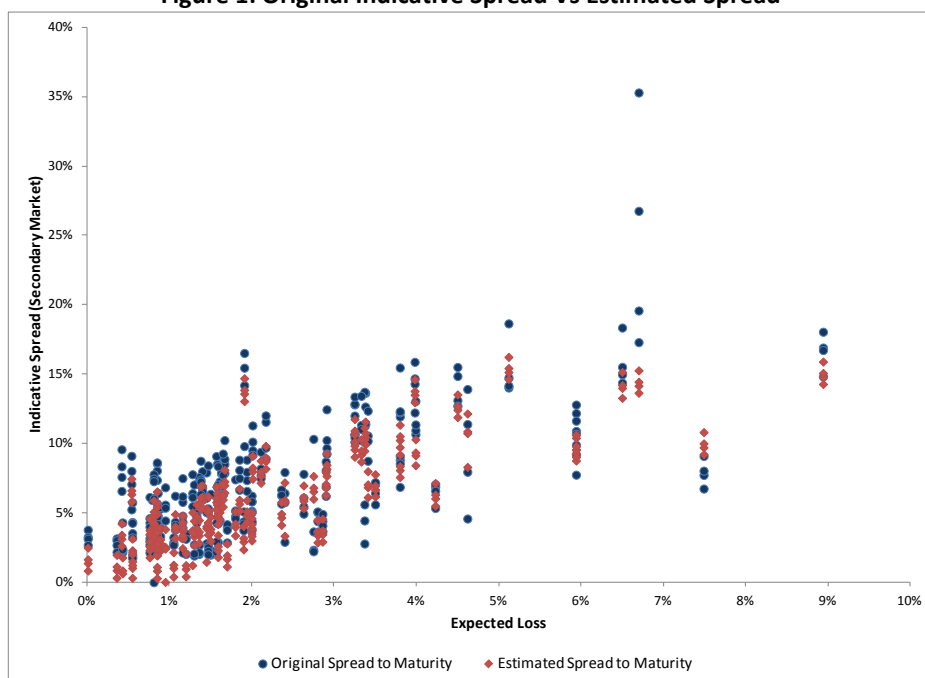
The model has a better adjustment for those Cat Bonds with lower expected loss, which are generally the ones trading at lower spreads. However, the spread in the secondary market of those Cat Bonds with a high expected Loss and a longer time to maturity, tends to have a very volatile behavior, for which our model tends to either under or overestimate the spread to maturity.

Table 2: Descriptive Statistics for the deviation of the Modeled Indicative Spread Vs Original Spread

Deviation	**0% - 1%**	**1%-2%**	**2%-6%**	**>6%**
Average Indicative Spread	6.44%	6.65%	8.41%	9.51%
Average Initial Spread	8.97%	8.18%	9.08%	11.83%
Average Expected Loss	2.46%	2.08%	2.39%	3.50%
Average Time to Maturity Factor	0.0017	0.0015	0.0020	0.0011
Number Observations	90	134	94	6
% Sample	28%	41%	29%	2%

Table 2 shows a clear relation of high deviations (above 6%), with higher initial spreads, Expected Loss and days to maturity. Future research can better focus on the particular performance of highly risk Cat Bonds, in order to better identify potential additional factors influencing the price perception of investors in the secondary market.

5.3. Static Model Assessment

Our hypothesis assumes that the indicative spread for each Cat Bond depends on the initial spread exclusively. However the question on whether the indicative spread on *t* is influenced by the indicative spread in *t-1* arises.

We therefore evaluate whether the model is static or dynamic, estimating the regression using the one-step GMM system estimator of Blundell-Bond.

Table 3: Regression Output using GMM system estimator (Blundell-Bond)

Indicative Spread	Coefficient	Standard Error	t-statistic	Prob.
L1.	0.0584	0.5033	0.1200	0.9080
Constant	-0.1677	0.2156	-0.7800	0.4370
Initial Spread	1.5726	1.0298	1.5300	0.1270
Expected Loss	2.0325	1.2391	1.6400	0.1010
Investment	3.1787	2.2984	1.3800	0.1670
Non Investment	0.3995	0.2888	1.3800	0.1670
Time to Maturity Factor	5.0873	4.6742	1.0900	0.2760
High_Yield Index	0.0003	0.0004	0.7300	0.4620
SCATTRR	-0.0029	0.0014	-2.1600	0.0310

Source: Stata results from Blundell-Bond estimator

From table 3 we can see that the variable L1, corresponding to the lagged indicative spread, has a p-value of 0.9, concluding our model is static and the results shown in the previous regression remain valid.

6. CONCLUSIONS

Previous authors exploring the dynamics of Cat Bonds' spread in the secondary market have focused exclusively in the probability of occurrence of a catastrophic event. Those models fall short in providing a robust model for explaining the spread of Cat Bonds, arising therefore the need to widen the scope of factors impacting these securities. Our research seeks to satisfy that need by including 3 internal and 2 external variables, to design a multifactor spread model.

Results suggest that 5 variables have a significant impact over the spread of Cat Bonds in the secondary market. Time to maturity was the most relevant factor, since it has a direct relation and high impact in the pricing of Bonds. However, other internal variables proved to be priced by investors, being the Spread at Issue and Expected Loss. Additionally, external factors like a benchmark with other non investment grade bonds, and the reinsurance index, tracking the total rate of return of a sample of Cat Bonds.

Our proposed model shows to have a high accuracy on replicating the spread of Cat Bonds in the secondary market. Furthermore, unlike those of most authors, our model has a general application, relevant both for the P&C and Life market of Cat Bonds. Therefore, we have developed not only a pricing tool, but an insightful model for understanding the variables that directly affect the pricing dynamics of Cat Bonds, in order for investors to make sound decisions.

Some areas for further research should focus in identifying additional factors impacting the spread of Cat Bonds in the secondary market, especially given the fact that these securities are relatively new, and their increasing attractiveness in financial market are

continuously changing their dynamics and structure, to better fit the market players' needs.

REFERENCES

- Aon Benfield. (2014), "The Aon Benfield Aggregate. Results for the year ended December 31, 2013", available at: https://www.abconnect.aonbenfield.com/ABConnect/Pages/MarketReView/MarketReView.aspx?bc=25 (accessed June 2014).

- Baryshnikov Y., Mayo A. and Taylor, D. R. (2011), Pricing of CAT Bonds, Statistical Tools for Finance and Insurance, Vol. 1, pp. 371-391.

- Bodoff, N. M., and Gan, Y. (2009), An analysis of the market price of Cat Bonds, Casualty Actuarial Society E-Forum. Spring, 2009

- Braun, Alexander. (2012), Pricing in the primary market for cat bonds: new empirical evidence, Working papers on risk management and insurance, Vol. 116.

- Cox, S. H., and Pedersen, H. W. (2000), Catastrophe risk bonds, North American Actuarial Journal, Vol 4, No.4, pp. 56-82.

- Cummins, J. D. (2008), CAT bonds and other risk-linked securities: State of the market and recent developments, Risk Management and Insurance Review, Vol. 11, pp. 23-47.

- Cummins, J. David, & Weiss, M. A. (2009), Convergence of Insurance and Financial Markets: Hybrid and Securitized Risk-Transfer Solutions, Journal of Risk and Insurance, Vol. 76, No. 3, pp. 493-545.

- Dieckmann, S. (2008), By force of nature: explaining the yield spread on catastrophe bonds, Working Paper, Wharton School, University of Pennsylvania, Philadelphia.

- Galeotti, M., Guertler, M., and Winkelvos, C. (2013), Accuracy of Premium Calculation Models for Cat Bonds – An Empirical Analysis, Journal of Risk and Insurance, forthcoming.

- Gomez, L. and Carcamo, U. (2014), Multifactor Spread Model for Cat Bonds in the Primary Market. Manuscript sumbitted for publication.

- Gürtler, M.; Hibbeln, M. and Winkelvos, C. (2012), The impact of the financial crisis and natural catastrophes on CAT bonds, Working Papers, Institut für Finanzwirtschaft, Technische Universität Braunschweig, No.IF40V1.

- Guy Carpenter. (2013), "Capital Stewardship: Charting the course to profitable growth.", available at: http://www.guycarp.com/content/dam/guycarp/en/documents/dynamic-content/Mid-Year-Market-Overview-Sept-2013.pdf (accessed January, 2014).

- Jin-Ping, and Min-Teh (2002), Pricing Default-Risky Cat Bonds with Moral Hazard and Basis Risk, The Journal of Risk and Insurance, Vol. 69 No.1 pp. 25-44.

- Lane Financial LLC. (2013), Soft Markets Ahead? Annual Review for the Four Quarters, Q2 2012 to Q1 2013. Publications, available at: http://www.lanefinancialllc.com/index.php?searchword=2006&option=com_search&Itemid= (accessed March, 2014).

- Lane Financial LLC. (2013), Trade Notes. Annual Review for the four quarters, Q2 2012 to Q1 2013. Publication available at : http://www.lanefinancialllc.com/index.php?option=com_search&Itemid=99999999&searchword=lane&searchphrase=any&ordering=newest&limit=30&limitstart=65 (accessed March 2014).

- Lane, M., & Mahul, O. (2008), Catastrophe risk pricing: an empirical analysis, World Bank publications, available at: https://openknowledge.worldbank.org/bitstream/handle/10986/6900/WPS4765.pdf?sequence=1 (accessed 20 December 2014)

- Loubergé et al. (1999), Using Catastrophe-Linked Securities to Diversify Insurance Risk: A Financial Analysis of Cat Bonds, Journal of insurance issues, Vol. 22, No. 2, pp.125-146.

- Tao, Z. (2011), Zero-Beta Characteristic of CAT Bonds, BIFE '11 Proceedings of the 2011 Fourth International Conference on Business Intelligence and Financial Engineering, pp. 641-644.

CAPITAL DISTRIBUTIONS IN THE BANKING INDUSTRY

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ABSTRACT

As the 2008 banking disaster loomed banks increased their dividends and stock repurchase distributions to common shareholders dramatically. This unique time period provides a natural experimental setting to examine financial institutions' capital management strategies during periods of macroeconomic change. As the crisis loomed, we find that U.S. banks did not conserve cash but returned capital to investors at the same pace that they earned capital from operations. We also find that U.S. firms that accepted funds from the Capital Purchase Program (CPP) relative to non-CPP firms, returned a higher proportion of their available capital to shareholders in the periods leading up to the financial crisis.

