LENGTH OF RECOVERY PERIODS ON NON- PERFORMING LOANS

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I certify that this thesis satisfies all the requirements as a thesis for the degree of Master of Science.

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

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ABSTRACT

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The academic environment focused on credit risk mostly on the corporate bond market basis for estimating losses in the event of default. No further analysis could be prepared as bank loans are private instruments and almost no data on defaulted loan losses are publicly available. The contribution of this paper is to question and explain the recovery period of the non-performing loans (NPLs) on which interest is overdue and even the full collection of principal is uncertain. It includes a unique set of micro-data on NPLs of a Turkish bank. The empirical results relate to the timing of recoveries on NPLs, the effect of collateral and capital amount on the length of the recovery period, the effect of collateral and capital amount rate and the intention of the debtors and utilization of their legal rights for lengthening the recovery period.

To My Parents

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1. Introduction

Whereas the estimates of the probability of default for borrowers have been intensely analyzed during the past few decades, the estimate of recovery rates has become the focus of the subject in academic literature. Most methodologies involve the prediction of three parameters:

- the probability of default on individual loans or pools of transactions,
- the estimate of the losses-given-default (LGD),
- the correlation across defaults

(Crouhy et al., 2000 ; Duffie and Singleton, 2003).

It is possible to calculate market-recovery rates – the payback quotas of the borrower - which can be acquired either at the moment of the default event or after a determined period following the default event as a measure of the actual market price and the nominal value. Even though several empirical academic researches have studied credit risk on corporate bonds, very few researches have been practiced to bank loans, as bank loans are private instruments, few data are publicly available.

The contribution of this paper is to question and explain the length of recovery period - is the time difference between the date when the debt is due as a defaulted loan and the liquidation of the debt - of the non-performing loans (NPLs) on which interest is overdue and even the full collection of principal is uncertain. It provides detailed information about the types of collateral and its importance. It provides a methodology to understand the instincts of recovering the defaulted loan and how the recovery period changes as the intention of debtors repaying attitude change. It includes a unique set of micro-data on NPLs over the period 2009- 2012. The data were provided by one of the largest private banks in Turkey. The

utilization of data from a specific bank is a limitation, but it is a big step in our comprehending the determinants of the recovery of defaulted loans.

In terms of contribution to the literature, this is the first study in Turkey that applies detailed investigation of the recovery period of defaulted bank loans, to analyze the timing of recoveries on NPLs, to test empirically the determinants such as collateral and the market value of collateral- on the basics that the market value of the collateral is above the debtor's principal or not- and the intention of the debtors and utilization of their legal rights for lengthening the recovery period. Further analysis in included to examine whether rate of the market value of the collateral and the amount of capital debt affects the outcome.

In brief, empirical evidence on the determinants of the NPL recovery needs to be collected by banks and their supervisors to evaluate the determinants and manipulate debtors' attitudes accordingly. For a bank manager, the shortest/ quickest time period to liquidate its principal is the main focus on NPLs. Within the scope of global crisis taking place 3 times per decade, the NPL ratios of banks tend to increase and professionals need to focus on such determinants as these determinants will also influence the credit allocation. In addition, Banking Regulation and Supervision Agency (BRSA) applies a provision policy for NPLs in Turkey. The banks should deposit a portion of the principal that is defaulted to the Central Bank Republic of Turkey (CBRT) - according to the length of the unrecovered loan and its collateral. In order to utilize its equity effectively the bank should recover its principal of the defaulted loan and utilize both the principal and the provision deposit for funding.

The first aim of this empirical study is to gain insights into what could be the determinants of recovering NPLs. It is the first academic research on *NPLs recovery period* at a large Turkish bank. Moreover very little research actually exists for continental Europe.

The paper is structured as follows. In Section 2, it is argued that bank loans significantly have different characteristics when compared to corporate bonds. In order to complement existing studies on corporate bonds specific studies on bank loans should be practiced. A summary of the literature follows. The influencing factors and treatment of recovery rates are also covered in this section. Furthermore the theory of games and economic behavior is discussed in Section 2 as the intention of others may change the rules of the game and the aspects of the recovery period as the concern of the research is the length of period not the rate of recovery.

The remainder of this paper is organized starting with a macro point of view about the NPLs and its importance. The section continues with the definition, importance and types of collateral used by the Turkish Banking sector are put in order in details. It is argued that market value of the collateral determine whether the principal can be recovered as a whole or partially. The section provides detailed information about the rights of the debtor to appeal to the court/ to object to the reports organized via Executive Offices according to *Republic of Turkey's Execution and Bankruptcy Law, No: 6352* that is in practice until May 5th, 2012. Even the new law includes some niches for the debtors to use against the creditor- that is the bank itself in our case. The data and the hypotheses are briefly explained in Section 4. In addition, in Section 5, a statistical regression analysis of the determinants of the recovery period's length is developed with graphical and algebraic explanations. Section 6 concludes the paper.

2. Literature Overview

The first aim of this empirical study is to seek answers for what could be the determinants of recovering NPLs. Moreover very little research actually exists for continental Europe. Although many studies have been practiced about the recovery rate and its determinants no further analysis is kept about the length of the recovery period in the literature.

Literature investigating recovery rates of loans initially studies analyzing the level of and important influencing factors on the recovery rate. These factors are summarized and statistical models of international rating agencies used to predict recovery rates of loans are specified below.

Altman (1989) studied mortality rates on US corporate bonds. This was followed by broad empirical literature on credit risk in the bond market (see, for instance, Nickell et al., 2000, or Acharya et al., 2003a). In contrast to bonds, only a few empirical studies concerning recovery rates of loans are practiced as loans are not tradable and problems with data discretion occur. All the studies considered that empirical studies that analyze the recovery rate at the time of default. The data of these studies are mainly with a small sample size and including only the US banking system. Normally, only mean values and quantiles are calculated and sometimes questions arise about the determinants in these samples. In view of this extensive literature, a need to justify a research on recovery on bank loans took place. Several arguments are proposed. The first two are that small firms are more opaque on the basis of reaching information than big scaled firms. As a result, the owner/manager of the smaller firm and the bank will tend to have closer relationship (Allen et al., 2004). This arises four main arguments. In the case of failure, the owner/manager has comparatively more to lose as its skills will be firm-specific. Its efforts to perform the company's repayments could be greater

than in a joint-stock company. Next, the close relationship between the small firm and the bank might refer to a bank in hesitation of foreclosing a loan in the hope of holding the future relationship with the firm (Dewenter and Hess, 2003). A third argument is that foreclosing large loans of a specific firm would be neglected as this could create local spillover effects on other bank's clients. However these considerations will be ignored for corporate bonds markets. Another argument suggests that a large number of default loans may create bottlenecks in the workout unit of the bank. In Turkey, BRSA applies a provision policy for NPLs. The banks should deposit a portion of the principal that is defaulted to the CBRT - according to the length of the unrecovered loan and its collateral. That's why the bank would ignore becoming due a loan as NPL.

Studies for different bond ratings on corporate bonds conveyed evidence on the probability of default over time, on recovery rates grounded on market prices at the due time of default, on evaluations of rating transition matrices, and on the level of correlation relationship among default frequencies and recovery rates (see, for instance, Frye 2000a,b; Allen and Saunders, 2003; Altman et al., 2003; or Acharya et al., 2003a). Acharya et al. (2003a) concluded an average recovery rate of 51% for senior unsecured bonds and 48% for senior secured bonds for an 18 year period among the years from 1982 to 1999. According to the study, recovery rate of bonds is affected by the industry conditions at the due time of default. The study for the US corporate bond market of Altman et al. (2003) concluded an average recovery rate, which is described as *price after default* at the paper, of 37 % for 20 years (1982-2001). In the research, negative correlation between the aggregate recovery rate on defaulted bonds and the supply of defaulted bonds occurred. Shleifer and Vishny (1992) examine the impact of industry conditions on liquidation values theoretically. In their research, they examined the impact of industry conditions on liquidation values. The above studies were based on publicly

traded bond data. Carey (1998) studied credit risk in privately placed bonds over 17 year period from 1986 to 1992. The research provided an asset category that is similar to loans in that they are monitored as private debt.

As mentioned above, many fewer studies had the concern on the bank loan markets. Asarnow and Edwards (1995) studied 831 defaulted loans at Citibank over a 24 year period from 1970 to 1993. According to their research, an average cumulative recovery rate of 65% took place, based on the *present value of future cash flows* received after the default due date. The distribution of recovery rates has two characteristics, with a concentration of recovery rates on either the high or the low end of the distribution. The distribution for recovery rates plays an important role in portfolio credit risk modeling. For instance, Altman et al. (2003) assume that the distribution for recovery rates follows a beta distribution. Carty and Lieberman (1996) pointed out that the recovery rate on a sample of 58 bank loans for the period 1989-1996. They examined an average *defaulted bank loan price* of 71% based on secondary market prices for defaulted bank loans. Carty and Lieberman did not note a bi-modal distribution. However they informed about skewness toward the high end of the price scale. In the same study, Carty and Lieberman measured the recovery rate of 79% on a sample of 229 loans for small and medium-size enterprises (SMEs) in the US. Their research in this topic was based on the present value of cash flows. Again, the distribution was highly skewed toward the high end of the scale. Grossman et al. (1997) analyzed recovery rate on 60 syndicated bank loans for the years from 1991 to 1997. According to their study, an average recovery figure of 82% with a standard deviation of 24% was measured based on secondary market prices after the credit event.

