

## INTERACTIONS AMONG POPULATIONS AND EFFECTS ON FOUNDING RATES: THE CASE OF FINANCIAL INTERMEDIARY INSTITUTIONS IN TURKEY: 1986-2005

*POPÜLASYONLAR ARASI ETKİLEŞİMLER VE KURULMA ORANLARINA  
OLAN ETKİLERİ: TÜRKİYE'DEKİ ARACI KURUMLAR ÖRNEĞİ: 1986-2005*

Hakkı Okan YELOĞLU<sup>(1)</sup>, Abdulkadir VAROĞLU<sup>(2)</sup>

<sup>(1,2)</sup> Başkent Üniversitesi

<sup>(1)</sup> okany@baskent.edu.tr, <sup>(2)</sup> kvaroglu@baskent.edu.tr

**ABSTRACT:** In this study, the interactions among populations and the effects on founding rates are examined within the context of organizational ecology theory. Two populations, bank intermediary institutions and non-bank intermediary institutions, which perform the same activities in the financial market in Turkey, are selected. Each population's density, the amount of their financial activities and the different time periods are taken as independent variables and the effects of these variables on founding rates are tested empirically. The results show that the population of bank intermediary institutions has a dominant effect on the population of non-bank intermediary institutions.

**Keywords:** Organizational Ecology Theory; Interactions Among Populations; Financial Intermediary Institutions; Organizational Founding Rates

**JEL Classification:** G20; G21; L20

**ÖZET:** Çalışmada, popülasyonların etkileşimi ve kurulma oranlarına etkileri Örgütsel Ekoloji Kuramı bağlamında incelenmiştir. Bunun için, Türkiye sermaye piyasasında faaliyet gösteren banka kökenli olan ve olmayan aracı kurumlar seçilmiştir. Her popülasyonun yoğunluğu, finansal faaliyetlerin büyüklüğü ve farklı zaman dilimleri bağımsız değişken olarak ele alınmış ve kurulma oranlarına olan etkileri görgül olarak test edilmiştir. Sonuçlar, banka kökenli aracı kurumların banka kökenli olmayan aracı kurumlara baskın bir etkisinin olduğunu göstermiştir.

**Anahtar Kelimeler:** Örgütsel Ekoloji Kuramı; Popülasyonlar Arası Etkileşimler; Finansal Aracı Kurumlar; Örgütsel Kurulma Oranları

### 1. Introduction

The interactions of populations is a major and critical research area in Organizational Ecology Theory since one population's vital events may depend on the dynamics of other populations. The examination of interactions is still open to debate in the theoretical context. One dimension of the debate focuses on the characteristics of organizations in populations and the others are based on the interactions among the organizations and/or populations which constitute the main topic of this paper. Theoretically, the interactions of populations can evolve out of two important processes, those of legitimation and competition. These processes can be explained through and supported by the density dependence theory in ecology literature. The arguments about the interactions and their complexity levels caused by competition and legitimation processes lead to new discussions and problematic within the Organizational Ecology Theory context. Organizational Ecology Theory is accepted,

by organizational theorists, as a macro organization theory in which the historical, political, and economic factors can affect not only one single organization but also the whole population (Astley and Fombrun, 1983). When these factors affect more than one population in a community, interactions among populations begin to emerge.

In this paper, we examine how the interactions between two populations may affect the founding rate. In order to identify and explain the interactions and their effects on the founding rate, we selected populations of financial intermediaries from Turkey. Basically, there are two different intermediary populations; the first is the population of bank intermediaries and the second is the population of non-bank intermediaries. These two populations have existed in the financial environment of Turkey since 1986, the year in which the Istanbul Stock Exchange was founded. The organizational forms of these two intermediaries differ from each other in that the former is owned by their own banks and the latter by individuals. They perform similar activities in the financial environment and this means that they use the same resources as individuals and organizations in order to survive.

This paper is organized as follows: First, we define organizational founding and density dependent theory in order to explain the interactions and to develop some hypotheses which are necessary for an empirical research. Second, we give some brief information about the financial intermediaries (such as their development in history, characteristics, ownership structures and their activities) in Turkey. Third, the methodology section describes the dataset, the variables we analyze, and the analytical technique for empirical modeling. Finally, we discuss the results and outline some implications. To conclude, we summarize and address some shortcomings of the study.