STOCK REPURCHASES AND FINANCIAL REFORM IN THE BANKING INDUSTRY

1. INTRODUCTION

The world economy is still recovering from the effects of the downfall of the financial industry. October 3rd, 2008 marked the beginning of the largest government bailout in history as President Bush signed the Emergency Economic Stabilization Act of 2008 (EESA) into law. The EESA created the Troubled Asset Relief Program (TARP) which provided the United States Department of the Treasury (Treasury) with broad authority to administer $700 billion of taxpayer funds to bolster the capital position of the struggling financial institutions, thus reducing the uncertainty in the troubled capital and credit markets. Ultimately, this controversial legislation resulted in a bailout of the banking system by the Treasury. The Capital Purchase Program (CPP), the largest program within TARP, authorized the Treasury to purchase up to $250 billion of senior preferred shares of qualifying U.S. controlled banks, savings associations, and certain saving and loan holding companies.

In light of the failures within the financial services industry, we examine banks' precipitating decisions and actions that expose some questionable capital management strategies. For example, many financial institutions (including those accepting CPP funds) continued returning cash to shareholders even after the banking industry began to feel repercussions from the deteriorating U.S. housing market in late 2006 and early 2007. As

default rates on subprime and adjustable rate mortgages (ARM) accelerated, banks did not appear to protect their capital positions, electing instead to maintain or increase cash distributions through share repurchase and dividend activities. In fact, 84% of 102 of the largest publicly traded US financial institutions repurchased their own stock in 2007, collectively returning $65.4 billion to their selling shareholders, double the $31.8 billion they spent on repurchases in 2004. Simultaneously, common dividend payments grew from $42.1 billion in 2004 to $59.7 billion in 2007.

Between 2004 and 2007, the 61 sample firms which ultimately received $165.3 billion in CPP funds made dividend payments of $157.5 billion to common shareholders and spent an *additional* $164.2 billion for common share repurchases. While academics, regulators, and practitioners debate the optimal level and composition of bank capital, reducing common equity capital through share repurchases and dividend payments shifts risk from shareholders to deposit funds, governments and ultimately taxpayers, particularly in a time period of declining economic conditions.   No research to our knowledge specifically examines the relationship between the structure, magnitude, and timing of the banking industry's cash payout policies and the inadequate level of capital during the financial crisis.[1] As the financial industry increased its risk-taking activities and the complexity of its financial transactions in the four years leading up to the fall of 2008, it simultaneously reduced common equity capital and increased leverage by returning significant funds to shareholders through accelerating dividend payments and share repurchases activities, with most banks maintaining core capital ratings at or above the regulators' "well-capitalized" levels.

We find that much of the prior academic research on the motivations for share repurchase programs specifically excludes financial firms (Dittmar, 2000; Skinner, 2008). Given this limited prior research and the accelerating volumes of repurchases over our sample period, we first explore the motivations of the repurchasing activities between 2004 and 2007 to see if previously studied theories (including free cash flows, signaling and undervaluation, capital structure, and employee stock options) describe the banking firms' repurchasing behaviors.   We find that between 2004 and 2006, banks appear to exhibit behaviors consistent with these theories; however, in 2007, we document a significant shift in the motivations for repurchase activities. This payout activity in 2007 is *inconsistent* with economic motivations for share repurchases established in the academic literature and is particularly interesting since it occurs during the year preceding the height of the financial crisis but after the symptoms and warnings of the forthcoming problems were observable.

This finding motivates us to examine whether higher firm cash disbursements to shareholders over this period put the institutions at risk for financial crisis. We use our

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[1] Acharya et. al. (2011) examine the relationship between dividends and bank capital of the largest 25 U.S. banking institutions; however, these authors do not consider share repurchases as a part of their study of bank capital.

unique dataset to examine and compare the impact of various forms of shareholder payouts on two measures of a firm's capital position, Tier 1 capital, as reported to U.S. banking regulators, and a measure of equity capital we call the tangible common equity ratio (TCE ratio).

Research has shown that CPP participants reported stronger financial performance than non-CPP firms, yet still held lower levels of capital preceding the fall of 2008 (Ng, Vasvari, and Wittenberg-Moerman, 2010). Although we recognize that a bank's capital position is a function of a variety of strategic operating decisions including lending, investing, risk management, and capital management decisions, we focus on whether a firm's decision to distribute cash through dividends and share repurchases increased the likelihood that it would participate in the CPP program. We provide evidence of declining levels of capital over the years leading up to the financial crisis and purport that the economically inefficient levels of shareholder payouts left banks with insufficient capital to withstand the risk of the 2008 financial crisis despite maintaining "well-capitalized" Tier1 core capital levels. Finally, in a regression analysis, we find that for every 1% of assets paid out in dividends or share repurchases, a firm's tangible common equity ratio decreased by an annualized rate of 0.32% or 0.44%, respectively.

This study is important for several reasons. First, we provide insight on the impact of shareholder payouts on banks' capital adequacy in periods of declining economic conditions. Second, in response to the increasing worldwide discussion of the composition and adequate levels of bank equity capital, we examine how well two current measures of capital adequacy, the Tier 1 and tangible common equity ratios, captured the increased payout activities of our sample firms. Although the liquidity crisis in 2008 was the result of both declining asset values and tightened credit markets, we provide evidence that firms returning higher proportions of tangible equity capital to their shareholders were more likely to accept infusions of capital from taxpayers. Following the financial crisis, capital returns to shareholders decreased significantly during 2009 and 2010, mostly due to the limitations imposed on CPP participants. However, in early 2011, several of the largest financial institutions, after receiving approval from the Federal Reserve, have once again increased capital payouts to shareholders. This paper provides important support for restrictions on all forms of capital payout activities.

The remainder of this paper is organized as follows. The second section examines motivations for stock repurchases and dividend payments in the financial industry. In the third section we discuss the sample, research methodology, and results, while the forth section provides summary and concluding remarks.

2. CAPITAL DISTRIBUTIONS THROUGH STOCK REPURCHASES AND DIVIDENDS

Researchers have long examined the determinants of and changes in corporate payout policies as well as the substitutability between dividends and share repurchases. Few of these studies, however, have included financial firms which not only must determine the most efficient means to return capital to shareholders but must also balance these payout policies against the capital requirements of their respective regulatory authorities.

2.1 Motivations for Share Repurchases

The economic motivation for repurchasing shares in light of financial decline is unclear. Theory suggests that firms repurchase stock for a number of reasons: agency costs of free cash flows (Jensen, 1986), signaling and undervaluation (Vermaelen, 1981; Ikenberry, Lakonishok and Vermaelen, 1995; Bhattacharya,1979; Vermaelen,1984; Miller and Rock,1985), capital structure (Dittmar, 2000; Bagwell and Shoven, 1988; Hovakimian, Opler and Titman, 2001),   tax consideration, and employee stock options (Fenn and Liang, 2001; Kahle, 2002), earnings management (Bens, Nagar, Skinner, and Wong, 2003; Hribar, Jenkins, and Johnson, 2006. However, most of the prior research in repurchases excludes financial firms and there is limited research on the financial industry.

For financial firms, the return of excess capital to shareholders may reduce the temptation of management to move to higher risk lending and investing activities. In her sample of publicly-traded and privately held financial institutions, Hirtle (2004) finds evidence suggesting that deployment of excess cash is a consideration for larger banks traded on major stock returns. For banks, the relationship between share repurchases and leverage is relatively complex. Banking firms tend to have less equity to total assets than non-financial firms and thus, have more financial leverage which is heavily weighted in short-term borrowings and demand deposits. As a result, a share repurchase transaction has a very different impact on a bank relative to non-financial firm. Smaller capital reserves provide greater   potential for profit; however, smaller levels also increases the risk of firm insolvency in periods of falling asset prices or other declining economic conditions. Bank manager share repurchase programs are also subject to capital adequacy requirements set by regulators to maintain the safety and soundness of the bank. Even so, much of the empirical and theoretical research of bank capital and optimal capital structure suggests that banks, like non-financial firms, act to optimize their capital structure such that capital regulations appear as a second order influence on this optimal capital structure.

Berger, DeYoung, Flannery, Lee, and Oztekin (2008) report evidence that banks do appear to manage capital ratios to firm-specific target levels with share repurchases which are used to offset both capital issuances and earnings retained in periods of strong financial performance. During their 1992-2006 sample period, share repurchases significantly offset new share issuance and increases in retained earnings. However, since their sample period reflected a profitable period, their study does not provide information on how banks manage capital ratios in times of losses.

2.2 Motivations for Dividends

In his 1976 seminal paper, "The Dividend Puzzle," Fischer Black questions why firms continue to pay dividends given the fact that dividend payments are value irrelevant and tax disadvantaged. However, research finds that investors view dividends, particularly dividend initiations and increases, as credible signals of the quality, reduced risk, and expectations of future earnings and cash flows (see Bhattacharya, 1979; Miller and Rock, 1985; Healy and Palepu, 1988; Nissam and Ziv, 2001).   Further research suggests that investors like the monitoring and control function that dividends provide over managers, particularly for cash-rich, mature firms (Easterbrook, 1984; Jenson 1986).   Finally, the

catering and clientele theories of dividends indicate that certain characteristics of investors themselves, such as investor demand and tax status (Baker and Wurgler 2004; Li and Lie (2006); Allen, Bernardo, and Welch, 2000), drive a preference for investment dividend paying firms.

Research has also examined the propensity to use share repurchases as a substitute for dividends. Grullon and Michaely (2002) document a decline in the growth of dividend payments while simultaneously finding that the volume of share repurchase activity has increased.   In their sample, mature firms are more likely to use excess capital to repurchase shares than increase dividends.   Again, however, the research on dividend payout policies often ignores the financial firms, and thus, our understanding of financial firm payout policies is limited.