All the above studies were focused on the US market, and not many studies were practiced with the focus of other continents. Hurt and Felsovalyi (1998) analyzed 1,149 bank loan losses in Latin America from 1970 to 1996. They measured an average recovery rate of 68.2%. Their methodology was based on calculating the present value of recovered cash flows. They displayed that *loan size* as a determinant to loss rates, with large amount of loan default exhibiting lower recovery rates. In addition, they inspected that large loans were made to economic groups that were family owned and these loans were often not secured. As in Asarnow and Edwards' study, they reported a bi-modal distribution. - a concentration of recovery rates on either the high or the low end - La Porta, Lopez-de-Silanes and Zamarripa (2003) questioned loan default and LGD in Mexico in the 'related lending' - that is lending to shareholders or directors of the bank – framework over the period 1995-1999. In their study, an average recovery rate of 27% for 'related' loans is evaluated. However the recovery rate for 'unrelated' loans is higher 46%. Once again evidence of skewness toward the high end of the distribution was stated too.

In most of the studies mentioned above, the market value of the collateral in comparison to the exposure at default, the precedence, the company's scale, the industry that the company is operating and macroeconomic environment are considered as the most influential factors on the recovery rate. The studies of Carty (1998), Gupton et al. (2000), Thorburn (2000), Kabance (2001), Bos et al. (2002), Emery et al. (2003), Araten et al. (2004) stress the importance of the market value of collateral is emphasized in all studies as a determinant. Loans partially or completely covered by collateral exhibit a higher recovery rate due to the realization of the underlying collateral. However no further information is provided about the length of recovery periods in these studies. Furthermore, in the case of the insolvency of the company, the recovery rate increases if the claims are better off. The results concerning the

size of the company differ as the common small sample size could not provide a general picture for the chosen determinant. In addition, Grossman et al. (1997 and 2001), Brennan et al. (1998), Bartlett (2000), O`Shea et al. (2001), Kabance (2001) and Araten et al. (2004) stress the influence of the *industry classification*, whereas Gupton et al. (2000) and Franks et al. (2004) detect no significant effect of this classification. Altman et al. (2001 and2004), Gupton and Stein (2002), Araten et al. (2004), Acharya et al. (2004) and Franks et al. (2004) illustrated that the recovery rate upturns in a macro-economically good environment. Franks et al. (2004) discover that the exposure at default and the size of the company's influence on the recovery rate is insignificant.

Unfortunately, the diversity of the empirical results demonstrates that the recovery rate is dependent on the data set and the methodology. A study that has a sample size which is too small includes the risk of producing inconclusive results. The possible risks related with the research is only justifiable if there is an accurate chance that the study will produce useful information and represent the group that is being studied. It must be mentioned that most of these researches study the impact on the recovery rate only based on a univariate method that compares mean values of two groups. Additionally, no further information is provided about the length of recovery periods in these studies.

As none of the above studies provided information on the timing of recoveries, no studies mention the about the intention of the debtors as a determinant factor which directly affects the length of recovery period as objection rights are given to the debtor. That's why the theory of games and economic behavior will be mentioned in this section.

The Theory of Games and Economic Behavior by von Neumann and Oskar Morgenstern (1944) tries to analyze the facts that affect the decision- making procedure. The study- actually is a book itself- commences with a simple case of an individual who faces a choice between two alternatives, and goes more deeply into the nature of the decision, with the individual making a choice among combinations of events. In the study, they illustrated that one can maximize its utility via acting rationally. In other words, these two researchers tried to emphasize that individuals try to maximize their utility simultaneously as each of them are aware of what the other individuals are about. If other individuals act irrationally (which is presumed to be minimum in theory), the one who acts rationally may earn more as irrationality causes mistakes. According to the game theory, the true source of uncertainty lies in the intentions of other individuals. This strategy creates an immeasurable risk as no individual can predict the intention of others.

According to Republic of Turkey's Execution and Bankruptcy Law, No: 6352, the debtor holds the rights of to appeal to the court/ to object to the reports organized via Executive Offices. The length of the NPLs' recovery period would be immeasurable as the intention of the debtors is unknown.

Thanks to access to a unique data-base on loans to individuals and SMEs, this paper provides some empirical evidence on the timing of recovery on NPLs, on cumulative recovery rates, on the effect of collateral on the length of the recovery period, on the intention of the debtors and utilization of their legal rights for lengthening the recovery period.

The game theory suggests that rational people always understand their preferences clearly and apply their strategies consistently, but is it possible to do so? Or do all individuals act

rationally? Isn't each individual isolated when they are making decisions? Or are they influenced by other players?

Dan Ariely's research sought answers to these questions. Starting from a belief that people are susceptible to irrelevant influences from their immediate environment, his research has focused on how people actually act, as opposed to how they should or would perform if they were completely rational.

In his speech at the EG 08' conference, he spoke about the fact that people are not in control of their own decisions. According to him, as things are getting complicated, individuals don't know what to do and they pick regularly what was chosen to be picked for them. Moreover the preferences of individuals change where an additional option occurs. For instance, a research studied by Mr. Ariely gave three possible options for the readers of a magazine (a survey conducted to 100 MIT students):

Web- page subscription: priced for £59.00, includes online access to all articles since 1997.

Print subscription: priced for £125.00, includes one- year subscription to the print edition of the magazine

Print& Web subscription: priced for £125.00, includes online Access to all articles since 1997 and one- year subscription to the print edition of the magazine.

The results of the survey were 16% of individuals who preferred web- page subscription, whereby 84% of the students preferred subscribing on Print& Web option. None preferred the print subscription option.

In another survey he conducted, he eliminated the print subscription option and asked to the same student group (ceteris paribus). The results were not the same of the third optioned survey. With two possible options, 68% preferred web- page subscription and selectors of the print& Web subscription were only 32%.

What was happening is that the option in the middle that was not useless for people to figure out what they wanted. Relative to the option in the middle, people preferred to subscribe both printed and online services of the magazine. And it looked like a fantastic deal to maintain an additional online access to the articles since 1997. The comparison of the two surveys holds the ultimate conclusion: "No matter what their intentions are, people don't know what their preferences are in general". And the motive behind the preference is a slightly worse option that influences the choice most.

In brief, it is choices of people that cause the outcome. The options individuals are abounded are the constraints- the limits. An additional option leads individual to the mistake, it is neither about being rational or preferring the most suitable option; the additional option guides our path to mistakes as we don't exactly know what to decide. If individuals can understand both the physical and the cognitive limitations, better outcomes they will obtain no matter what their intuitions are. The players such as advocates, parties who are willing to purchase the collateralized properties, guarantors are the other players in the game that will influence/ manipulate the decision of the debtor during this period.

3. Turkish Banking System, Execution and Bankruptcy Law and their applications

This section covers a macro point of view about the NPLs and its importance including the definition, importance and types of collateral used by the Turkish Banking sector in details. The section provides detailed information about *Republic of Turkey's Execution and Bankruptcy Law, No: 6352* and its applications.

3.1 A Macro view of NPLs in the Turkish Banking System

During the global crisis (among years of 2008 and 2009), credit growth rate slowed down in our country, especially in Small- Medium-sized Enterprise (SME) loans, banks' investments in government securities increased, non-performing loan ratio increased and financial outsourcing from abroad decreased. In this period, the interest rate reduction policy of CBRT decreased interest rates that provided an increasing profitability as net interest margin spread among loan interest rates and bond interest rates expanded due to maturity mismatches in the balance sheet of the banking sector. The weight of loans decreased in the balance sheet, investment in public securities and increase the capital adequacy ratio generated a positive profitability performance. However, increase in the ratio of non-performing loans has been a limiting factor in this development. These results indicate that weight of NPLs on the bank's balance sheet directly influences the profitability of the bank.

As Turkish economy commenced getting out of the crisis in time, all credit types, including SME loans had accelerated increases and non-performing loan ratios declined with the help of economic recovery and low-level interest rates. Funding from abroad opportunities for the banking sector improved as most corporate banks have signed syndicated loan contracts. Investments in public securities reduced in values. Despite the improvement in credit quality,

with contraction of net interest margin, profitability performance indicators tended to decline. With rapid increase in loan volume, a limited decline on the capital adequacy ratio took place.