## **2. Organizational Founding**

One of the main problems in Organizational Ecology Theory is how social, economic and political conditions can affect the rate and the directions of foundings (Lomi 1995a:75-78). Another important issue within the theory is the question of how the observed demographic characteristics of organizations, how or in which ways the density, distribution of the resources, legitimation, competition and mutualism can affect the rate of foundings. While different definitions for the term “organizational founding” exist in the literature, “founding” can be defined as the entering of an organization into a new population, its beginning to operate or, simply, its being born in a new population. This explanation yields different views. For example, the founding of a new organization may initiate a new form, and, qualitatively, it contributes to the diversity of organizations in the society (Hannan and Freeman, 1987). The literature on founding rates of populations argues that there is an inverted-U relation between the density and the founding rate (Lomi 1995b; Hannan and Freeman 1987:912, 916-917; Messelam, 1998). That is to say, as density increases, the rate of founding increases, but when density reaches a certain point, it begins to decrease due to different mechanisms. The decrease in density, in turn, decreases the rate of founding. It is also argued that the different environments (such as geographical environments), the dynamics of populations, local resources, and legitimation and competition processes can affect the density and rate of foundings (Lomi, 1995b). The demands and levels of reaching resources can also affect the density, and the levels and patterns of interactions of populations.

### 3. Interactions Among Populations

There is a great number of research which focuses on interactions and their effect on the rates. In ecology theory, there are few studies about the interactions among populations since it is difficult to define those interactions and since their complexity and ambiguity levels are high (Aldrich, 1999). Due to the unpredictability of interactions caused by the competition and the degree of mutualism, the studies and interpretations about interactions among the populations remain unclear (Barnett and Carroll 1987:402; Baum 1996:93). On the other hand, studies trying to explain the interactions focus on how those interactions affect the founding rate. The effect can be explained in different ways. When two or more populations interact, the number of organizations that enter or exit the populations begins to change, and so do densities. As it will be observed in time, there will be increases and decreases in the founding rates of organizational populations. These arguments have been thoroughly and empirically tested in literature.

One of the reasons, the founding rate, -whether increasing or decreasing- is the power of the interactions, while the other is the direction of those interactions. Firstly, the interactions assign the interdependence of the populations. This feature can change due to density and the dynamics of the population itself, the forms in which organizations exist in populations and the amount of sources that organizations share (Staber, 1992). Secondly, different forms of organizations existing in different populations can regulate the interdependence level in horizontal and vertical ways. Additionally, this dependence varies in terms of management dependence, geographical dependence, and state dependence, in a complex structure. The interdependence which is caused by the interactions of populations can be investigated and explained by the legitimation process, as well as the competition process. Evaluating these processes together helps us explain the consequences of interactions more thoroughly (Hannan and Carroll, 1992; Ranger-Moore et al 1991; Hannan and Freeman 1987 and 1988). As new organizations are founded, they initially affect the density. When a population's density increases, the competition process begins, and weak organizations begin to exit the population (or they die). Decreasing density will have a negative effect on the founding rate, while affecting the mortality rate positively. The density of two interacting populations will have effects on the founding rate of each population. The first level of each population's density effect will cause an increase in the founding rates. The second level of each population's density effect will cause a decrease in the founding rates of each population. Thus there will be an inverted-U relation between densities of populations and their founding rates.

The organizational forms having different cognitive legitimacy levels in different populations can have different interaction patterns. If one population's evolution is older than that of the other population in the historical context, the level of their interdependence will differ. Besides, when an organizational form's cognitive legitimacy level in a population is high, this form is accepted as taken for granted in the social environment. This may indicate the point that early increases in density legitimate the organizational form itself, encouraging foundings (Baum and Singh, 1994). Thus, the population with the organizational form of high cognitive legitimacy interacts with the new organizational forms having low level cognitive legitimacy, and, consequently, that population will have a dominant effect on the new population. The populations with high cognitive legitimacy level organizational

forms tend to use the same resources in the same environment more efficiently than the new population. Therefore, the new population with low cognitive legitimacy level organizational forms will have a greater risk of surviving and this will cause pressure on them. As a result of this pressure, when density of the population with organizational forms having high level cognitive legitimacy increases, the founding rate will decrease in the population with organizational forms having low level cognitive legitimacy. Thus,

*Proposition 1: As the density increases in the population having organizational forms with high level cognitive legitimacy, the founding rate will decrease in the population having organizational forms with low level cognitive legitimacy.*