Since the market reacts positively to dividend initiations and strongly and negatively to dividend omissions, dividend policy is viewed as "sticky" as managers resist cuts in dividends out of concern the reductions may signal poor performance (DeAngelo, DeAngelo and Skinner, 1992; Brav et. al., 2005). Perhaps because of this reluctance to cut dividends, Guay and Harford (2000) find that when increases in cash flows are viewed as temporary, managers are more likely to make share repurchases than increase dividends. For banks, Hirtle (1998) contends that the composition of shareholder payouts between dividends and repurchases is especially important as repurchases are easier to cut than dividend payments if earnings and cash are constrained and the bank needs to suddenly preserve capital to remain solvent.

In the recent financial crisis, some conjecture that the reluctance to reduce dividends quickly in response to declining economic conditions more than likely increased the insolvency pressures the banks faced during the fall of 2008. Acharya et al. (2011) find that their 2007 - 2009 sample of TARP participants paid dividends which amounted to 45% of the capital they eventually received from the TARP program.

3. Research Design

In light of the financial crisis, the call for regulator focus on dividend and share repurchase activity is apparent. First, we examine the motivations for stock repurchases and dividend payments in the financial industry. To understand the capital equity behavior of banks we then explore banking firms' shareholder payouts in the years leading up to the financial crisis and capital levels.   This analysis is especially important given the strong negative response by the financial services industry when more stringent capital and liquidity standards were announced. Empirical support for the additional information contained in the new regulations will help demonstrate the need to identify potential problems in the financial services industry before they reach a crisis level.

3.1 Sample

Our sample consists of large (market value of equity or total book assets in excess of $1.5 billion) publicly traded banks listed on Compustat in 2006 with SIC codes 6000-6300. We exclude investment advisory firms, investment banks that are pure brokerage houses, firms that are market exchanges, personal credit institutions, subsidiaries primarily owned

by non-US banks, as well as any firm without lending activities. Our final sample includes 113 firms which we list in Exhibit 1. For each firm, we collect accounting information from Compustat, banking information from Compustat Bank, and share repurchase program and monthly share repurchase information directly from the relevant 10-Q and 10-K filings beginning in 2004, the first year the data is available.

Table 1 provides summary statistics for our sample for the 2006 sample selection year. Consistent with our choice of large firms in excess of $1.5 billion of assets, the mean asset value for our sample is $120.6 billion while the mean market value is $16.5 billion. We note a discernible difference between the mean and median firms indicating that although our sample is constrained to the largest U.S. banking firms, a few of the largest banks dominate our sample means. Thus, we subdivide our sample to parse out the very largest firms. We define *Large Firms* as those reporting a market value of equity greater than or equal to the 85th percentile and *Other Firms* as those below the 85th percentile of the New York Stock Exchange (NYSE) traded firms. We find that the 28 *Large Firms* report larger assets (p<0.01) and market value of equity (p<0.01) than the 85 other firms.

Consistent with interest in capital adequacy measures, we report two measures of capital strength, the Tier 1 capital ratio, defined as core equity to risk weighted assets, and the tangible common equity ratio (TCE Ratio), defined as common equity less intangible assets to tangible assets. While both measures presumably capture a firm's ability to remain solvent in the face of declining asset values or deteriorating economic conditions, the former is a regulatory reporting ratio and includes common stock and some preferred equity and hybrid debt securities. Since the TCE Ratio excludes intangible assets, which hold little liquidity value in adverse economic conditions, some in the financial services industry claim that the TCE Ratio is an "acid" test of a bank's capital position and financial strength to weather a declining economy as it provides a more stringent liquidity measure. For banks with available date, the mean (median) Tier 1 ratio is 9.93% (9.77%), well above the 6% benchmark considered "well capitalized." We also note that our *Large Firms* report a lower capital buffer in both of our measures than the other firms (p<0.01) which is consistent with prior banking studies that find that the larger, more well-diversified institutions hold less capital.

Table 2 reports on the sample firms' shareholder payouts from 2004 and 2007 in gross terms as well as relative to shares outstanding, capital, and earnings. While total payouts increased over the time period, mean (median) share repurchases more than doubled (quadrupled) from $312.1 million ($12.8 million) in 2004 to $656.8 million ($63.2 million) in 2007. The pace of share repurchases accelerates considerably in 2007 as the median sample firm repurchased over 3.1% of the shares outstanding at an amount that comprised nearly 9% of the tangible common equity. The proportion of dividends paid out remained fairly consistent over the sample period. Through a combination of dividends and repurchases, the median firm increased its payout to shareholders from 59% of 2004 earnings to over 90% of 2007 earnings. The increase over 2006 levels is dramatic as median total payouts to income jumped from 57.9% to 90.1% and repurchases as a proportion of TCE increased from 1.9% to 7.4%.

Given the increasing volume of share repurchase activities and proportion of capital spent on common stock repurchases between 2004 and 2007, we first consider the motivations for financial firms to return capital through share repurchases. We follow a methodology similar to Dittmar's (2000) study of non-financial firms and include variables to proxy for firms' motivations for share repurchases including the agency costs of free cash flows, signaling and undervaluation, capital structure, and employee stock options in our model.

$RP_t = \alpha_0 + \beta_1\ Adj\ Ret_{t-1} + \beta_2\ MB_{t-1} + \beta_3\ Cash_{t-1} + \beta_4\ FCF_t + \beta_5\ Div\ Payout_t + \beta_6\ TCE\ Ratio_{t-1} +$

$$\beta_7\ Options_t + \beta_8\ Size_{t-1} + \varepsilon_t$$

Given our hand collected data, we construct our dependent variable, *RP*, as the exact percentage of common shares repurchased to shares outstanding at the beginning of the year. We elect to use shares repurchased to shares outstanding rather than the market value of shares repurchased to market value of equity as the former is less affected by changes in the market value of a firm's stock and represents the volume of share repurchase activity conducted by the firm.

We include variables in our model to examine existing motivations for share repurchases discussed above. The undervaluation hypothesis suggests that when information asymmetry exists, managers, with their inside knowledge of the firm can signal this information to the market through share repurchase activities. Ofer and Thakor (1987) show that managers choose stock repurchases over dividends when the undervaluation is more significant. We include a measure of past stock price performance. *Adj Ret* is the CRSP value-weighted adjusted annual buy and hold return of each bank measured over the preceding fiscal year, and we expect a negative coefficient as firms are more likely to repurchase stock when it is viewed as undervalued. In addition, the findings of Lakonishok, Shleifer, and Vishny (1994) suggest that low market to book value may lead managers to engage in repurchase activity to mitigate potential undervaluation; thus, we expect a negative coefficient on *MB*.

To examine whether the decision to repurchase stock is positively related to excess cash, we include cash holdings at the beginning of the year (*Cash*) and cash flow generated during the year (*FCF)* in our model. After controlling for investment opportunities proxied by market to book value of equity (*MB*) and given that banks should use repurchases as a way to distribute <u>excess</u> capital to investors, we expect to find a positive and significant relation between share repurchases and our excess cash measures.

We also control for dividend payouts (*Div Payout*) since management may use either dividends or share repurchases to distribute excess cash flows. Dittmar's (2000) and Skinner's (2008) find that share repurchases are not dividend substitutes and instead suggest that firms use both dividends and share repurchases to return capital to investors.

As discussed above, financial firms manage their capital cushions in light of future expected economic opportunities, regulatory requirements, and management's subjective assessment of risk exposure and future need for outside funding. Banks should

only repurchase stock when they find they have excess capital and limited alternative investment opportunities. Thus, we include tangible common equity ratio, *TCE Ratio*, as a measure of a bank's capital and expect a positive relationship between the *TCE Ratio* and share repurchase transactions.

Finally, we consider the stock option compensation hypothesis which suggests that stock options may motivate managers to repurchase stock to meet the demands of stock compensation redemptions while mitigating the effect of stock dilution. We include a measure of options exercised during the current year to shares outstanding at the beginning of the year, *Options,* to test this hypothesis and expect a positive coefficient. Consistent with prior research, we also include *Size*, measured as the percentile of the firm's market value to the NYSE at the end of the prior year, as a control variable.

Table 3 presents descriptive statistics and the Pearson and Spearman correlations for our 2004-2007 sample firms for which regression data is available. We partition the data based on whether or not the firm repurchased shares. We find that repurchasers are significantly larger (median size 0.65 vs. 0.40) and have a higher dividend payout ratio (median 0.46 vs. 0.32) As predicted, repurchases are positively and significantly associated with cash and free cash flow as well as options, and negatively related to prior period returns and the market to book ratio; these results lend support for the free cash flow, undervaluation, and stock option hypotheses. Surprisingly, we find no significance between our measure of regulatory capital, *TCE Ratio*, and repurchases.

3.2.2. Empirical Results

Results from estimating the tobit model for 403 firm year observations with available data are provided in Table 4, Panel A, models 1-3. In model 1-3, our findings are consistent with employee stock options hypothesis as the coefficient on *Options* is positive and significant ($p<0.01$) across all models. The coefficients on *Cash* and *TCE Ratio* are positive and significant ($p< 0.01$) which suggest that firms make share repurchases when they have the excess cash and capital available. Finally, *MB* and *Adj. Ret* are negative and but not always significant suggesting mixed support for the undervaluation hypothesis. As noted earlier, we observe an upward trend of repurchases over time, both in volume and in relation to capital and earnings, despite increased financial challenges within the banking industry, and we question whether there is a shift in the motivation for share repurchases around 2007 (See Table 2). For this reason, we test for a structural shift in the share repurchase behavior of our sample firms, both by the inclusion of an indicator variable for 2007 in Models 2 - 3 and a size interaction with 2007 in Model 3 , as our results also appear to indicate a change in behavior of the *Other Firms* around this time. We find that not only is the *2007* indicator variable positive and significant across models ($p<0.01$), but statistical comparisons indicate the coefficient is also larger than that of either the *2006* ($p<0.00$) and *2005* ($p<0.00$) indicator variables. This finding suggests that, even after controlling for the motivations for repurchasing activities, banks made higher volumes of share repurchases in 2007 than in the prior years. Further statistical comparisons of the combined size coefficient (*Size*2007 + Size*) indicate that in 2007, unlike in the prior years, repurchasing firms were significantly smaller ($p<0.00$) sized banks.