In 2010, the quality of loan portfolio improved and NPL ratios decreased in all loan types. As of September 2010, the rate of non-performing loans (NPLs) to total loans reduced 190 basis points to 4.3%. In addition to the increase in loans, collection of NPLs, removal of the portfolio with the sale to asset management companies has been effective on the NPL ratio improvement. NPL ratios for all credit types indicate a downward trend. SME loan is the loan type showing the most rapid decline in the NPL ratio. According to provision ordinance, CBRT requires high levels of provisions in place for NPLs. The rate of provisions to NPLs is 83.8 % as of September 2010. The sum of required reserves (provisions) and values of collateral taken into consideration in calculation exceeds the amount of NPLs. High required reserve rate and reducing NPL ratio indicate an improvement in the credit risk allocation of banking sector.

The graph below illustrates changes in NPL ratio, required reserve/NPL with numeric values on right axis and (required reserve + collateral)/NPL with numeric values on left axis among 12.2007 and 09.2010.

Figure 3.1.a *NPL ratio, required reserve/NPL, (required reserve + collateral)/NPL*

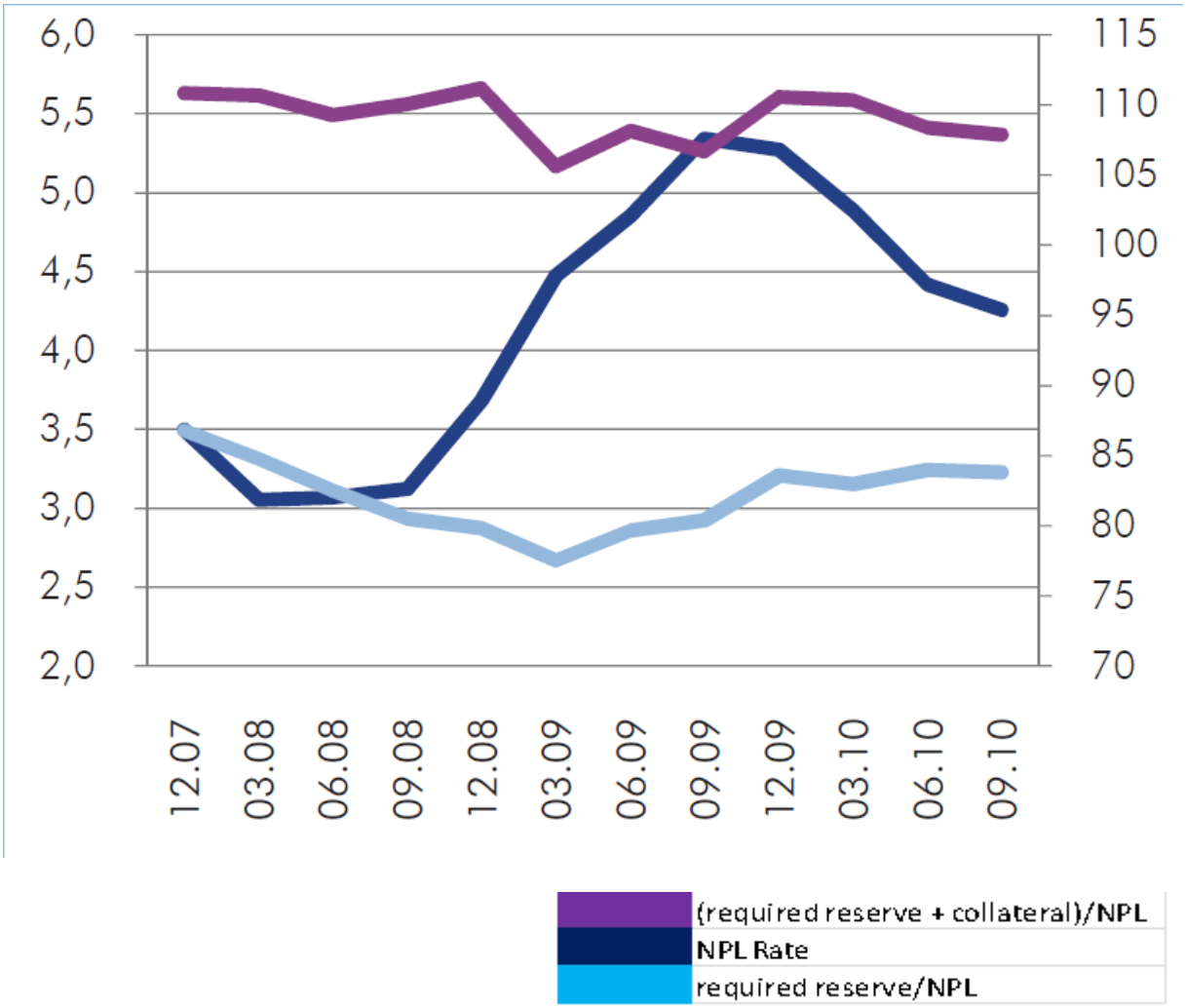


Table 3.1.a *NPL ratios according to types of loans*

Loan Type	2008	2009	09.10
Total Loans	3.7	5.3	4.3
Commercial Loans	3.7	4.9	4.0
SME Loans	4.8	7.6	5.5
Corporate Loans	3.1	3.6	3.2
Individual Loans	3.7	6.0	4.8
Consumer Loans	2.4	4.1	3.2
Mortgage Loans	1.3	2.1	1.6
Car Loans	6.0	10.3	7.6
Consumer Support Loans	3.0	5.5	4.3
Credit card	6.5	10.4	9.1
Resource: Banking Regulation and Supervision Agency			

Credit recovery, as well as the decline in the unemployment rate and economic growth has been effective on NPL ratio reduction. Improvement in the economy had a positive impact on loan repayment performance. NPL ratio has a positive correlation with the rate of economic growth. During periods of increased production and growth of firms, the rate of non-performing loans decreases. The unemployment rate of non-performing loan ratio of individual loans are in a close relationship too. In the periods when unemployment rate declines, non-performing loan ratio declines as the ability of households to repay the loan improves.

Compared with European countries, the ratio of non-performing loans in the banking sector is at reasonable levels. At the end of 2009, EU countries' average non-performing loan ratio stood at 4.2 per cent and 50.5 % of nonperforming loans is held as provisions. As a result, the rate of net non-performing loans after provisions amount to equity ratio stood at 21.7 %. In Turkey, the ratio of non-performing loans is close to the EU average. However due to the high provisions rate of net non-performing loans does not pose a significant risk on equity.

In brief, the recovery of NPLs is essential for banking sector that the bank is not able to utilize its equity until the loan is recovered and an additional required reserve is held at the Central Bank accounts. With the high levels of provision policy for NPLs, the cost is multiplied for the bank. That's why sustainable growth and profitability is directly linked with NPL management of the bank.

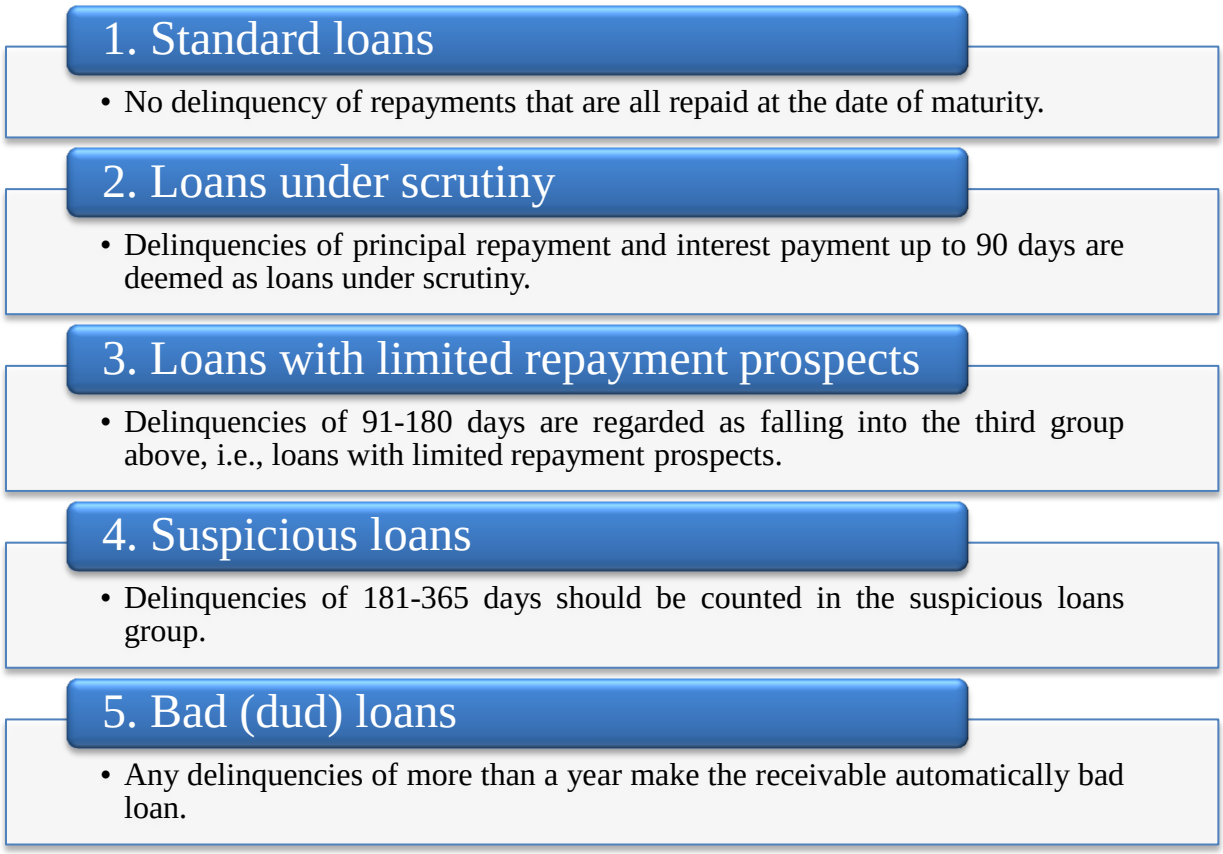
3.2 Overview: Types of Collateral Utilized at Banks