### **3.1. Availability of Resources**

The characteristics of organizations are significant for the definitions of populations and communities. This significance emphasizes the survival of the organizations, and interactions with the other organizations in different populations. Moreover, availability of resources is important for interactions and occurrence of interdependence (Freeman and Hannan 1983:1188). In this context, the fundamental definition is that of the niche, which denotes the “set of resources with which an organization or population can survive”; and niche width is defined as “the dimensions and width of resources in populations” (Carroll 1985:1266). As the organizations operate in a single industry, they may operate in different industries. In a new population, an increase in the organizational forms having low level cognitive legitimation yields the following; in order to survive, such forms will start to use resources more and compete with other organizations and populations. This causes a decrease in the founding rate of organizational forms of a population having high level cognitive legitimation which interacts with the populations. Organizations having low level cognitive legitimation tend to use the resources aggressively in order to survive and to compete with the other population. As a result of the competition, population density decreases and this causes a negative effect on the founding rate. Thus,

*Proposition 2: The greater the volume of the available resources, the lower the founding rate of the population having organizational forms with high level cognitive legitimation that focus on those resources.*

### **3.2. Environmental Changes**

Environmental changes are important in explaining the interactions of populations with legitimation and competition processes. The effects of institutional and regulative environments on populations have also been considered in numerous studies by several authors. For example, Carroll and Delacroix (1982) and Carroll and Huo (1986) state that political turmoil may increase or decrease founding or mortality rates. In addition, Clegg and Orsatto (1999:275) argue that political environments are dominant factors for populations and that organizational forms are formalized by the laws, regularities, and normative pressures in order to survive. Dobrev (2001) also claims that political and social environments are important for populations; and, additionally, that sociological and political factors legitimize the organizational forms in their evolutionary processes. He also stresses that while political turmoil forces organizational founding, institutionalized political decisions have positive effects.

The arguments of the authors on the organizational founding in the environmental context point to the uncertainty and complexity levels of the environments. The fluctuations in the environments may have negative or positive effects on the founding rate. These fluctuations may evolve in different time periods and may increase or decrease, directly or indirectly, the density and carrying capacity. To illustrate, turbulence in an environment that occurs independently of the population can show its effects in a long time period (Emery and Trist, 1965). With the turbulence effect, the stability or the instable fluctuations of the environment causes differences in the founding rates (Swaminathan 1995:655). Regulative and political actors of the state, as well as the state itself may cause environmental fluctuations and turbulence. When the environment becomes more complex and unstable, entries to populations will be less. Therefore, the founding rate at different time periods will decrease or increase due to differences in environments.

*Proposition 3: In evolutionary processes, the occurrence of turbulence will have a negative effect on the founding rate in different time periods.*

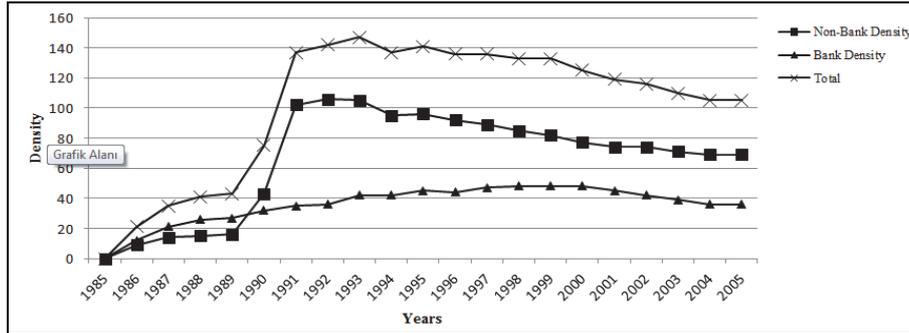
#### **4. Financial Intermediaries in the Turkish Capital Market**

In 1986, with the establishment of Istanbul Stock Exchange (ISE), transactions and activities of financial actors have begun and they have been embedded in the financial environment. Banks have also continued the activities of buying and selling stocks in the exchange market. At the same time, new organizational forms which have been founded and owned by individual owners called “non-bank intermediary institutions” have started their activities in ISE. This new type of organizational form has been founded gradually in years and has existed alongside the banks as intermediaries in the stock exchange market.