Finally, in Model 4, we limit our sample to the 286 firm year observations with non-zero repurchases to examine how the firm characteristics influence the volume of shares repurchased. Results are similar to the full sample except we now find a negative and significant (p<0.01) relation between *Div Payout* and percent of repurchases indicating that firms with higher dividend payouts repurchase less shares. We also find positive and significant coefficients on the yearly indicators indicating a rising proportion of shares repurchased over time. Interestingly, cash levels are not related to the volume of shares repurchased.

Table 4, Panel B reports the results of running our model annually for the sample firms, similar to Dittmar (2000). Running the regressions separately allows us to examine whether the motivations for repurchasing activity remain consistent over the sample period or change across the years, although we acknowledge that the models will suffer reduced power given the smaller sample sizes. For each year 2004 – 2006, the positive and significant (p<0.01) coefficients on *Options* and *Size* remain, indicating that large firms and firms with high levels of option exercises are more likely to repurchase stock. The *TCE Ratio* is significant (p< 0.04) in every year other than 2006 while the *Adj. Ret.* and *Cash* are not statistically significant in any model.

We observe interesting differences for 2007. Overall, we note a remarkable decline in the 2007 model's overall predictive ability as the pseudo R^2, which ranged from 0.23 to 0.27 between 2004 and 2006, drops to 0.05 in 2007, suggesting that the model of traditional share repurchase motivations does not fit the banking firms in 2007 as well as it did in prior years. We also find no evidence that the volume of 2007 share repurchases are driven by size, prior period stock performance, cash, market to book, or employee stock compensation redemptions. This non-significance is particularly surprising for stock options as we find the coefficient on this variable is positive and significant in all previous models (Table 4, Panels A and B). We interpret the results in Table 4, Panel B, particularly the declining model fit, as behavior inconsistent with efficient capital management motivations for share repurchase activities of banks in 2007. This is particularly important given that indicators of financial problems such as the accelerating default rate on subprime mortgages were known during this time period and by August 2007 at the latest. The results in Panel B could suggest that financial institutions elected to payout excess cash to their shareholders in an effort to perhaps maintain a market for their own shares, rather than conserve capital in anticipation of future needs. If a macro-prudential approach to regulation is enacted, then regulators would have the structure in place to require additional capital is maintained when indicators warrant such action.

3.3 Tangible Equity Ratios, Firm Payout Policies and the Capital Purchase Program (CPP)

Given incidences of credit freezes in the market as early as August of 2006 when the first subprime mortgage companies failed, share repurchases made in 2007 could have had the dual effect of reducing capital below an optimal level and increasing firm risk, making it more difficult for a bank to make future capital issues in the public and private markets. In this section, we examine whether the financial institutions' payout policies prior to the crisis increased the probability the bank would participate in the CPP program. While

other studies have addressed the financial crisis and evaluated the success of the CPP program (Bayazitova and Shivdasani, 2009; Veronesi and Zingales, 2010), research has not yet examined the association between the banking firms' shareholder payouts in the years leading up to the financial crisis and capital levels.

At the inception of the CPP program in October of 2008, 87 of our initial 113 sample firms remained viable and eligible to apply for the government-supplied capital. Of these firms,61 applied for and received CPP funds (CPP Firms). Four other banks, which applied for CPP funds, either withdrew their applications or were not strong enough to qualify and are included in the 26 non-CPP sample firms.   We compare the common shareholder capital payouts between these two groups of firms to determine whether the CPP firms distributed capital to shareholders at higher levels in the years preceding the financial crisis.

Table 5 shows a comparison of the CPP and non-CPP firms in the 20 quarters preceding the financial crisis and the four quarters of 2008. The first column shows the mean and median total capital payout, including common stock dividends and share repurchases to prior quarter assets for the 24 quarter sample period. For both groups of firms, the median firm increased its total capital distribution in 2007 and, due to declining asset values and sustained capital payouts, hit a peak between the second and third quarters of 2007, well after the signs of deteriorating economic conditions in the financial industry became apparent.   Both the median CPP and non- CPP firm returned a significant amount (18 -33%) of the quarters' beginning assets to shareholders. Median dividends to assets are significantly lower for non-CPP participants over all quarters through 2007. Tier 1 ratios are significantly lower for CPP participants in most quarters and remain above the "well-capitalized" level throughout the sample period. We also find significantly lower and declining levels of the TCE ratio for firms accepting CPP funds.

This median TCE ratio for CPP firms falls below 6% as early as Q1 2006 and remains below 6% through the end of 2008 as the CPP distributions from the U.S. government did not increase tangible common equity. This finding is consistent with Ng, et. al. (2010) who find that CPP participants, though appearing financially healthier than non CPP participants, faced greater liquidity needs. It is interesting to note that the difference in TCE ratio between the CPP and non-CPP firms is consistently more significant than the difference in Tier 1 capital. Banks appear to manage their regulatory ratios and consistently have a cushion or a target Tier 1 capital ratio in excess of regulatory requirements. However, the quality of the equity capital in terms of liquidity may be better measured by the TCE ratio which is different between the two groups of firms, particularly after 2005. This finding suggests there is different information available to regulators obtained by separately monitoring these two capital adequacy measures.

Overall, the results in Table 5 indicate that in the years leading up to 2008, both the CPP and non-CPP firms returned a high proportion of available capital to their investors. The CPP firms appear to weaken their tangible assets and their ability to absorb losses (as measured by the TCE ratio) more than the non-CPP firms, and much of this regulatory capital was later replenished by the government and taxpayers.

This finding and the move by regulators to more conservative capital adequacy measures along with the Basel III emphasis on tangible common equity leads us to test the impact of time, performance, and capital payout decisions on the TCE ratio. For these tests, we consider three separate samples: a full sample of banking firms with all available regression variables; a sample of CPP firms or firms that were eligible to apply for CPP funding in the fall of 2008; and a sample of "other firms" which excludes the largest, more well-diversified banks which tend to hold lower levels of capital. The descriptive statistics for each of these samples is reported in Table 6. Consistent with the results in Table 5, we observe a decrease in the TCE ratio over the 2004-2007 time periods in each of our samples although this decline appears smaller for the smaller banks.   Correlations indicate that changes in quarterly TCE ratios are related to repurchases, loan growth, and operating performance.

We regress the change in TCE on measures of time, performance and capital payout decisions for all quarterly observations with available data over the 2004-2007 time period for each of our samples. We choose this model to be consistent with the capital structure literature which suggests that cash flows, growth, leverage, and risk are determinants of equity capital targets. We use the following model

$\Delta TCE\ ratio_q = \alpha_0 + \beta_1\ TCE\ ratio_{q-1} + \beta_2\ Size_{q-1} + \beta_3\ Div_q + \beta_4\ RP_q + \beta_5\ \Delta NPAT_q + \beta_6\ Loan$

$Growth_q + \beta_7\ EBTP_q + \beta_8\ MB_{q-1}\ \ + \varepsilon t$

where

$\Delta TCE\ ratio_q$ is the percentage change in the TCE ratio from the beginning to the end of the quarter. $TCE\ ratio_{q-1}$ is the TCE ratio at the end of the prior quarter and is included to ensure that

$\Delta TCE\ ratio_q$ captures capital changes with regard to the prior capital position. *Size* is the French break point related to the NYSE market percentile measured at the end of the prior quarter. Dividends (*DIV*) and repurchases (*RP*) during the quarter are divided by total assets at the end of the prior quarter and ΔNPAT is the percentage change in non-performing assets over the quarter. *LoanGrow*th is the percentage change in the ratio of net loans to total assets from the beginning to the end of the quarter. *EBTP* is quarterly pretax earnings before the provision for loan losses divided by the average assets for the quarter.   *MB* is the market to book ratio measured at the end of the prior quarter and measures the ability for a firm to raise capital in the market. We also include year fixed effects, quarterly indicator variables to capture any seasonality, and Newey and West standard errors (lag 5) to correct for serial correlation in our observations.

The results are reported in Table 7. The coefficients on dividends and repurchases are negative and significant ($p < 0.001$) after controlling for current operations and time which is consistent with the mechanical impact the capital payouts have on tangible common equity. Operational performance, *EBTP*, has a positive and significant impact on TCE ($p<0.001$) as mechanically a bank's earnings increase its equity position. Statistical comparisons of the capital distribution variables (*Div + RP*) and the operational

performance (*EBTP)* coefficients are insignificant which appear to indicate that over this time period firms returned capital to common shareholders at the same pace they earned it from operations, a result not surprising given the mean payout percentage of net income in excess of 90% reported in Table 2. We also compare the coefficients on *Div* and *RP* and find they are indistinguishable indicating the capital payouts in the form of dividends have a similar impact on TCE as share repurchases, a finding which supports regulators' recent policies to simultaneously consider the impact of share repurchases *and* dividends upon a banks internal capital planning.

Among our samples, it appears that the prior tangible common equity position had the most impact on the non-large banks. For these firms, larger declines in the TCE ratio are noted for firms with higher starting capital positions. Although the full and CPP samples also report negative coefficients on *TCE Ratio*, these coefficients are less negative and mildly significant. Additionally, the changes in tangible equity are more (negatively) affected by changes in the quality of the bank's assets as noted by the negative and significant ($p<0.03$) coefficient on ΔNPAT, a result which is not noted when the larger banks are included.

Finally, we note the change in the TCE ratio is positive and significant in the third quarter perhaps reflecting the cyclical nature of the lending markets. In addition, while we note an overall decline in the TCE ratio in our sample period, we find a positive and significant increase in 2006, the year before the symptoms of the mortgage crisis began to appear and a year of a high volume of mortgage activities.   Interestingly, the positive and significant coefficient on 2006 is not noted when the large banks are excluded perhaps indicating a systemic impact in that year that only affected the largest banks.