The fundamental function of banks is to collect deposits from entities and fund its resources – collected deposits and a proportion of its equity- to its customers. The bank maintains a risk premium that is the difference between the interest rates of deposits and loans. It resembles a simple transaction; however the banks bear the cost of deposit interests and the risk of uncovered repayments on loans. In this sensitive balance, banks should secure the return of the loan repayments. Therefore, the banks create internal rating procedures in selecting to whom to be credited, and take guarantees if a default of the loan takes place. These guarantees are called collateral. In practice, the type of collateral varies according to the type and amount of the loan. In this section, the types of collateral which are most commonly utilized in Turkish banking sector are mentioned in detail.

When the loan is not repaid to the bank, the bank utilizes different ways according to the type of the collateral in order to recover the debt. It is preferred to maintain collateral with higher market value and with higher liquidity. In other words, the collateral should be valuable and be easily convertible to cash in order to recover the principal and the rest of the loan.

Mindful of the adverse effects of the financial melt-downs of the ‘90s, Turkish government issued Decrees in 1997 and 1999 in terms of the provisions of loan losses for the banking system. The Banking Regulation and Supervision Agency (BRSA) issued a communiqué in this regard, which classifies the bank loans as follows:

Figure 3.2.a *Classification of Bank Loans According to the communiqué of BRSA*



Three groups from the bottom are regarded as *dormant loans* – which is taken into account as NPLs.

Banks are required to stop charging interest on 3rd through 5th groups of loans, and to move the balances in the 3rd and 4th groups to the "credit balances to be liquidated accounts", and the balances of the 5th group to the "credit losses accounts". In case of defaults in general, the commercial Banks are free to restructure and renew the loans on once only basis.

Banks in Turkey are required to set aside the following "provisions for loan losses": provisions for loan losses, of general character and of special character

The general provisions for loan losses are accounted for by: 0.5 % (five per thousand) of the balances in the 1st and 2nd groups above and 0.1 % (one per thousand) of the total of all non-cash commitments of the banks

The special provisions are set aside at:

- 20% for the 3rd group of non-performing loans
- 50% for the 4th group of non-performing loans
- 100% for the 5th group of non-performing loans[1]

According to the provision procedure of the BRSA, banks declare losses and at the same time are unable to utilize set amount of their equity as they hold it as provision. The collaterals of loans are deducted from above balances in computing the provisions for loan losses. That's why collateral is way too essential both in the recovery period of the loan and in the holding less provision for the defaulted loan.

Collateral is grouped in 4 categories:

Cash Blockage:

A blockage is registered on the current account deposits/ foreign exchange deposits as collateral to the loan. When the repayments are delayed the amount of the repayment is covered from the deposit account. It is the most liquid collateral as it can be turned into collection of repayment within minutes of time.

Checks and promissory notes:

[1] Class notes, Money and Banking, Halit Soydan (2008)

Checks are payment orders. These types of negotiable instruments can only be drawn by banks. Checks are not drawn with maturity. They are, in principle, payable upon presentation. Checks are payment vehicles, not debt instruments. If issued post-dated, check does not lose its value as a negotiable instrument but the maturity is regarded as null and void. However, with the new Turkish Commercial Code- that is in practice on February 3rd, 2012; checks are drawn with maturity and the payment should be made on the date of the maturity.

Promissory notes are negotiable instruments whose title is transferred by endorsement and delivery. Endorser is the entity whose signature is on the backside of the negotiable instrument. Main debtor is the entity whose signature appears on the face of the note. In Turkish Commercial Code, endorser is responsible for the payment on due date as much as the main debtor. The holder of the note is free to recourse for payment to either debtor or any of the endorsers.

The maturity dates of the checks and promissory notes affect the length of the recovery period. In addition, it bears the risk of not being paid in the date of maturity. The main debtor and the endorser are both responsible for the debt. However the banks upon which the checks are drawn have a monetary responsibility up to 655.00 TL for each check leaf. If the check total exceeds 655.00 TL, the creditor seeks its rights at the Executive's Office. The trial court bans the check offenders for insufficient check provisions from opening checking account and issuing checks.

Before taking checks and promissory notes as collateral, intelligence about the main debtor and the endorser on the market should be made. If the intelligence on the market has been negative, these types of negotiable instruments should not be taken as collateral.

In terms of liquidity, the ability of the main debtor and the endorser to pay its obligations drawn on the check or the promissory note and the maturity date due will directly affect the recovery of the loan. Yet, it is still the second most liquid collateral type with the assumption that the main debtor or the endorser will pay the amount at the time of the maturity.

Pledge (Mortgage):

Pledge is the guarantee to make a claim on a particular asset when the risk of covering debt occurs. The pledge is examined under three groups that are chattel mortgage, real estate mortgage and commercial enterprise mortgage. The guarantee of the right to claim the credit is the pledge (mortgage) itself. If the creditor will not obtain the repayments of the loan, it might do it so with the way of the pledge liquidation. The way of pledge liquidation takes long time and it is costly. First, the mortgaged goods should be arrested if it is a movable, and then the valuation report should be arranged by the experts and date of sale should be taken at the Executive's Office. As mentioned before, all these steps are way too high in cost when compared to the levels of debt. As a result, banks include a mortgage agreement at the allocation of the loan. In the agreement, "the property will be sold under the request of the debtor" sentence could be added. This sentence is valid in law. In addition, if the debt is not paid, the creditor could buy the property from the owner and may deduct the purchase price from debtor's unpaid loan repayments. The scope of the mortgage agreement covers not only the pledged property, but also the add-ons and complementary parts of the property. It covers the add-ons and complementary parts of the property unless otherwise stated. In order to avoid the necessity of proof to validate the movables as add-ons or complementary parts, it is essential to record the movable good as an add-on or complementary part of the immovable on the official deed contracting table and declarations field of the register of deeds.

Add-ons and complementary parts are often a major part of the collateral, that's why they should be periodically monitored after the establishment of mortgage. If an add-on or a complementary part on the immovable has been permanently removed without any reason, the bank should seek to take legal action based on its rights to ensure that the parts of the immovable are returned back. Otherwise, the bank's mortgage lien on the movables with the complementary qualification will be ended.

i. *Chattel Mortgage:*

Chattel mortgage is organized among the 939th and 953rd clauses of the Turkish Civil Code.

This type of mortgage depends on the delivery of the property. In order to pledge a property, a mortgage agreement between creditor and the debtor has to be signed and transfer of property's possession is a must. More than one property with the same quality can be mortgaged. In this case, all the mortgaged property must be included in the mortgage agreement one by one and all the property's possession should be delivered to the creditor. Delivery is the transfer of the debtor's property domination to the creditor. According to the Turkish Civil Code., if the movable is recorded at the Trade Registry, it is possible to mortgage a movable by recording the mortgage at the Trade Registry, without transfer of possession, in order to safeguard the receivables of real or legal entities.

The legal status of procedures with trustees is as follows. Within the application of Turkish banks, it is common to have a trustee for the mortgaged movable in the procedure of credit allocation (especially for commercial loans that take trade goods as collateral and car loans). In this regard, it will be handy to explain the legal status of procedures with trustees. The safety agreement involves two parties: the trustee and the party who delivers the trust. The

party who delivers the trust should pay all the costs incurred to the trustee for the execution of the contract. Furthermore the party who delivers the trust- that is the mortgaged property- is held responsible for the consequences of delivery damages without any significant proof that is not the party's (bank's) fault. The trustee is not allowed to use the mortgaged movable without bank's permission. The trustee is responsible for the damage whether it still utilizes the property or goods without permission. According to the Turkish Penal Code, with the complaint of the concerned entity of the trustee for selling a property or a good which is entrusted to the trustee, or mortgaging, or using, or consuming, or acting reluctant to return, or delivering the movable(s) with missing components, the trustee will be sentenced from 3 months to 2 years in addition to criminal fines.