There was a significant action in the capital markets in 1985, and bank and non-bank intermediaries were founded for the aim of creating a network among buyers and sellers and executing the activities of an intermediary institution. The banks had performed all financial activities until 1997. After 1997, however, either the banks’ intermediaries were founded immediately in accordance with the law or they were forced to buy an intermediary institution to make transactions among investors. The densities of both populations have changed continuously because of the founding or closing of bank and non-bank intermediaries. In the late 1980s especially, the proliferation of intermediaries was seen more clearly. This proliferation continued in the early 1990s, but in the early years of 2000, this pattern changed and was replaced by fluctuations caused by different reasons in Turkey. A time series plot of population of bank and non-bank intermediaries can be seen in Figure 1. The line with the cross signs represents the community of intermediaries; the line with the square dots represents the density of non-bank intermediaries, and lines with the rectangular dots represent the density of bank intermediaries in Turkey.

Figure 1 indicates the patterns. The first pattern is the proliferation of intermediaries in the years from 1989 to 1991, and the other is the closing of intermediaries as of 1998. The reasons for these patterns can be investigated through different sources. According to the reports of Capital Markets Board of Turkey, the reason for the proliferation of intermediaries in the early 1990s is identified as the attraction of capital markets as new investment areas and increase in the sales of stocks and

bonds (Yeloğlu, 2007). As Taşkıran (1991) notes, the need of intermediaries to have a greater share in the market and the expanding volume of the exchange market are taken as indicative of the proliferation of intermediaries. Furthermore, in 1990, while the bankers were making transactions in the exchange markets, they were forced by the legal laws to found an intermediary institution in the country. This caused an increase in the density of intermediary institution populations.



**Figure 1. Population of Intermediaries in Turkey (1986-2005)**  
Source: Yeloğlu (2007:55)

Bank and non-bank intermediaries that operate in the capital markets have gained major importance with the foundation of the Istanbul Stock Exchange. Between the years 1986 and 1996, banks and non-bank intermediaries made the transactions among buyers and sellers, but after 1996, banks had to found or buy an intermediary institution to make transactions in the capital markets. This has created an advantage for bank intermediaries, having high level of cognitive legitimation, over non-bank intermediaries. Furthermore, it was the normative action of the Capital Markets Board of Turkey to confer the banks with the right to regulate and inspect the behaviors of their intermediaries. This separation is indicated in the law of the capital market. In the related clause, intermediaries are defined as the intermediary institutions and the banks. As a result, populations of bank intermediaries and non-bank intermediaries evolved separately and began to interact in the community.

In Turkey, the revenues of financial intermediaries are classified in two categories. The first is the income from the sales of financial tools which they sell in the name of themselves and their accounts. The second, as different from the first, is the revenues from the sales of financial tools which they sell in the name of investors and their accounts. Intermediaries also get profit from the activities of consulting in the merging of organizations, and consulting services provided to local and foreign investors. According to the Law of Capital Markets, they have to be established as incorporations (İnceoğlu 2004: 59); all of the bonds must be written in the name of investors; contracts must be in accordance with the law of the capital market, and the owners of the intermediaries must not be convicted with an infamous crime. To protect the investors' rights and to pay the capital and the interest of money back to investors, intermediaries have to be authorized by the Ministry of Finance (Ünal 1997).

There are three actors for intermediaries as a new regulative and normative environment. The first to be acknowledged is the Capital Markets Board of Turkey

(Sermaye Piyasası Kurulu) which was founded in 1981; the second one is the Istanbul Stock Exchange which was founded in 1985 to provide the selling and buying of financial instruments as stocks and bonds, and the last is the Association of Capital Market Intermediary Institutions of Turkey (Türkiye Sermaye Piyasası Aracı Kuruluşlar Birliği) which was founded in 2001. These three institutions also create an institutional environment for these two populations because they have normative and coercive effects. Furthermore, these three institutions interact with each other because each institution has its own properties and they may act together to regulate the markets. As they interact, intermediaries interact with them vertically and horizontally. Their behaviors in populations can create interdependence because their survival depends on not only the other organizations in other populations but on the dynamics of the environment. In this framework, it is possible to say that these interaction patterns can affect population dynamics, as well as the founding rates of bank and non-bank intermediaries. The interacting population of intermediaries in the capital markets can be explored from the foundation of Istanbul Stock Exchange in 1986 to recent years. In this study, we explore the interactions of populations from 1986 to 2005 and time intervals are organized according to the crises in Turkey. The crises in Turkey stemmed from various different reasons. Instability in the banking system, credits withdrawn from foreign countries, fluctuations in the exchange rates, deficient structures of deposit accounts of banks, and political issues prepared the starting point for both crises of 1994 and 2001.