4. SUMMARY AND CONCLUSION

This paper adds to the literature that examines the multiple factors that contributed to the financial crisis. We provide evidence that financial institutions share the excess cash, undervaluation, and stock compensation motivations for share repurchase programs as their non- financial counterparts. However, for 2007, we find that these common and economically efficient share repurchase motivations are only weakly descriptive of the share repurchase behaviors of our sample of banking firms. We note increasing dividend and share repurchase payments between 2004 and 2007, in relation to both reported earnings and equity capital, and particularly large volume increase in shares repurchased between 2006 and 2007. Given this increased share repurchase activity in a market of known economic deterioration and declining stock prices, we question whether the banking firms engaged in share repurchase activities in an attempt to bolster their falling stock prices.   We also examine whether the level of shareholder payouts (both repurchases and dividends) during the years 2004-2007 increased the probability of a firm's eventual participation in the CPP. The 59 sample firms that participated in the CPP returned more capital to common shareholders between 2004 and 2007 than the capital infusions they eventually received under the CPP. In fact, we provide strong evidence that firms which paid out higher proportions of tangible equity capital between 2004 and 2007 in the form of share repurchases and dividend payments, were more likely to receive CPP capital infusions.

While there is much academic and political discussion about the success of the CPP program and TARP in general, one measure of success, increased confidence in the financial markets, is difficult to quantify.   While we acknowledge that this study contributes to one small piece in the analysis of the causes and consequences of the financial crises, we believe that we have highlighted the need for financial regulators to consider all facets of a firm's capital payout program and the effect on the bank's capital position as the various regulators continue to draft new financial regulations. The impact of payout policies, including <u>both</u> share repurchases and dividends, for financial institutions need consideration as the legislation is implemented. Equally important will be the development of consistent definitions and appropriate measures of Tier 1 and TCE ratios.

REFERENCES

- Acharya, V., I. Gujral, N. Kulkarni, and H. Shin (2011), 'Dividends and Bank Capital in the Financial Crisis of 2007-2009', National Bureau of Economic Research Working Paper No. 16896.

- Allen, F., A. Bernardo, and I. Welch (2000, 'A Theory of Dividends Based on Tax Clienteles', The Journal of Finance, Vol. 55 (December), pp. 2499 – 2536.

- Bagwell, L., and J. Shoven (1988), 'Share Repurchases and Acquisitions: An Analysis of which Firms Participate' in Corporate Takeovers: Causes and Consequences, Edited by A.G. Auerbach, (Chicago, IL: University of Chicago Press).

- Baker, M., and Wurgler, J. (2004), 'A Catering Theory of Dividends', The Journal of Finance, Vol. 59 (June), pp. 1125-1165.

- Bayazitova, D, and A. Shivdasani (2009), 'Assessing TARP', Working Paper (University of North Carolina).

- Bens, D., V. Nagar, D. Skinner, and M. Wong (2003), 'The Real Investment Implications of ESO Exercises', Journal of Accounting Research, Vol. 40, pp. 359-393.

- Berger, A., R. DeYoung, M. Flannery, D. Lee and O. Oztekin (2008), 'How Do Large Banking Organizations Manage Capital Ratios?' The Federal Reserve Bank of Kansas City Economic Research Department, RWP 08-01.

- Bhattacharya, S. (1979), 'Imperfect Information, Dividend Policy, and 'the Bird in the Hand' Fallacy', Bell Journal of Economics, Vol. 10, pp. 259-270.

- Black, F. (1976), 'The Dividend Puzzle', Journal of Portfolio Management, Vol. 2, pp. 5-8.

- Brav, A., J. Graham, C. Harvey, and R. Michaely (2005), 'Payout Policy in the 21st Century', Journal of Financial Economics, Vol. 77, pp. 483-527.

- DeAngelo, H., L. DeAngelo, and D. Skinner (1992). 'Dividends and Losses', The Journal of Finance, Vol. 47, pp. 1837-1863.

- Dittmar, A.K., (2000), 'Why do Firms Repurchase Stocks?' The Journal of Business, Vol. 73, pp. 331–356.

- Easterbrook, F. (1984), 'Two Agency-Cost Explanations of Dividends', American Economic Review, Vol. 84, pp. 650-659.

- Fenn, G. and N. Liang (2001), 'Corporate Payout Policy and Managerial Stock Incentives', Journal of Financial Economics, Vol. 60, pp. 45-72.

- Grullon, G. and R. Michaely (2002), 'Dividends, Share Repurchases, and the Substitution Hypothesis', Journal of Finance, Vol. 57, pp. 1649-1684.

- Guay, W. and J. Harford (2000), 'The Cash-Flow Permanence and Information Content of Dividend Increases Versus Repurchases', Journal of Financial Economics, Vol. 57, pp. 385-415.

- Healy, P. and K. G. Palepu (1988), 'Earnings Information Conveyed by Dividend Initiations and Omissions', Journal of Financial Economics, Vol. 21, pp. 149-176.

- Hirtle, B. (1998), 'Bank Holding Company Capital Ratios and Shareholder Payouts', Current Issues in Economics and Finance (Federal Reserve Bank Of New York), Vol. 4 (September), pp. 1-6.

- Hirtle , B. (2004), 'Stock Repurchases and Bank Holding Company Performance', Journal of Financial Intermediation, Vol. 13, pp. 28-57.

- Hovakimian, A., T. Opler, and S. Titman (2001, 'The Debt-Equity Choice.', Journal of Financial and Quantitative Analysis, Vol. 36 (March), pp. 1-24.

- Hribar, S.,N. Jenkins, and W. Johnson (2006), 'Stock Repurchases as an Earnings Management Device', Journal of Accounting and Economics, Vol. 41, pp. 3-27.

- Ikenberry, D., J. Lakonishok, and T. Vermaelen (1995), 'Market Underreaction to Open Market Share Repurchases', Journal of Financial Economics, Vol. 39, pp. 181-208.

- Jensen, M. C. (1986), 'Agency Costs of Free Cash Flow, Corporate Finance, and Takeovers', American Economic Review, Vol. 76, pp. 323-329.

- Kahle, K.M. (2002, 'When a Buyback isn't a Buyback: Open Market Repurchases and Employee Options', Journal Of Financial Economics, Vol. 63, pp. 235-261.

- Lakonishok, J., A. Shleifer, and R. Vishny, R.W. (1994), 'Contrarian Investment, Extrapolation, and Risk.', Journal of Finance, Vol. 49, pp. 1541-1578.

- Li, W. and E. Lie (2006), 'Dividend Changes and Catering Incentives', Journal of Financial Economics, Vol. 80, pp. 293-308.

- Miller, M. And K. Rock (1985), 'Dividend Policy Under Asymmetric Information', Journal of Finance, Vol. 40 (September), pp. 1031-1051.

- Ng, J., F. Vasvari, and R. Wittenberg-Moerman, R. (2010), 'The Participants in the TARP Capital Purchase Program: Failing or Healthy Banks?' Chicago Booth Research Paper No. 20-10.

- Nissam, D. and A. Ziv (2001), 'Dividend Changes and Future Profitability', Journal of Finance, Vol. 56, pp. 2111-2133.

- Ofer, A. And A. Thakor (1987), 'A Theory of Stock Price Responses to Alternative Corporate Cash Disbursement Methods: Stock Repurchases and Dividends', Journal of Finance, Vol. 42 (June), pp. 365-394.

- Skinner, D. (2008), 'The Evolving Relation Between Earnings, Dividends, and Stock Repurchases.', Journal of Financial Economics, Vol. 87, pp. 582-609.

- Vafeas, N. (1997), 'Determinants of The Choice Between Alternative Share Repurchase Methods', Journal of Accounting, Auditing and Finance, Vol. 12, pp. 101-124.

- Vermaelen, T. (1981), 'Common Stock Repurchases and Market Signaling: An Empirical Study', Journal of Financial Economics, Vol. 9, pp. 139-183.

- Vermaelen, T. (1984), 'Repurchase Tender Offers, Signaling and Managerial Incentives', Journal of Financial and Quantitative Analysis, Vol. 19, pp. 163-181.

- Vermaelen, T. (2005), 'Share Repurchases, Foundations and Trends', in Finance, Vol. 1, pp. 171-268 (Hanover, MA, Now Publishers).

- Veronesi P. and L. Zingales (2010), 'Paulson's Gift', Journal of Financial Economics, Vol. 97, pp. 339-368.

Exhibit 1 – Sample Firms

1	Accredited Home Lenders	59	**JP Morgan Chase & Co.**
2	Alabama National Bancorporation	60	**Keycorp**
3	Amcore Financial Inc.	61	**Lehman Brothers Holding**
4	Associated Banc-Corp	62	**M&T Bank Corp**
5	Astoria Financial Corp.	63	MAF Bancorp Inc.
6	Bancorpsouth Inc.	64	**Marshall & Ilsley Corp.**
7	**Bank of America Corp**	65	MB Financial Inc.
8	Bank of Hawaii Corp.	66	Mercantile Bankshares Corp.
9	**Bank of New York Mellon**	67	**Merrill Lynch & Co. Inc.**
10	Bankatlantic Bancorp	68	**Morgan Stanley**
11	Bankunited Financial Corp.	69	**National City Corp.**
12	**BB&T Corp.**	70	National Pen Bancshare
13	**Bear Stearns Companies**	71	NBT Bancorp Inc.
14	BFC Financial Corp.	72	New York Community Bancorp
15	BOK Financial	73	Newalliance Bancshares
16	Boston Private Financial Holdings	74	**Northern Trust Corp.**
17	Capitol Federal Financial	75	Northwest Bancorp Inc.
18	Cathay General Bancorp	76	Old National Bancorp
19	Central Pacific Financial Corp.	77	Pacific Capital Bancorp.
20	Chittenden Corp.	78	Pacwest Bancorp
21	**Citigroup Inc.**	79	Park National Corp.
22	Citizens Republic Bancorporation	80	**PNC Financial Services Group**
23	City National Corp	81	Popular Inc.
24	Colonial Bancgroup	82	Provident Bankshares Co.
25	**Comerica Inc.**	83	Provident Financial Services Inc.
26	Commerce Bancorp Inc.	84	**Regions Financial Corp.**
27	Compass Bancshares Inc.	85	Signature Bank (NY)\
28	Corus Bankshares Inc.	86	SKY Financial Group Inc.
29	**Countrywide Financial Corp.**	87	South Financial Group Inc.
30	Cullen/Frost Bankers Inc.	88	Sovereign Bancorp Inc.
31	CVB Financial Corp.	89	Sterling Financial Corp.
32	Delta Financial Corp.	90	**Suntrust Banks Inc.**
33	Downey Financial Corp.	91	Susquehanna Bancshares
34	East West Bancorp Inc.	92	SVB Financial Group
35	**Fannie Mae**	93	**Synovus Financial Corp.**
36	First Citizens Bancshares	94	TCF Financial Corp.
37	First Commonwealth Financial Corp.	95	Trustmark Corp.
38	First Horizon National	96	**U.S. Bancorp**
39	First Midwest Bancorp. Inc.	97	UCBH Holdings Inc.
40	First Niagara Financial	98	UMB Financial corp.
41	Firstfed Financial Corp.	99	Umpqua Holdings corop.
42	Firstmerit Corp	100	**Unionbancal Corp.**
43	**Fifth Third Bancorp**	101	United Bankshares Inc.
44	Flagstar Bancorp Inc.	102	United Community Banks