The creditor possessing the negotiable instrument or the mortgaged movable has the right to hold the possession and perform liquidation of the instrument/ movable in trade for its receivable.

The mortgage depending on delivery is born with the written agreement. However the right to possess and perform liquidation of the instrument/ movable in trade for its receivable is rooted from the law. Thanks the this right, that the creditor is able to detain the movable and sell the property with the procedures according to Execution and Bankruptcy Law until the whole debt is fully recovered.

ii. *Real Estate Mortgage:*

Real estate mortgage is organized among the 850th and 880th clauses of Turkish Civil Code.

Real estate mortgage is one type of the collateral, which is established on an immovable as a financial guarantee in order to recover a certain amount of debt. It gives the creditor the right to follow the procedures of Execution and Bankruptcy Law to sell the property in case of a defaulted loan. The sale price of the immovable will be deducted from the debt. Real estate mortgage can be established in the form of mortgage bonds, forfeited shares and hypothecs. It is assumed that mortgage certificates would play an essential role in Turkish banking sector. However both mortgage bonds and forfeited shares are not commonly used in the sector. The mortgage bonds as outlined in Turkish Civil Code have hardly contributed to meeting the financing needs of housing sectors in Turkey.

Hypothec is a type of collateral which is commonly utilized in Turkey. It secures the existing or yet unborn receivables of the creditor from the date of establishment. Hypothec is invalid until it is claimed on the title deed. The Land Registry clerk organizes hypothec. The condition for validity of the contract is being created in the official form and according the norms and procedures of the law. In addition, immovable property that is subject to hypothec is not required to be owned by the debtor. The owner can be any party.

The properties and qualifications of the mortgaged immovable are essential in the way of pledge liquidation. Therefore the location of the property, the situation of the building or the land etc. should be taken into account when deciding on what to mortgage. In addition, it is preferred to mortgage immovable property which can be sold easily on the market with its current properties and qualifications. In the general application applied by banks in Turkey, properties are mortgaged for an indefinite period. The official duration of the mortgage is not placed on the hypothec contract because of this general application. Both the hypothec

contract and mortgage document includes the phrase about the period of the mortgage: "*not releasing the mortgage until the bank declares to do so*".

In the circumstances which bank has "the right to self-order" recognition, this right should be recorded on the corresponding column in land registry. This right gives the creditor to take advantage when another creditor releases its mortgage. For instance, creditor A has recorded mortgage with an amount of 100,000.00 TL on the first row and creditor B has recorded mortgage with an amount of 50,000.00 TL on the second row. If creditor A recovers its debt and releases its mortgage, creditor B will still have a recorded mortgage with an amount of 50,000.00 TL on the second row without "the right to self-order". And another creditor will record mortgage with a set amount on the first row. Creditor B loses its advantage of recording mortgage on the land registry earlier. If creditor B had the right to self-order, than its mortgage will be on the first row after creditor A released its mortgage.

If the receivable which was mortgaged by the creditor is fully recovered, the real estate mortgage is terminated. Briefly, the termination of liability generates the release of the mortgage. In such a case, the pledgee (creditor) must request in writing to release its mortgage from land registry.

Both transfer of the mortgaged debt and transfer of the mortgaged property's ownership are valid. In both cases after a transfer, the creditor has the right to claim its hypothec right to the owner of the property. The transfer of the mortgaged property's ownership does not change any clause in the borrower's debt unless there is a contrary agreement among contracting parties. This contract is notified to the creditor by land registry officer. The creditor has to send a notification in writing– including the right to claim its repayments via the way of

mortgaged property's liquidation - to the new owner within a year. The Land Registry should also be notified in writing with the same clause within one year of time.

iii. *Commercial Enterprise Mortgage:*

Commercial enterprise mortgage is a type of collateral that provides to take all the elements included in the commercial operations of the enterprise into account as guarantee. This type of mortgage does not include the delivery of goods or the property itself to the creditor. The debtor or the owner of the commercial enterprise can still utilize the mortgaged items in order to continue its business operations. The commercial enterprise is the subject itself for the pledge. The owner(s) (whether a real or a legal entity) of the commercial enterprise is able to put their enterprises in pledge as guarantee for their or third persons' debt.

Commercial enterprise mortgage agreement should be drawn by a notary around the trade registry borders. For instance, the agreement for a commercial enterprise located around Izmir and recorded at Izmir Trade Registry should be drawn by a notary in the boundaries of Izmir. In addition, it is a must that the agreement should be drawn in the form of ex-officio with the recognition of the contracting parties. The agreement should be recorded at the Trade Registry of the enterprise within 10 days after signing it. If some of the elements involved in the firm are replaced by others or some elements are purchased after the agreement is set, these elements should be added to the list and an additional mortgage agreement should be drawn in the notary. Again, the agreement with the list should be recorded at the Trade Registry of the enterprise within 10 days after signing it. By the way, the creditor may also request registration in this period of time.

In order to have a completed commercial enterprise mortgage, a list prepared by notary is necessary. Elements such as trade name, business name, machinery, vehicles, equipment, motor transport vehicles and other business installations are put in order by type and amount (in numbers, in liters, in kilograms, etc.) on the list of elements that is attached to the mortgage agreement. It is not necessary to list all machinery, vehicles, equipment, motor transport vehicles for manufacturing enterprises. The movables installed on the factory, the equipment of the movables and all the pieces of the movables that are present at the time of mortgage is not needed to be delivered to the creditor. However it may be subject to pledge. According to Commercial Business Law, the creditor's lien can be claimed against anyone who takes over commercial properties.

Guarantor:

The provisions about the guarantor contract are organized with the 483rd clause of the Turkish Code of Obligations.

According to the code, bail is an agreement that guarantor undertakes to creditor for ensuring repayment of the loan. Basically, the agreement provides personal guarantee that the debt should be repaid by the debtor, otherwise by the guarantor. A third person becomes responsible for payment of a debt which is not its own debt. Despite debtor's personal debt is the subject of the agreement, debtor is not a party in this contract. The agreement is settled between the creditor and the guarantor.

The most important quality of the contract is that it is a bounding agreement on the repayments of the debtor. The guarantor is valid depending on the actually existing debt. Whatever the reason of termination might be, the role of the guarantor ends with the

termination of the original debt. In addition, the guarantor cannot hold much of a liability than the debtor itself. In other words, the obligation of the guarantor cannot be different or heavier than the debtor. Receivables cannot be demanded from guarantors until it becomes to be able to be demanded from debtor. Yet, at the maturity date of the repayment the debtor is asked to pay its obligations first. If the receivable is not recovered, than guarantor is inquired to fulfill the obligations.

A person must have the capacity to act and it is enough to have the capacity to act for a person in order to enter into debt without authorization and with their consent. Legal entities can sign the guarantor contract too, but it is not allowed for businesses to sign the guarantor agreement under all circumstances. In order to have a valid agreement, the corporation should guarantee according the terms and conditions written at its articles of the association. Otherwise, the guarantor agreement is null and void.

An actual debt must exist in order to form the conditions of the guarantor. An existing or arising debt will be covered with the contract. The debtor can only apply to the guarantor when there is a certain amount of debt. The guarantor contract must be in written form. Otherwise it is null and void. In other words, the creditor will not be able to claim the obligations of the debtor from the guarantor without a written contract. The contract should be signed by the guarantor covering the form of guarantor's declaration. Only the signature of guarantor on the contract is enough to claim the debt. There is no need for the creditor to sign the agreement. However the written agreement should be kept by the creditor. Furthermore the amount – the limit of the guarantee- should clearly be written both in numeric and in the hand writing of the guarantor.

The responsibilities and obligations of the guarantor are organized with the 490th clause of the Turkish Code of Obligations. The responsibility of the guarantor is limited to the amount of the guarantee that is written on the contract, its obligation will never exceed this limit. This limited liability of the guarantor will occur only when the current repayments are uncovered by the creditor. Before any other items, the guarantor is responsible for the principal at first. The liability of the guarantor is a predicate obligation. Therefore the liability of the guarantor is eliminated with the termination of debt. If the actual debt reduces, the liability of the guarantor substantially reduces too. The guarantor is responsible for the partial or full amount of the debt according to the repayment habit of the debtor and the limit of the guarantor. Likewise the guarantor is also held accountable for the legal results of the unpaid debt. In the given case, the guarantor is held responsible for litigation and attorney's costs for the legal recovery period. The liability of the guarantor does not end up with the payment of the principal for debts including interest. If the repayment of interest is included in the debt, the guarantor is responsible for the default interest too.

The Turkish Commercial Code that is in practice on this year identifies the liabilities and responsibilities of the guarantor. The signature of the guarantor will be valid for 10 years after the date of the signature on the contract. The guarantee of the third party will become null and void in 10 years of the contract date.

For defaulted loans, the liquidation of the receivable as soon as possible is the main focus. Therefore the type of collateral determines the length of the NPLs' recovery period. Cash blockage, checks and promissory notes (with the assumption that they are paid by their drawers at maturity date), immovable and movable mortgages are ordered from fastest to slowest according to liquidity.