## 5. Method

### 5.1. Data and Measures

In defining the birth or death of an organization, an “event” has importance in ecological studies. The other important thing is the occurrence of births in time. To explain these situations, events history analysis is widely used in literature. The critical issue in event history analysis is the dependent variable of the study. The dependent variable can be taken as a time interval or duration of occurring events. It is also important how and in which way independent variables can affect the dependent variable, as the independent variables taken by the studies can show differences in different time intervals and thus, these independent variables can be accepted as time dependent covariates (Hobcraft and Murphy 1986, 8-9). What is of primary concern in this study is to find out whether an intermediary institution is a bank or non-bank intermediary institution. To solve this problem, we analyzed the ownership structure of the intermediaries and categorized them accordingly. As such, if an intermediary institution is owned by a bank, it is named as a bank intermediary; if an intermediary institution is owned by an individual or a group it is named as a non-bank intermediary. Hence, two populations are created for the study.

The primary and secondary data are, then, added into the analyses. The data consist of the founding of intermediaries and densities per year, the volume of stocks and bonds, and the time and intervals as dummy variables. The findings are not sensitive to the definition of the time periods. As the periods change, the results can differ according to these changes. The annual sales of stocks and bonds of intermediaries are collected and accepted as independent variables. The data are also cleared from the impact of inflation because of the high inflation rate that exists in Turkey. This intervention has made the data clearer and has helped the building of models correctly.

## 5.2. Dependent Variable

Taking population as the unit of analysis, the dependent variable focuses on the members entering the population. Additionally, an organizational founding process is considered as an instance of the arrival process for the population (Hannan 1989). The arrival process characterizes the stochastic behavior of the flow of arrivals into the system, such as a population. If the cumulative number of arrivals in a population by time,  $t$  is represented by the random variable  $Y(t)$  and the time of the  $i$ th arrival by  $T_i$ . The founding process is  $\{Y(t) | t \geq 0\}$ , with the state space equal to  $\{0, 1, 2, \dots\}$ . The founding rate as an independent variable, the rate of arrival at state  $y + 1$  at time  $t$ , can be defined as

$$\lambda_y(t) = \lim_{\Delta t \downarrow 0} \frac{\Pr[Y(t + \Delta t) - Y(t) = 1 | Y(t) = y]}{\Delta t}$$

In Organizational Ecology theory, research on arrival processes focuses on parameterization of the arrival rate as a function of observations. Generally, most of the applications use a parameterization that is log-linear in parameters, such as

$$\lambda_i(x_i) = \exp(x_i' \pi), \quad (1)$$

where  $x_i$  is the vector of observed covariates. This approach is widely used in the literature (Cefls and Marsili 2005; Sorensen and Stuart 2000; Miner 1991; Moraita, Lee and Munday 1993) to investigate how independent variables affect the founding rate. As mentioned earlier, in gathering the archival records of interarrival times, we used TDA (Transition Data Analysis) program to analyze the data and to interpret the models, and we used the likelihood ratio tests to compare the models. The test statistic is two times that of the difference of the models' log-likelihoods. This statistic is used to explain the significance of the models (Blossfeld and Rohwer 1995).

## 5.3. Independent Variables

### 5.3.1. Densities of Bank and Non-Bank Intermediaries

All of the intermediaries (the banks and non-banks) are included in the study. As such, the point of focus is on the whole community of intermediaries, instead of a regular sample. The intermediaries are not classified according to their geographical locations, the branches in which they operate or other such criteria. Each of the densities is taken as an independent variable. We have also taken the natural logarithms of the densities to eliminate the extreme points and make the data more stationary.

### 5.3.2. Prior Foundings

Prior foundings have been described as the total number of foundings that are founded in the previous years. In this study, prior foundings are taken in one year lag and accepted as independent variables. The prior foundings of bank and non-bank intermediaries are expected to have an effect on densities and also on the founding rates of organizations. It has been assumed that there is a curvilinear relation between prior foundings and the founding rate.