45	FNB Corp.	103	Valley National Bancorp
46	Franklin Bank Corp.	104	**Wachovia Corp.**
47	Fremont General Corp.	105	Washington Federal Inc.
48	Fulton Financial Corp.	106	**Washington Mutual Inc.**
49	**Goldman Sachs Group Inc.**	107	Webster Financial Corp.
50	Greater Bay Bancorp	108	**Wells Fargo & Co.**
51	Hancock Holding Co.	109	Westamerica Bancorporation
52	Hudson City Bancorp Inc.	110	Whitney Holding Corp.
53	Huntington Bancshares	111	Wilmington Trust Corp
54	Indymac Bancorp Inc.	112	Wintrust Financial Corp.
55	International Bancshares Corp.	113	Zions Bancorporation
56	Investors Bancorp Inc.		
57	Investors Financial Services		
58	Irwin Financial Corp.		

Large firms indicated in bold print.

Table 1 - Descriptive statistics of sample for selection year 2006

		N	All Firms	N	Large Firms		N	Other Firms
Assets	Mean	113	120,631	28	444,643	***	85	13,898
	Median		12,891		191,074	***		9,828
							85	2,412
MVE	Mean	113	16,461	28	59.112	***		
	Median		2,151		28,532	***		1,709
Tier 1 Ratio	Mean	101	9.933	20	8.544	***	81	10.276
	Median		9.770		8.515	***		9.900
TCE Ratio	Mean	113	6.340	28	4.974	***	85	6.790
	Median		6.311		4.830	***		6.480
Return on TCE	Mean	113	0.196	28	0.248		85	0.179
	Median		0.196		0.268	***		0.173
Market to Book	Mean	113	1.992	28	2.075		85	1.965
	Median		1.912		2.004			1.855

Assets is the book value of assets measured as of the end of 2006 (millions); *MVE* is the market value of common stock outstanding, measured as of the end of the fiscal year 2006 (millions); *Tier 1 Ratio* is the tier 1 capital ratio calculated according to FDIC and OTC thrift rules and reported during the fourth quarter of fiscal 2006 (percent); *TCE Ratio* is calculated as tangible common equity divided by tangible assets as of the end of fiscal 2006 (percent); *Return on TCE* is fiscal 2006 net income divided by average common tangible equity; *Market to Book* is the ratio of the market value of common equity divided by the book value of common equity. *Large Firms* are defined as having a fiscal 2006 market value of equity of at least the 85th percentile of the NYSE while *Other Firms* have a fiscal 2006 market value of equity of less than then 85th percentile of the NYSE. *** and ** indicate a 0.01 and 0.05 difference respectively between the large firms and other firms using a two sample mean test and Wilcoxon sum rank tests of the medians.

Table 2: Descriptive Statististics of firm payouts 2004 - 2007

Panel	A - All Firms	N	$ DIV	$ RP	% RP	RP / TCE	DIV / NI	PO / NI	% Change CSOS
2004	- Mean	112	379.7	312.1	0.0172	0.0351	0.3952	0.6700	0.0643
	- Median		52.0	12.8	0.0091	0.0273	0.4150	0.5859	0.0119
2005	- Mean	112	423.9	561.1	0.0220	0.0649	0.4284	1.0519	0.0181
	- Median		54.3	23.9	0.0114	0.0328	0.4108	0.6481	0.0033
2006	- Mean	113	472.7	681.1	0.0242	0.0732	0.3960	0.7171	0.0450
	- Median		56.0	28.0	0.0140	0.0387	0.4315	0.7080	0.0064
2007	- Mean	102	584.7	656.8	0.0360	0.0941	0.4477	1.0092	0.0125
	- Median		75.5	63.2	0.0315	0.0848	0.4597	0.9004	-0.0090

Panel	B - Large Firms	N	$ DIV		$ RP		% RP		RP / TCE		DIV / NI	PO / NI		% Change CSOS	
2004	- Mean	31	1,258.2	***	1,062.9	***	0.0303	***	0.1022	**	0.4104	0.8234	*	0.0853	
	- Median		565.0	***	530.8	***	0.0242	***	0.0794	**	0.4271	0.7786	***	0.0156	
2005	- Mean	30	1,446.0	***	2,001.1	***	0.0405	***	0.1208	***	0.4136	0.9324		-0.0017	**
	- Median		609.0	***	537.5	***	0.0330	***	0.1092	***	0.4636	0.9412	***	-0.0100	**
2006	- Mean	28	1,731.5	***	2,625.7	***	0.0453	***	0.1457	***	0.4094	0.9648	***	0.0260	
	- Median		879.8	***	968.2	***	0.0389	***	0.1238	***	0.4562	0.9374	***	-0.0077	**
2007	- Mean	29	1,892.8	***	2,207.3	***	0.0453	*	0.1245		0.4487	0.9453		0.0187	
	- Median		914.0	***	1,098.3	***	0.0414	**	0.1343	**	0.4663	0.8994		-0.0028	

Panel	C - Other Firms	N	$ DIV	$ RP	% RP	RP / TCE	DIV / NI	PO / NI	% Change CSOS
2004	- Mean	80	43.5	24.7	0.0121	0.0095	0.3894	0.6105	0.0561
	- Median		34.8	4.6	0.0043	0.0065	0.4135	0.4879	0.0118
2005	- Mean	82	49.9	34.3	0.0153	0.0444	0.4338	1.0957	0.0253
	- Median		39.2	9.1	0.0065	0.0193	0.4083	0.5355	0.0056
2006	- Mean	85	58.1	40.5	0.0171	0.0493	0.3916	0.6356	0.0513
	- Median		41.5	12.4	0.0066	0.0189	0.4218	0.5791	0.0096
2007	- Mean	73	65.0	57.3	0.0324	0.0824	0.4473	1.0347	0.0100
	- Median		47.4	40.0	0.0300	0.0746	0.4567	0.9013	-0.0106

$ DIV is common dividends paid during the year (millions); *$RP* is the total value of share repurchases and shares accepted in lieu of employee stock exercise prices and other tax withholdings for employee stock compensation redemptions (millions); *% RP* is the number of shares repurchased during the year to common shares outstanding at the end of the prior year; *RP / TCE* is the dollar amout of shares repurchased to tangible common equity measured at the end of the prior fiscal year; *DIV / NI* is common dividends *t* divided by income available to common shareholders at *t-1*; *PO / NI* is total payouts to common shareholders (dividends plus share repurchases) divided by net income available to common shareholders at *t-1* ; is net income divided by average assets. *% Change CSOS* is the percentage reduction in common shares outstanding between *t-1* and *t*. A firm is considered a large firm if its market value of equity at the end of the prior year is at least in the 85 percentile of the NYSE. . ***, **, and * indicate a 0.01, 0.05, and 0.10 difference respectively between the large firms and other firms using a two sample means test and Wilcoxon sum rank tests of the medians.

Table 3: Characteristics of Repurchasing Firms

Panel A: Descriptive Statistics

	Full Sample			Repurchasers			No Repurchases		
	N	Mean	Median	N	Mean	Median	N	Mean	Median
RP	403	0.0233	0.0133	286	0.0329 ***	0.0285 ***	117	0.0000	0.0000
Size	403	0.5975	0.5500	286	0.6505 ***	0.6500 ***	117	0.4679	0.4000
Adj. Ret	403	-0.1114	-0.0910	286	-0.1254 **	-0.0972 **	117	-0.0771	-0.0757
Cash	403	0.0565	0.0318	286	0.0644 ***	0.0327 ***	117	0.0373	0.0280
Options	403	0.0125	0.0090	286	0.0125	0.0091	117	0.0126	0.0090
Div. Payout	403	0.4100	0.4267	286	0.4446 **	0.4590 ***	117	0.3253	0.3204
MB	403	2.1874	2.0662	286	2.1914	2.0656	117	2.1776	2.0662
TCE Ratio	403	0.0639	0.0619	286	0.0653 *	0.0627	117	0.0605	0.0602
FCF	403	0.0206	0.0177	286	0.0192 **	0.0173	117	0.0240	0.0179

Panel B: Pearson Correlation Coefficients

	Size	Adj Ret	Cash	Options	Div Payout	MB	TCE Ratio	FCF
RP	0.2608	-0.1160	0.2843	0.2505	-0.0532	-0.1694	0.0145	0.0510
	(0.000)	(0.020)	(0.000)	(0.000)	(0.286)	(0.001)	(0.772)	(0.307)
Size		0.1944	0.4227	0.2202	0.1374	0.0944	-0.2283	0.1639
		(0.000)	(0.000)	(0.000)	(0.006)	(0.058)	(0.000)	(0.001)
Adj. Ret			0.2546	0.2668	-0.1541	0.0801	0.1008	0.2973
			(0.000)	(0.000)	(0.002)	(0.109)	(0.043)	(0.001)
Cash					-0.1933	-0.0460	-0.1663	0.4105
					(0.000)	(0.357)	(0.001)	(0.000)
Options					-0.2403	-0.0416	-0.3187	0.4436
					(0.000)	(0.405)	(0.000)	(0.000)
Div. Payout						-0.0677	0.1888	-0.4170
						(0.175)	(0.000)	(0.000)
MB							0.0005	0.0904
							(0.992)	(0.070)
TCE Ratio								-0.3453
								(0.000)

RP equals the number of shares repurchased (non-employee redemptions) divided by common shares outstanding at the end of the prior year. *Size* is measured as the Ken French break point related to the NYSE market percentile measured at the end of the last month of the prior fiscal year; *Adj Ret* is the firm's annual return adjusted by the CRSP value weighted market return; *Cash* is the firm's cash and short term assets divided by total assets, measured at the end of the prior year; *Options* are the number of options exercised during the year divided by common shares outstanding at the end of the prior fiscal year; *Div Payout* is common dividends *t* divided by income available to common shareholders at *t-1*; are the number of options exercised during the current year deflated by the common shares outstanding measured at the end of the prior year; *MB* is the ratio of the market value of equity to the book value of equity, measured at the end of the prior year; *TCE Ratio* is tangible common equity divided by tangible assets, measured at the end of the prior year; *FCF* is equal to the current year operating income before depreciation less taxes paid, common dividends and preferred dividends paid divided by the

book value of assets measured at the end of the prior year. All continuous variables are winsorized at the top and bottom 1%. P values reported in parenthesis. ***, **, and * indicate a 0.01, 0.05, and 0.10 difference respectively between the repurchasing and non-repurchasing firms using a two sample means test and Wilcoxon sum rank tests of the medians.