3.3 Debtor's Rights to Appeal:

In society, there are borrowers who avoid repaying the debt for several reasons and who remain insolvent to create enough cash flows for paying the debt. In this case, Turkish Execution and Bankruptcy Law allow the creditor to claim its right with the support of executive bodies of the state. Moreover the law includes arrangements for ways of doing it with its sentences and clauses.

In the way of enforcement proceeding without judgment, creditor will commence the liquidation of the mortgaged property or sequestrated property without any documents such as court order, etc. In order to continue until the end of the procedure, the debtor should not object to the payment order. If debtor has an objection to the payment order, the creditor should sue against the debtor to remove this objection. In this respect, enforcement proceeding without judgment is risky as it is not based on a document.

Initially, creditor applies to the Executive Office and demands for legal proceedings in order to collect its receivable by the help of the state institutions. The authorized Executive office is located at the settlement of the debtor. If the debt is born with a written agreement or a contract, the authorized Executive Office is located where the terms and conditions of the contract will be fulfilled. In the loan contract, the subject of the contract is currency and currency debt will be paid in the place of the creditor. Therefore the branch of the bank's location will have the authorized Executive Office.

Enforcement proceeding without judgment can both be utilized for collection of currency receivables and collateral receivables. However, this type of legal proceedings cannot be utilized for other types of receivable collection.

Sequestration is the confiscation of debtor's property and rights in order to recover the creditor's receivable that is subject to a finalized proceeding. The subject of the sequestration is the movables, immovable and property of the debtor. Debtor's receivables on third persons are another subject of sequestration.

There are two ways of sequestration that are general sequestration and proceeding through the sequestration of specific bills of exchange. In both ways, creditor applies to the Executive Office and demands for legal proceedings. At the request of the creditor, the authorized Executive Office sends a payment order to the debtor within 3 days of creditor's demand. On the payment order, it is declared that the debtor should pay the debt or deliver its objection whether the debtor has.

The debtor who receives the payment order has the right of objection within 7 days if it is general sequestration or 5 days if it is proceeding through the sequestration of specific bills of exchange.

The objections should be delivered in the written or oral format to the Executive Court. If the debtor does not utilize its right of objection, the final proceeding progresses to the sequestration and sales stage.

The objection of the debtor can be in two ways that are objection to debt and objection to signature.

Objection to debt is based on reasons including the debtor does not own the debt, the debt has been terminated, the debt is postponed, the debt is time-barred, the Executive Office is not authorized, etc. The debtor can claim that the signature on the contract does not match his.

There are two ways to continue to legal proceedings if the debtor has an objection to the payment order: The creditor should sue in order to make the objection null and void or request the removal of objection.

If the removal of objection request is accepted, the debtor shall be fined a compensation fee of 20 % of the amount on the payment order in minimum with the request of the creditor and vice versa if the removal of objection request is rejected.

According to 68/b clause of the Turkish Execution and Bankruptcy Law, banks are able to utilize the documents in the credit allocation and the start of legal proceedings process as evidence in its removal of objection request. According to the given clause loan contracts and their attachments, extracts of account about the contracts that is subject to the defaulted loan, protests in the written form and annotations of delivery and other documents and receipts presented by the creditor are the documents that can hold evidence value for suing in order to make the objection null and void.

Affidavit of means is the procedure in which debtor reports all kinds of its income and profit, all the types and qualifications of property it owns, all the receivables and rights it holds from

third parties and how it will repay its debt accordingly to the Executive office in written format or orally.

Without an objection of the debtor to the payment order or as a result of the rejection of the appeal, enforcement proceedings are finalized. After the finalization of the enforcement proceedings, sequestration is recorded to the properties and receivables owned by the debtor in order to secure the payment of the receivable.

The creditor forwards its sequestration request of debtor's immovable to the authorized Executive Office. Executive office clerk sends a written directive to the related Land Registry Office for the sequestration of the immovable. Land registry officer records the sequestration transaction on the title deed on the basis of the notification delivered from the Executive Office.

The creditor forwards its sequestration request of debtor's movables to the authorized Executive Office. Sequestration transaction is performed by the Executive Office where the legal proceedings commenced. If the movable is located at the jurisdiction of another Executive Office, the authorized office will proceed with the written notification of the Executive Office where the legal proceedings commenced.

It is possible to claim the debtor's deposit on a bank for the recovery of the defaulted loan. In such a case, the authorized Executive Office sends a written notification to the related bank for the sequestration of the currency on the current account.

The creditor should request the sale of the movables within 6 months after the date of sequestration. Moreover the sale of the immovable should be requested within a year after the date of sequestration. Otherwise their sequestration right is terminated. The debtor's receivable is taken into account as movables according to the clause.

According to law, sale of the movables should be organized by Executive Office within two months after the creditor's sale request. The time period for immovable properties is three months. The sale is organized as an auction. Any entity is held free to participate in the auction. The sale could be organized by the way of bargaining if special terms occur on the contract. The date, location, day and hour of the first and second auction are announced at least ten days before the sale. The first auction starts with 60% of the estimated value of the property on the valuation report. If there is no one willing to participate in the first sale, the second auction is organized. It is after 5 days of the first auction for movables and 10 days after the first auction for immovable. The second auction starts with 40% of the estimated value of the property on the valuation report. The expenses and other types of taxes taken by the government are deducted from the sale price. The remaining transaction is distributed to the creditors according to their level of receivables and orders on the score sheet.

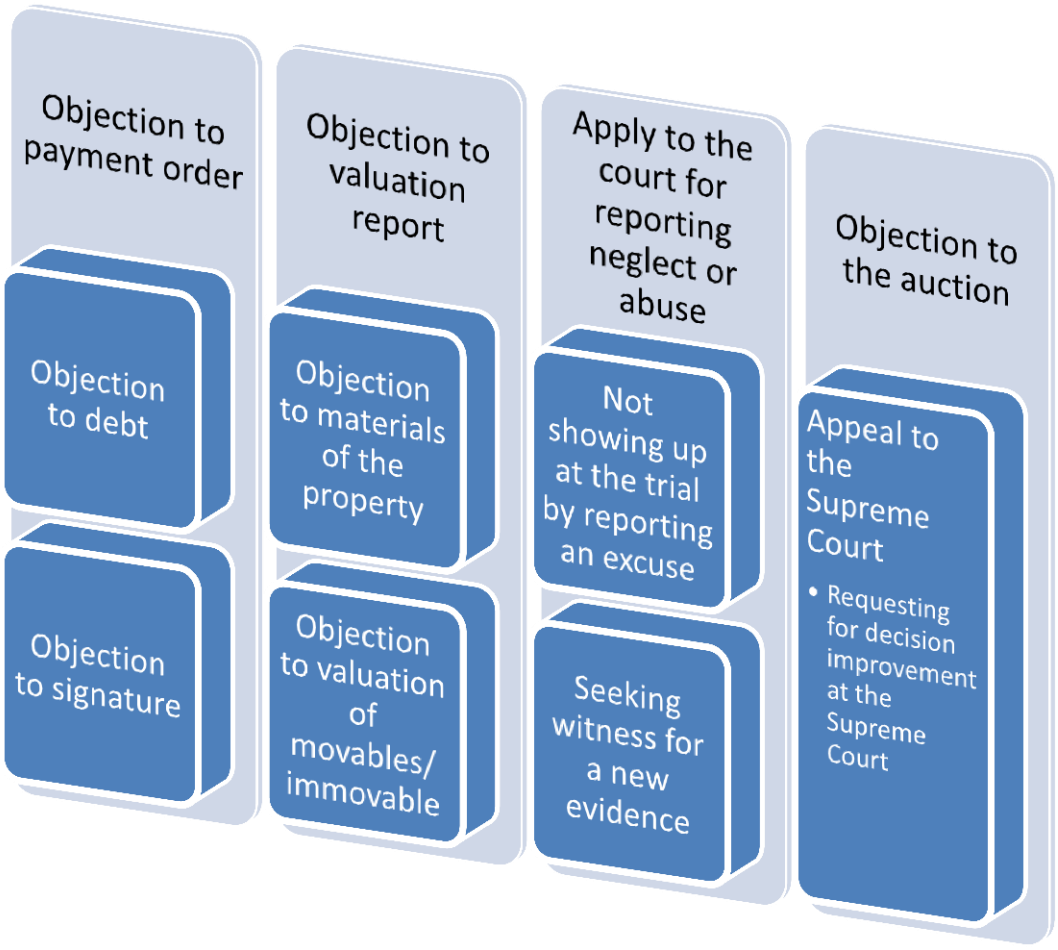
In the way of chattel mortgage liquidation, the creditor initially applies to the Executive Office and demands for legal proceedings in order to collect its receivable by the help of the state institutions. In its application, the type and the owner of the mortgaged property should be defined. If another mortgage or sequestration is included on the property, the creditor is responsible for reporting their record on the property to the Executive Office.