### 5.3.3. Change in the Sales of Stocks, Bonds and Treasury Bonds

Selling stocks, bonds and treasury bonds fall within the main working area of bank and non-bank intermediaries. Intermediaries get commissions from the stocks they sell to investors. The total amount of sales of stocks per year is obtained from the related sources. Instead of dealing with the actual amounts, the percentage of change in the sales of the financial instruments per year has been dealt with.

### 5.3.4. Time Periods

The time periods are chosen according to the financial crises in Turkey. The first time period starts with 1986, which marks the founding of the Istanbul Stock Exchange, and lasts until 1990. The second time period is from 1990 to the year before the first financial crisis. The third period relates to the period from 1994 to 2000. The final period is from 2001, when the second crisis occurred in the country, to 2005. These time periods are coded as dummy variables and analyzed in the models. The interaction patterns of bank and non-bank intermediaries are investigated according to these periods, in which the baseline period is the years from 1986 to 1990.

## 6. Models and Estimations

Table 1 shows the correlations. Some correlations seem to be high but tests of adding or dropping one or more variables at a time show no harmful effects on the high correlations. Generally, independent variables are not highly correlated, and for that reason they were included in the models in a hierarchical way.

Table 2 shows the coefficient estimates, standard errors, and tests for significance of each variable. In the models, we follow a two-fold approach. The first approach explores the density dependence approach in which the dynamics of populations affect the founding rate of organizations at the first level (legitimation process). The second approach explores the effects of population dynamics on the founding rate at the second level (competition process). Natural logarithms of densities of populations are taken into account in order to avoid the volatilities and extreme values. This approach is used to find the first level of effects. This type of approach is used in some studies in the literature (such as in Carroll and Hannan, 2000).

Models in Table 2 are estimated to explain the effects of independent variables on the founding rate, which are discussed and hypothesized early in the paper. We followed a stepwise method to find the decreasing or increasing effects of independent variables on the founding rates. In model 1, the absence of the inverted-U relationship between the density of non-bank intermediaries and the founding rate is examined. The significance of the first level (density of the non-bank intermediaries) and the second level (the square of the density of the non-bank intermediaries) effects are tested in the model. According to the results, it can be concluded that the first effect of the density has an increasing effect and the second effect of the density has a decreasing effect on the founding rate of non-bank intermediaries. These effects are also statistically significant.

Since non-bank intermediaries are accepted as having low level cognitive legitimacy, these results are expected with the support of the density dependent theory. When non-bank intermediaries begin to gain cognitive legitimation, there appears a growth in their number and it causes an increase in their own population.

This also increases the founding rate of non-bank intermediaries. With the competition process, the density begins to decrease and it has a negative effect on the rate of non-bank intermediaries. These findings are in accordance with the basic arguments of density dependent and organizational ecology theory.

**Table 1. Correlations**

	Ln (NBID)	NBID <sup>2</sup>	Ln (BID)	PF NBI	PFNBI <sup>2</sup>	ST SALES	BNT BSALES	1990-1993	1994-2000	2001-2005
Ln (NBID)	1									
NBID <sup>2</sup>	.695(**)	1								
Ln (BID)	.906(**)	.402(**)	1							
PFNBI	.353(**)	.650(**)	.155	1						
PFNBI <sup>2</sup>	.265(**)	.515(**)	.099	.962(**)	1					
ST SALES	.473(**)	.190(*)	.321(**)	.254(**)	.228(**)	1				
BNT BSALES	.243(**)	.309(**)	.194(*)	-.057	-.066	-.297(**)	1			
1990-1993	.142	.097	.106	-.063	-.051	-.215(**)	-.055	1		
1994-2000	-.151	-.567(**)	.188(*)	-.347(**)	-.275(**)	-.018	-.274(**)	-.222(**)	1	
2001-2005	-.064	-.184(*)	.084	-.065	-.087	-.117	-.028	-.059	.016	1

\*Correlation is significant at the 0.05 level, \*\*Correlation is significant at the 0.01 level

The models 2, 3 and 4, which follow Model 1, test the relationship between the first and the second levels of prior foundings and the founding rate of non-bank intermediaries. When these three models are evaluated together, we can say that the first and second levels of prior foundings of non-bank intermediaries do not have any significant effect on the founding rate of non-bank intermediaries. These variables are tested in other models, yet they still do not display any significant effects. Consequently they are excluded from the models in Table 2. These results show that the argument of density dependent theory about prior foundings and the founding rates is not valid for non-bank intermediaries. The reasons of these findings may differ in some ways. For example, the deaths of non-bank intermediaries may have an effect on the founding rate. However, in this study it was not possible to find the exact date of closings of intermediaries. We could not find the exact number of closings per year in each intermediary institution population, either. The other reason is about the data gathered from one year lag of foundings. If the lags were taken for more than one year, these would change the results because they would affect the density of intermediaries to begin with.