Table 4 - Panel A

Panel Tobit and Linear regressions of the motivations for repurchases by banks

	Predicted Sign	Tobit Models			Regression
		Model 1	Model 2	Model 3	Model 4
Intercept	±	-0.0320	-0.0494	-0.0637	-0.0079
		(0.004)	*(0.000)*	*(0.000)*	*(0.478)*
Adj Ret	-	-0.0443	-0.0182	-0.0183	-0.0088
		(0.000)	(0.125)	(0.118)	(0.427)
MB		-0.0060	-0.0040	-0.0039	-0.0064
		(0.014)	(0.106)	(0.108)	(0.002)
Cash	+	0.1048	0.0785	0.0736	-0.0082
		(0.000)	(0.009)	(0.010)	(0.31)
FCF	+	-0.2394	-0.1845	-0.1357	0.2074
		(0.156)	(0.269)	(0.432)	(0.273)
Div Payout	+	-0.0086	-0.0076	-0.0057	-0.0268
		(0.292)	(0.355)	(0.472)	(0.001)
TCE Ratio	+	0.3361	0.3512	0.3553	0.2550
		(0.000)	(0.000)	(0.000)	(0.000)
Options	+	0.5813	0.6526	0.6862	0.6678
		(0.000)	(0.000)	(0.000)	(0.000)
Size	+	0.0495	0.0506	0.0685	0.0357
		(0.000)	(0.000)	(0.000)	(0.000)
2005	±		0.0115	0.0120	0.0121
			(0.007)	(0.004)	(0.000)
2006	±		0.0151	0.0160	0.0130
			(0.001)	(0.000)	(0.000)
2007	±		0.0267	0.0715	0.0496
			(0.000)	(0.000)	(0.000)
Size * 2007	+			-0.0699	-0.0459
				(0.000)	(0.000)
N		403	403	403	286
Pseudo (adj) R^2		0.2449	0.2871	0.3416	0.3676

Models1 - 3 report the results estimating a tobit model for all firm year observations with available information and Model 4 reports the results of the multivariate regression for firms with non-zero repurchases. The dependent variable is *RP* or the number of common shares repurchased (non-employee redemptions) during the year divided by common shares outstanding at the beginning of the year. *Adj Ret* is the firm's annual return adjusted by the CRSP value weighted market return; *MB* is the ratio of the market value of equity to the book value of equity, measured at the end of the prior year; *Cash* is the firm's cash and short term assets divided by total assets, measured at the end of the prior year; *FCF* is equal to the operating income before depreciation less taxes paid, common dividends and preferred dividends paid divided by the book value of assets measured at the end of the prior year; *Div Payout* is common dividends *t* divided by income available to common shareholders at *t-1*; *TCE Ratio* is tangible common equity divided by tangible assets, measured at the end of the prior year; *Options* are the number of stock options exercised during the year divided by common shares outstanding at the end of the prior fiscal year; *Size* is measured as the Ken French break
point related to the NYSE market percentile measured at the end of the last month of the prior fiscal year; *2005, 2006,* and *2007* are indicator variable of 1 for firm observations in the respective year and 0 otherwise. All continuous variables are winsorized at the top and bottom 1%. White heterskedastic consistent *p* values are reported in parenthesis.

Table 4 - Panel B

Annual Tobit Regressions explaining the probability that a bank makes a share repurchase

	Predicted Sign	2004	2005	2006	2007
Intercept	±	-0.0419	-0.0666	-0.0410	0.0154
		(0.021)	(0.001)	(0.035)	(0.620)
Adj Ret	-	-0.0084	0.0002	-0.0417	-0.0189
		(0.636)	(0.994)	(0.147)	(0.373)
MB	-	-0.0032	-0.0021	-0.0032	-0.0063
		(0.358)	(0.633)	(0.593)	(0.266)
Cash	+	0.0504	0.0462	0.1167	0.0109
		(0.279)	(0.416)	(0.121)	(0.879)
FCF	+	-0.6486	-0.4937	-0.4447	0.3064
		(0.070)	(0.252)	(0.181)	(0.465)
Div Payout	±	-0.0022	0.0054	-0.0059	-0.0284
		(0.868)	(0.673)	(0.698)	(0.095)
TCE Ratio	+	0.2770	0.4657	0.2330	0.3655
		(0.021)	(0.008)	(0.115)	(0.037)
Options	+	0.4801	1.3265	1.2244	0.3063
		(0.000)	(0.000)	(0.001)	(0.306)
Size	+	0.0673	0.0731	0.0609	0.0091
		(0.000)	(0.000)	(0.000)	(0.572)
N		99	104	103	97
$N_{repurchases}$		63	69	71	83
Pseudo R^2		0.2678	0.2642	0.2311	0.0490

The dependent variable is *RP* or the number of common shares repurchased (non-employee redemptions) during the year divided by common shares outstanding at the beginning of the year. *Adj Ret* is the firm's annual return adjusted by the CRSP value weighted market return; *MB* is the ratio of the market value of equity to the book value of equity, measured at the end of the prior year; *Cash* is the firm's cash and short term assets divided by total assets, measured at the end of the prior year; *FCF* is equal to the operating income before depreciation less taxes paid, common dividends and preferred dividends paid divided by the book value of assets measured at the

end of the prior year; *Div Payout* is common dividends *t* divided by income available to common shareholders at

t-1; *TCE Ratio* is tangible common equity divided by tangible assets, measured at the end of the prior year; *Options* are the number of stock options exercised during the year divided by common shares outstanding at the end of the prior fiscal year; *Size* is measured as the Ken French break point related to the NYSE market percentile measured at the end of the last month of the prior fiscal year. All continuous variables are winsorized at the top and bottom 1%. White heterskedastic consistent p values are reported in parenthesis.

Table 5: Quarterly Comparisons of CPP and Non-CPP across Payout Activities and Capital Adequacy Ratios 2004 - 2008

		Non- CPP firms						CPP FIRMS				
		N	Payout	Div	RP	Tier 1	TCE	N	Payout	Div	RP	Tier 1	TCE
Q1 2004	Mean	24	0.2270	0.1091	0.1180	12.36**	7.91	57	0.2355	0.1343	0.1012	10.20	6.83
	Median		0.2038	0.1017*	0.0530	11.47**	7.39*		0.2040	0.1473	0.0167	9.80	6.56
Q2	Mean	23	0.3121	0.1292	0.1830*	12.05*	7.65*	58	0.2210	0.1386	0.0825	10.35	6.31
	Median		0.2498	0.1118*	0.0555	11.12	6.88**		0.1949	0.1453	0.0162	9.91	6.06
Q3	Mean	24	0.2238	0.1073*	0.1165	11.76*	7.94**	58	0.1839	0.1353	0.0487	10.14	6.52
	Median		0.1608	0.1097*	0.0127	11.59**	7.32**		0.1710	0.1439	0.0016	9.58	6.27
Q4	Mean	25	0.1879	0.1021**	0.0858	11.39	7.44	59	0.2217	0.1555	0.0662	10.41	6.55
	Median		0.1228	0.1066**	0.0095	11.60**	7.31*		0.1823	0.1436	0.0041	9.73	6.17
Q1 2005	Mean	24	0.2930	0.1047*	0.1247	11.21*	7.57**	57	0.2800	0.1362	0.1438	9.92	6.18
	Median		0.1412	0.1108*	0.0238	10.70*	7.06**		0.2150	0.1455	0.0495	9.60	6.10
Q2	Mean	25	0.1981	0.1113	0.0868	11.36**	8.01**	57	0.2463	0.1365	0.1097	9.79	6.32
	Median		0.1646	0.1127	0.0021	10.47**	7.23**		0.1995	0.1483	0.0342	9.60	6.17
Q3	Mean	25	0.2260	0.1044*	0.1217	11.32**	7.83**	57	0.2068	0.1331	0.0736	9.77	6.25
	Median		0.1531	0.1116**	0.0147	10.42***	7.10**		0.1901	0.1459	0.0222	9.49	6.17
Q4	Mean	25	0.2397	0.1074**	0.1323	11.19*	7.58*	59	0.2261	0.1504	0.0757	9.87	6.20
	Median		0.1550	0.1114**	0.0404	10.70**	6.91**		0.2004	0.1441	0.0067	9.30	6.02
Q1 2006	Mean	27	0.2140	0.1052**	0.1088	10.96*	7.63**	58	0.2681	0.1360	0.1321	9.66	6.03
	Median		0.1540	0.1069**	0.0341	10.65**	7.15***		0.2192	0.1502	0.0687	9.09	5.97
Q2	Mean	27	0.2246	0.1091**	0.1155	10.61**	7.93***	58	0.2537	0.1425	0.1102	9.57	5.90
	Median		0.1686	0.1151**	0.0359	10.71**	7.09***		0.2033	0.1502	0.0289	9.43	5.91
Q3	Mean	27	0.1853	0.1025*	0.0828	10.64**	8.10***	58	0.2144	0.1310	0.0835	9.67	6.22
	Median		0.1451	0.1118**	0.0122	10.47**	7.51***		0.1646	0.1470	0.0040	9.36	6.22
Q4	Mean	27	0.1905	0.1060***	0.0845	10.54*	7.97***	59	0.2382	0.1605	0.0777	9.77	6.25
	Median		0.1627	0.1087**	0.0222	10.94**	7.58***		0.1745	0.1496	0.0086	9.56	6.06
Q1 2007	Mean	27	0.2164*	0.1067**	0.1096	10.45**	8.06***	58	0.2835	0.1383	0.1453	9.63	6.15
	Median		0.1847	0.1140**	0.0935	10.41**	7.82***		0.2548	0.1486	0.0977	9.52	6.01
Q2	Mean	27	0.3253	0.1303	0.1950	10.29*	7.83***	58	0.3335	0.1427	0.1908	9.52	5.93
	Median		0.3332	0.1140**	0.1089	10.18**	7.27***		0.2525	0.1510	0.1325	9.51	5.85
Q3	Mean	27	0.3326	0.1064**	0.2262	10.80*	7.68***	58	0.2953	0.1444	0.1509	9.37	5.91
	Median		0.3010	0.1104**	0.1832	10.19**	7.30***		0.2608	0.1463	0.1028	9.25	5.94
Q4	Mean	27	0.2588	0.1062**	0.1526	10.05**	7.55***	59	0.2484	0.1559	0.0925	9.06	5.89
	Median		0.1856	0.1067**	0.0215	10.20**	7.11***		0.2128	0.1525	0.0150	9.15	5.93
Q1 2008	Mean	26	0.1522	0.1021*	0.0501	9.85**	7.52***	58	0.1732	0.1325	0.0407	9.04	5.79
	Median		0.1294	0.1059*	0.0047	9.94**	7.54***		0.1608	0.1469	0.0005	9.07	6.02
Q2	Mean	26	0.1226	0.0916*	0.0310	9.76	7.37***	58	0.1455	0.1251	0.0205	9.27	5.61
	Median		0.1122	0.0955*	0.0001	10.01	7.19***		0.1451	0.1360	0.0000	9.24	5.74
Q3	Mean	26	0.1096	0.0920	0.0175	9.70	7.24***	58	0.1215	0.1156	0.0059	9.37	5.54
	Median		0.1123	0.0944	0.0000	10.00	6.97***		0.1096	0.1096	0.0000	9.21	5.75
Q4	Mean	26	0.1024	0.0919	0.0105	9.64***	6.57**	59	0.1249	0.1223	0.0026	11.31	5.43
	Median		0.0949	0.0809	0.0000	9.96***	6.92*		0.1039	0.1036	0.0000	11.20	5.75