In order to have a valid hypothec on the immovable property, the hypothec must be recorded in the Land Registry. In the way of real estate mortgage liquidation, the creditor initially applies to the Executive Office and demands for legal proceedings in order to collect its receivable by the help of the state institutions. The creditor provides a sample of the contracting table attached to the hypothec document to the authorized Executive Office and declares the type and amount of debt in details.

Just as it progresses on the sequestrated proceedings, the valuation report of the movables or immovable property is prepared. The sale of the property is requested according to the estimated value on the valuation report.

Turkish Execution and Bankruptcy Law provides debtor the right to appeal to court or object almost on each stage of the legal proceedings. The debtors who utilize their rights to appeal are retarding the length of NPL recovery period. These indebted parties are able to utilize their rights almost with any excuses. These rights are listed below on the diagram:

Figure 3.3.a *Debtor's Objection Rights Provided by Turkish Execution and Bankruptcy Law*



The length of the recovery period for NPLs is prolonged with the methods of objecting by the debtors and their advocates. This fact prolongs the period no matter how well qualified and how valuable the collateral is.

Bankruptcy is applicable to real or legal entities that are defined as merchant according to Turkish Commercial Code and to entities that are subject to bankruptcy with conditioned clauses. However the creditor will seek to request for legal proceedings with the way of sequestration. If the conditions of the bankruptcy take place, the creditors will be able to progress on legal proceedings except mortgaged properties. With the acceptation of

bankruptcy, default interest continues to be calculated on a daily basis. However the principals of the all creditors should be covered before claiming the default interest.

If the assets exceed the liabilities of corporations and co-operatives, the representing parties will be able to apply to Commercial Court which is located at the base of the company for bankruptcy without any prosecution. It is also a legal requirement for corporation executives. For this purpose, any creditor of the company or co-operative may apply to the court. In such a case the court must decide bankruptcy of the company. However, if the representing parties present a project which is about improving the financial situation of the company, they will demand postponement of bankruptcy from the court.

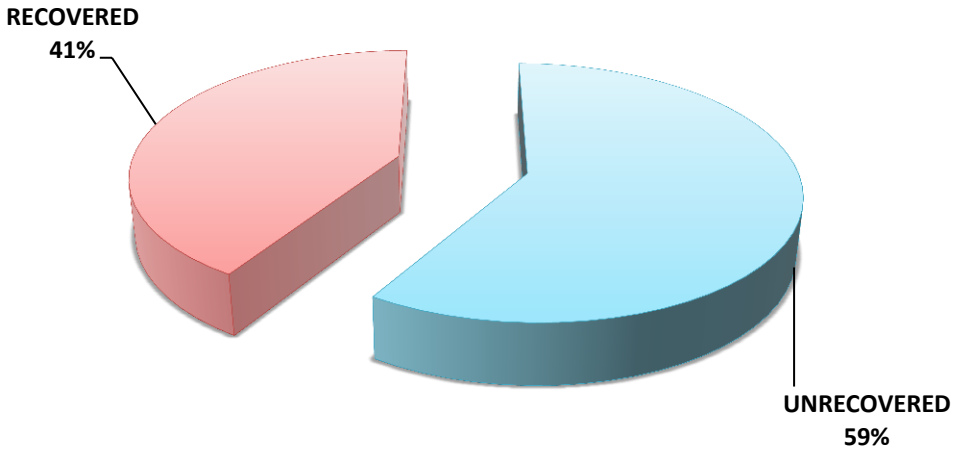
The court, which decided to postpone bankruptcy, takes measures in order to protect the assets of the company. For this purpose the court assigns a trustee in order to inspect the decisions and operations of the Board of Directors or directly manage the company. The duties, responsibilities and authorities of the trustee is explained in the reasoned decision of the Court. Maximum postponement period is one year. However the judge may extend this period if the trustee reports that project is on the right track and it requires additional time in order to reach its goal. In addition, these extensions may not exceed four years. Thus, the postponement of bankruptcy will be extended up to 5 years in total. On the other hand, the judge may terminate the postponement period as long as enough evidence is provided that the project is not working properly for the firm.

If such a case as the postponement of bankruptcy occurs the period could be up to 5 years of time and the debtor could not claim its rights during the given period. The collaterals cannot be converted into cash and no claims could be put in practice until the end of postponement.

4. Data, Methodology and Hypothesis:

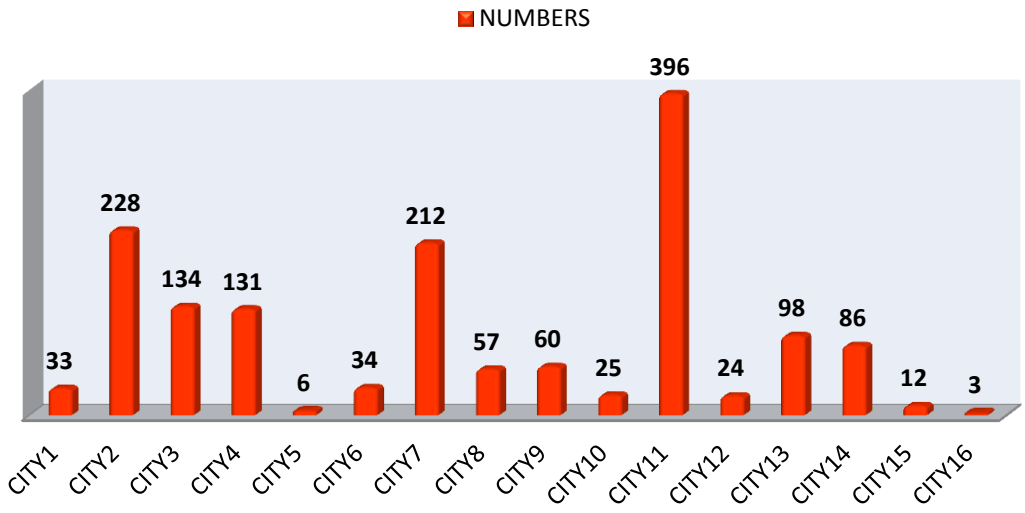
The data includes 1,539 observations. The data is taken on December 12th, 2012. 631 of these observations are recovered and 908 of these observations are not recovered at the date of the data capture. The main focus of this study is the factors that influence the recovery period. No further duration analysis is for estimating the periods of the unrecovered samples. The main focus of this study set is the 631 recovered observations.

FIGURE 4.a *DISTRIBUTION OF RECOVERED AND UNRECOVERED OBSERVATIONS*



The data includes the cities of the branches. The data covers 17 big cities of Turkey and branches spread among these cities. However, the number of samples among cities is not distributed homogeneously. The graph below exhibits the sample sizes among cities.

FIGURE 4.b *DISTRIBUTION OF SAMPLE SIZES AMONG CITIES*



As the sample sizes differ, some cities will include results that cannot represent the whole sample in that city, the repayment habits according to cities is not taken into consideration. 12, 6 or 3 observations do not represent the great picture at all. Therefore NPL periods according to cities are not measured and it is not the major concern of this study.

The data include amount of capital (in TLs), the market value of the collateral (in TLs), the rate of capital amount over collateral's market value (in %s), the date when the debt is due (DD.MM.YYYY), debt's closing date (DD.MM.YYYY) and period between due date and closing date of the debt (in days).

The distribution, mean and variance of the determinants are not taken into consideration one by one and are not explained in graphs as it is not the main purpose and task of this study. Moreover it will include information about insights of the corporation's credit allocation. The main cause of not covering these analyses in the study is moral issues. However it is only measured as a determinant of the NPLs recovery period.

The capital amount of debt and the rate of capital amount over collateral's market value may influence debtor's repayment intention. The debtor may not wish to lose a valuable asset for a little amount of debt. This factor will influence the intention and behavior of the debtor directly.

In order to observe the effect of utilization rights on the NPLs recovery period, the data includes dummy variables:

- If the debtor utilized its obligation rights, the column for the sample takes the value of "1";
- If the debtor did not utilize its obligation rights, the column for the sample takes the value of "0".

These dummy variables are grouped as non- negative integers. The utilization of obligation is a categorical data in which the counts represent the numbers of items falling into each of the two main categories.

The utilization of the obligation rights directly longing the period as the legal procedures take time to close the case. In addition, it is a measure of intention of the debtors; mostly the debtors utilize their obligation rights provided by the Turkish Execution and Bankruptcy Law in order to earn additional time.

As the samples include count data and a continuous data- that is period- they are treated as count variable, statistical methodologies such as OLS and analysis of variance are not useful. These can be modified to manage count data by using data transformations such as the square

root transformation. However such methods have numerous drawbacks; they are estimated at best and approximate parameters that are often hard to measure and interpret.