The fifth model (Model 5) aims to test the interactions of non-bank intermediary institution and bank intermediary institution populations, and their effects on the founding rates. This model is also built for the purpose of testing the hypothesis suggested in the related discussions of the paper. In Model 5, the first and second levels of densities of non-bank intermediaries are entered. Furthermore, the first effect of the density of bank intermediaries is added to the model. According to the results obtained from Model 5, the first level of bank intermediary institution density has a negative effect on the founding rate of non-bank intermediaries. This can be observed through the significance of coefficient of the density of the bank intermediary institution population. In other words, as the density of bank intermediaries which have high cognitive legitimation level increases, the founding rate of non-bank intermediaries which have low level cognitive legitimation decreases. This result also supports Proposition 1, suggested by the arguments of the paper. In the other models, the first and second level effects of the non-bank intermediary institution density, the first level of the bank intermediary institution

density, and other independent variables are entered and interpreted in conjunction in the following models.

In Models 6 and 7, the percentage of change in total sales of bonds, stocks and treasury bills of all intermediaries are included. The effect of the percentage of change in total sales of bonds on the founding rate of non-bank intermediaries is examined in Model 6. In addition, the effect of the percentage of change in total sales of bonds and treasury bills is added to Model 7. Models 6 and 7 are examined separately. The reason for this is the probability of multicollinearity among independent variables. To avoid this problem, these independent variables are analyzed separately in the models. The significance of the (change in the total sales of) bonds on the founding rate is analyzed in Model 6. According to the results, it is evident that there is a positive relationship between the change in the sales of bonds and the founding rate.

As the sales of bonds expand, it has a positive effect on the founding rate of non-bank intermediaries. The sales of bonds are one of the main income sources for the intermediaries because these intermediaries get commissions from the sales. More importantly, the sales also constitute a niche width for both populations. This niche width is an opportunity for intermediaries to survive financially. On the other hand, while the existing intermediaries use the niche, new intermediaries begin to be founded, taking the advantage of being in the population in time, and these foundings increase the density of intermediaries. In model 7, whether the percentage of changes in the sales of stocks and treasury bills has an effect on the founding rate of non-bank intermediaries is tested. It is realized that these two variables have no significant effect on the founding rate. This result can be seen from the significance of the coefficients of these variables in the models. In other simulated models, the same results were obtained, and for this reason, they are not evaluated separately in the study.

Model 8 and Model 9 are constructed to measure the increasing or decreasing effect of time periods on the founding rate of non-bank intermediaries. In these models, the first and second effect of non-bank intermediaries' density and the first effect of bank intermediary institutions' density are added. The variables of niche width are not entered in these models. In model 8, three time periods are added to the model. According to the results, the specified 1990-1993 time period has no significant effect on the founding rate, while 1994-2000 and 2001-2005 time periods display a decreasing effect. Through the obtained results, it becomes evident that the 1990-1993 period makes the first effect of bank intermediaries' density insignificant. Therefore, a new model is estimated by excluding the variable 1990-1993. When the other time periods are entered into Model 9 (1994-2000 and 2001-2005), the decreasing effect on the founding rate is determined. These results can be interpreted as the negative effects of the two financial crises that the country went through.

According to all of these results obtained from the estimated models, it can be said that while the first effect of bank intermediary institution density, 1994-2000 and 2001-2005 time periods, decreased the founding rate of non-bank intermediaries, the change in the percentage of bonds increased the founding rate. Therefore, hypotheses 2 and 3 are partially supported, while hypothesis 1 is supported by the results of the models.