Sample includes all firms which could have applied for CPP funds beginning in 3Q 2008 which have all available data for the quarter.   The sample excludes Morgan Stanley and Goldman Sachs which were not organized as bank holding companies prior to 4Q 2008. CPP firms received capital infusions from the government in 2008 or 2009 while non-CPP firms did not. *Payout* is the sum of common dividends paid and all (program and employee compensation redemptions) share repurchases during the quarter divided by assets at the end of the prior quarter (Assets$_{q-1}$). *DIV* is common dividends paid during the quarter divided by Assets$_{q-1}$. *RP* is the value of common shares repurchased divided by Assets at the end of the prior quarter. *Total Payout*, *DIV*, and *RP* are expressed as percents (i.e. * 100). *Tier1$_q$* is the Tier 1 to risk-based assets as reported at the end of the quarter to banking regulatory authorities. *TCE$_q$* is tangible common equity divided by tangible assets as of the end of the quarter expressed as a percent.   ***, **, and * indicate a 0.01, 0.05, and 0.10 significance respectively of two sample test of means and the Wilcoxon sum rank tests of medians (two tail).

Table 6: Quarterly Bank Descriptive Statistics

Panel A: All Years 2004 - 2007

Variable	N	Full Sample Mean	Median	N	CPP Sample Mean	Median	N	"Other Mean	firms" Median
∆TCE Ratio	1441	-0.00879	-0.00239	1212	-0.00931	-0.00200	1126	-0.00652	-0.00028
TCE Ratio$_{q-1}$	1441	0.06800	0.06426	1212	0.06927	0.06471	1126	0.07090	0.06592
Size	1441	0.59455	0.55000	1212	0.58391	0.55000	1126	0.49702	0.50000
Div	1441	0.00128	0.00138	1212	0.00134	0.00141	1126	0.00119	0.00127
RP	1441	0.00111	0.00027	1212	0.00118	0.00038	1126	0.00100	0.00012
∆NPAT	1441	0.00030	0.00002	1212	0.00027	0.00002	1126	0.00034	0.00003
Loan Growth	1441	0.01900	0.01400	1212	0.01841	0.01355	1126	0.01953	0.01387
EBTP	1441	0.00488	0.00494	1212	0.00494	0.00500	1126	0.00465	0.00477
MB	1441	2.13265	2.00927	1212	2.15700	2.03233	1126	2.12894	2.00394

Panel B: Pearson Correlation Table of Full Sample (p values in parenthesis)

Variable	TCE$_{q-1}$	Size	Div	RP	∆NPAT	Loan Growth	EBTP	MB
∆TCE Ratio	0.1211 (0.000)	0.0072 (0.786)	0.0404 (0.125)	0.2441 (0.000)	0.0394 (0.135)	0.3798 (0.000)	0.0660 (0.012)	0.0216 (0.413)
TCE Ratio$_{q-1}$		-0.1841 (0.000)	-0.0260 (0.324)	0.1693 (0.000)	-0.0456 (0.083)	0.0976 (0.000)	0.0634 (0.016)	-0.0840 (0.001)
Size			0.3517 (0.000)	0.1252 (0.000)	-0.1260 (0.000)	-0.0502 (0.057)	0.3482 (0.000)	0.1729 (0.000)
Div				0.1330 (0.000)	-0.0648 (0.014)	-0.0555 (0.035)	0.3845 (0.000)	0.1693 (0.000)
RP					-0.0229 (0.385)	-0.0674 (0.011)	0.1616 (0.000)	0.0664 (0.012)
∆NPAT						-0.0180 (0.496)	-0.1894 (0.000)	-0.2108 (0.000)
Loan Growth							0.0350 (0.184)	0.0261 (0.321)
EBTP								0.4588 (0.000)

Full Sample includes all quarterly observations with all available information. *CPP Sample* includes all firms which were eligible to apply for CPP funds starting in October 2008 while *"Other Firms"* excludes the largest banks (*Size* ≥ 0.85).   ∆*TCE Ratio* is the percentage change in the tangible common equity ratio measured between the beginning and the end of the quarter, *q*. *TCE Ratio$_{q-1}$* is tangible common equity ratio reported at the end of the prior quarter. *Size* is measured as the Ken French break point related to the NYSE market percentile measured at the end of the prior quarter. *Div* is measured as common dividends paid during the quarter divided by total assets at the end of the prior quarter (Assets$_{q-1}$). *RP* are share repurchases made during the quarter divided by Assets$_{q-}$

$_1$. ∆*NPAT* is the percentage change in non-performing assets from the beginning to the end of the quarter. *Loan Growth* is the

percentage change in the ratio of net loans to total assets measured between the beginning to the end of the quarter. *EBTP* is quarterly pretax earnings before the provision for loan losses divided by average assets from the beginning to the end of the quarter. *MB* is the ratio of market value of equity to the book value of equity measured at the end of the prior quarter

Table 7: Analysis of Firm Payouts on Change in Tangible Common Equity Ratio

	Predicted Sign	Full Sample	CPP Sample	"Other" Firms
Intercept	±	0.0114	0.0160	0.0240
		(0.405)	(0.346)	(0.185)
TCE Ratio$_{q-1}$	-	-0.1777	-0.1891	-0.3196
		(0.082)	(0.085)	(0.011)
Size	-	-0.0081	-0.0131	0.0026
		(0.383)	(0.222)	(0.847)
Div	-	-8.0567	-8.1267	-9.0986
		(0.002)	(0.002)	(0.001)
RP	-	-10.9541	-9.5352	-9.2125
		(0.000)	(0.000)	(0.000)
ΔNPAT	-	-2.3123	-2.1677	-2.9797
		(0.096)	(0.158)	(0.025)
Loan Growth	-	-0.9164	-0.9526	-0.9597
		(0.000)	(0.000)	(0.000)
EBTP	+	6.4539	5.4533	6.0716
		(0.000)	(0.001)	(0.000)
MB	-	-0.0012	-0.0015	-0.0036
		(0.654)	(0.627)	(0.286)
Q1	±	-0.0026	0.0085	0.0055
		(0.406)	(0.104)	(0.312)
Q2	±	-0.0110	-0.0081	-0.0071
		(0.065)	(0.210)	(0.312)
Q3	±	0.0290	0.0303	0.0310
		(0.000)	(0.000)	(0.000)
2005	±	-0.0026	-0.0117	-0.0024
		(0.692)	(-0.15)	(0.778)
2006	±	0.0127	0.0147	0.0113
		(0.029)	(0.028)	(0.128)
2007	±	0.0019	0.0035	0.0018
		(0.762)	(0.633)	(0.819)
N		1441	1212	1126
Adj. R^2		0.2844	0.2801	0.2822

Full Sample includes all quarterly observations with all available information. *CPP Sample* includes all firms which were eligible to apply for CPP funds starting in October 2008 while *"Other Firms"* excludes the largest banks (*Size* ≥ 0.85). Δ*TCE Ratio* is percentage change in the tangible common equity ratio measured between the beginning and ending of quarter, *q. TCE Ratio*$_{q-1}$ is tangible common equity ratio reported at the end of the prior quarter. *Size* is measured as the Ken French break point related to the NYSE market percentile measured at the end of the prior quarter. *Div* is measured as common dividends paid during the quarter divided by total assets at the end of the

prior quarter (Assets$_{q-1}$). *RP* are share repurchases made during the quarter divided by Assets$_{q-1}$. *NPAT* is the percentage change in non-performing assets from the beginning to the end of the quarter. *Loan Growth* is the percentage change in the ratio of net loans to total assets measured between the beginning and the end of the quarter. *EBTP* is quarterly pretax earnings before the provision for loan losses divided by average assets from the beginning to the end of the quarter. *MB* is the ratio of market value of equity to book value of equity measured at the end of the prior quarter.   Newey and West adjusted   *p* values (to correct for serial correlation) reported in parentheses.