**Table 2. Partial Likelihood Estimates of Non-Bank Intermediaries**

	Model 1	Model 2	Model 3	Model 4	Model5	Model 6	Model 7	Model 8	Model 9
(Ln) Non-Bank Intermediaries Density	0.2367**	0.2479**	0.2481**	0.2475**	0.8910***	1.0242***	0.8746***	0.4497	0.6081**
Ln(NBID)	(0.1166)	(0.1183)	(0.1182)	(0.1185)	(0.2137)	(0.2261)	(0.2144)	(0.4309)	(0.2324)
Non-Bank Intermediaries Density <sup>2</sup>	-0.0112**	-0.0131**	-0.0126**	-0.0132**	-0.0104**	0.0021	-0.0108**	-0.0085**	-0.0089**
NBID2	(0.0036)	(0.0042)	(0.0040)	(0.0044)	(0.0035)	(0.0048)	(0.0036)	(0.0035)	(0.0034)
(Ln) Bank Intermediaries Density					-0.9502**	-1.4613***	-0.9233**	-0.3877	-0.5452*
Ln(BID)					(0.2657)	(0.3196)	(0.2683)	(0.4655)	(0.2955)
Prior Foundings (Non-Bank Intermediaries)		0.0079		0.0099					
PFNBI		(0.0087)		(0.0295)					
Prior Foundings <sup>2</sup> (Non-Bank Intermediaries)			0.1133	-0.0308					
PFNBI <sup>2</sup>			(0.1322)	(0.4508)					
Change in Stock Sales (Percentage)						0.0007**			
STSALES						(0.0002)			
Change in Bonds and Treasury Bills Sales (Percentage)							0.0000		
BNTBSALES							(0.0001)		
Before Crisis I Time Period								0.1702	
1990-1993								(0.3897)	
After Crisis I Time Period								-0.6907	-0.7278*
1994-2000								(0.4342)	(0.4242)
After Crisis II Time Period								-1.9300**	-1.9147**
2001-2005								(0.7652)	(0.7642)
Number of Events	145	145	145	145	145	145	145	145	145
Number of Spells	155	155	155	155	155	155	155	155	155
Degree of Freedom (d.f.)	2	3	3	4	3	4	4	6	5
-2LL/s.d.	5.3182**	3.8082**	3.7731**	2.8573***	8.1380***	10.0388***	6.1903***	5.8582***	6.9906***

\*p<0.10, \*\*p<0.05, \*\*\*p<0.01

+ Standard errors are in parentheses

## 7. Concluding Remarks

One of the main findings of this study is the interaction patterns and the level of interdependence between the two populations. According to the results obtained from the empirical models, the interdependence results from the interactions caused by *partial competition* between populations of bank and non-bank intermediary institutions. With the density of each population, change in the percentage of total sales of bonds, stocks and treasury bills, and different time periods representing the crisis times are taken as explanatory variables to examine the effects on the founding rate of non-bank intermediaries. Furthermore the overall results show that a growth in the density of a population can be dominant over the other population. This domination negatively affects the founding rate of the dominated population. The other reason for the negative effect is the high level cognitive legitimation of the organizational form in the dominant population. The bank intermediaries are owned by their own banks, and their cognitive legitimation level can be accepted as high as the banks.

The institutionalized structure of banks makes their intermediaries high legitimate organizational form. Because the non-bank intermediary institutions are owned by individuals and they have begun their activities after 1986, their organizational forms have become known sooner than those of the banks. This causes a disadvantage for non-bank intermediaries in the financial market. They begin to compete with bank intermediary institutions while trying to make their form more legitimate cognitively. On the other hand, bank intermediary institutions have an advantage that cannot be ignored. This privilege is the chance for the bank intermediaries' decisions to be dependent on their banks. Bank intermediaries continue their activities depending on their banks' decisions even if they do not profit from the transactions they make in the financial market. Nevertheless, non-bank intermediaries may not have this privilege because of their ownership structure. As they continuously lose money, owners of non-bank intermediaries can decide to close these intermediary institutions in a certain time period. This problem may affect the interaction patterns because the power of the banks and their intermediaries creates dominance over non-bank intermediaries. This is the major implication for this study to explain the overall process.

A final finding in this study is that the interactions among populations may not be caused only by the population dynamics but also by the environmental effects. The normative effects of the regulative actors surrounding the intermediary community mean that the intermediary institutions are subject to the rules of the financial environment. This dependency has a dominating effect on interactions because the regulations of the normative actors play a crucial role in the historical context which is discussed in the early part of the paper. Moreover, the paper emphasizes that the two financial crises which occurred in 1994 and 2001 had negative effects both on the founding rates and on the other economical dynamics of the country.

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