The Poisson distribution can outline the origin for some analyses of count data and in this case Poisson regression may be utilized as methodology. The maximum likelihood procedure in the Poisson distribution is used to derive the estimates. In addition, the procedure provides the estimated variability (standard errors) of those estimates in Poisson regression. It makes a strong assumption that every subject matter within a covariate sample group has the same underlying rate of the outcome. Negative binomial distribution contains specific forms of model where the assumptions of the Poisson model are violated, in particular when the range of count values is limited. The majority of small values and clearly continuous nature of the period length OLS should be improved. The Poisson regression model has been widely used to study such data.

The hypotheses of the research try to determine the factors and their level influencing the period.

H_1: NPL period is negatively correlated with debt's capital amount

H_2: NPL period is positively correlated with market value of the collateral

H_3: NPL period is positively correlated with rate of the collateral/capital

H_4: NPL period is positively correlated when obligation rights are utilized by the debtor.

For the Poisson model, each y_i is drawn from a Poisson distribution with parameter $\lambda_{i,}$ which is related to the regressor $\mathbf{x_i}$. The primary equation of the model is:

Prob ($Y_i = y_i \mid \mathbf{x_i}$) = ($e^{-\lambda i} * \lambda_i^{yi}$) / y_i!, y_i = 0, 1, 2, … where y_i is the recovery period of the NPL in days.

The most common formulation for λ_i, is the loglinear model.

ln (λ_i) = β_0 + β_1 * ln (capital) + β_2 * ln (collateral) + β_3 * ln (collateral / capital) + β_4 * utilization of obligation rights + α

The negative binomial model arises from natural formulation of cross- section heterogeneity. The Poisson model is generalized with an unobserved effect into the conditional mean.

ln (μ_i) = **x'i β** + $\varepsilon_{i,}$ ln (μ_i) = β_0 + β_1 * ln (capital) + β_2 * ln (collateral) + β_3 * ln (collateral / capital) + β_4 * utilization of obligation rights + α

The hypothesis is tested on "Eviews" software with Poisson Regression, Negative Binomial Count (ML) and Negative Binomial Count (QML) in order. In Section 6 a statistical regression analysis of the determinants of the recovery period's length is developed with graphical and algebraic explanations.

5. The Determinants of Recovery Period, a Statistical Analysis:

5.1 Poisson Count Regression Model Test:

ln (λ_i) = 1.385424 + 0.684004 * ln (capital) - 0.655929 * ln (collateral) + 4.260303 * ln (collateral/capital) + 0.897152 * (utilization of obligation rights) + α

The coefficient of determination R^2 is 0.1147645 closer to 0 that indicates the regression line does not fit the data very well.

Table 5.1.a *Poisson Count (ML/QML) Results*			
Variable	**Coefficient**	**Std. Error**	**Prob.**
Constant	1.385424	0.118354	0.0000
Capital	0.684004	0.012707	0.0000
Collateral	(0.655929)	0.012294	0.0000
Collateral/Capital	4.260303	0.111522	0.0000
Utilization of Obligation Rights	0.897152	0.006493	0.0000
R-squared	0.147645		
Adjusted R-squared	0.142198		
S.E. of regression	282.5354		
Log L	(71.95371)		

In this model all of the regressors are statistically significant under 99% level of confidence. However the standard error of regression is 282.5354. According to the game theory, the true source of uncertainty lies in the intentions of other individuals. This strategy creates an immeasurable risk as no individual can predict the intention of others. as debtor's intention to pay the debt is vague. In other words, the length of the NPLs' recovery period would be immeasurable as the intention of the debtors is unknown and the law provides many niches in its norms and procedures that generates advantages for debtors without good faith.

5.2. Negative Binomial Count Regression (ML):

$\ln(\mu_i) = 0.753642 + 0.796507 * \ln(\text{capital}) - 0.765397 * \ln(\text{collateral}) + 4.854562 * \ln(\text{collateral/capital}) + 0.959858 * \text{utilization of obligation rights} + \alpha$

Table 5.2.a *Negative Binomial Count (ML) Results*			
Variable	**Coefficient**	**Std. Error**	**Prob.**
Constant	0.753642	2.514763	0.7644
Capital	0.796507	0.270994	0.0033
Collateral	(0.765397)	0.262802	0.0036
Collateral/Capital	4.854562	2.385405	0.0418
Utilization of Obligation Rights	0.959858	6.023190	0.0000
R-squared	0.140382		
Adjusted R-squared	0.133505		
S.E. of regression	283.9634		
Log L	(4410.088)		

The coefficient of determination R^2 is 0.140382 closer to 0 that indicates the regression line does not fit the data very well. In this model, all of the regressors except the constant and collateral/capital are statistically significant under 99% level of confidence.

The amount of the debt and amount of the collateral's market price may not create an impact on the debtor without good faith. The debtor may plan to create struggles for the creditor in order to longer the recovery period. If the debtor does not hold good faith in paying the debt, no mathematical expression may explain the length of recovery period in terms of regressors. That's why the standard error of regression is 283.9634. Briefly, the level of standard error is way too high in days almost 4/5 of a year as debtor's intention to pay the debt is imprecise.

5.3. Negative Binomial Count Regression (QML):

The quasi maximum likelihood method is fundamentally the similar as the maximum likelihood method. It is possible that identifying a density function, with a broad-spectrum and more flexible than identifying a function for conditional mean, is more likely to result in specification errors. On the contrary, the traditional maximum likelihood method assumes that the density function is true, so that specification errors are assumed away. For that reason, the

results in the maximum likelihood method are just special cases of the quasi maximum likelihood method. That's why the coefficients of the regressors are so close with each other:

ln (μ_i) = 0.752357 + 0.796688 * ln (capital) - 0.765582 * ln (collateral) + 4.855877 * ln (collateral/capital) + 0.9599 * utilization of obligation rights + α

Table 5.3.a *Negative Binomial Count (QML) Results*

Variable	Coefficient	Std. Error	Prob.
Constant	0.752357	2.514763	0.7644
Capital	0.796688	0.270994	0.0033
Collateral	(0.765582)	0.262802	0.0036
Collateral/Capital	4.855877	2.385405	0.0418
Utilization of Obligation Rights	0.9599	6.023190	0.0000
R-squared	0.140373		
Adjusted R-squared	0.134880		
S.E. of regression	283.7380		
Log L	(4414.257)		

The coefficient of determination R^2 is 0.140373 closer to 0 that indicates the regression line does not fit the data very well. In this model, all of the regressors except the constant and the rate of collateral/capital amount are statistically significant under 99% level of confidence just like in the maximum likelihood procedure.

However the standard error of regression is 283.738 as debtor's intention to pay the debt is vague.

6. Discussion:

This paper analyzes the determinants of the recovery period. In addition, it covers detailed information about banking terms and Republic of Turkey's Execution and Bankruptcy Law,

No: 6352 that is in practice until May 5th, 2012. Despite the fact that the amount of capital, the market value of collateral, the rate of collateral over capital and the effect of utilization rights are all statistically significant as the results illustrate; yet faith in the reality of rational behavior and in the power of measurement in risk management persisted throughout all the analysis process. The duration of the recovery period is directly influenced with the intention of the debtor whether they intend to pay the debt or not.

According to the studies of Von Neumann and Morgenstern, one can maximize its utility with the act of performing rational behavior. In other words, their study point out that individuals try to maximize their utility simultaneously as each of them are aware of what the other players of the game are about. Other players in the game are advocates of the bank, the debtor, third persons who are willing to buy the collateralized property and guarantors. If other individuals act irrationally (which is presumed to be minimum in theory), the one who acts rationally may earn more as irrationality causes mistakes.

The possibility of losing takes place in the theory among the parties that are mentioned above. Presumably acting rational, being risk- averse is the key of not losing for debtors. In order to do so, debtors should keep their good faith and try to come up with a settlement on the repayment plan with the creditor as the debt increases day by day with its default interest.

Yet, game theory's assumption of rational behavior led to many practical applications. The game theory states that the true sources of uncertainty lie in the intentions of other individuals- or let’s say debtors, advocates, guarantors, parties who are willing to purchase the collateralized property and other players in banking sector. However the strategy of simulating madness creates an immeasurable risk as no individual can predict the intention of

others. That's why the standard error of the regression is approximately 285 days in the recovery period duration.

7. Conclusion

This study attempted to mathematically capture behavior in strategic situations, in which an individual's success in making choices depends on the choices of others – whether they keep good faith and utilize their obligation rights or not. The theory of games tries to illustrate the influence of one another's preference on the outcome of the given cases and how each other are affected with the outcome. Cooperation is the key point for creating the optimal outcome for all parties. Both the bank and the debtor will have reached their main purpose in this way. The debtor naturally seeks ways for paying the least available amount for the termination of its debt whereas the bank attempts to recover its principal in the shortest duration because it has to hold a percentage of the principal as required reserve at CBRT.

In addition, it is certain that without cooperation, a Nash equilibrium point is reached that leads to the best outcome of the bad bargain. The game includes strategies of each individual and its likelihood of preferring with the given information. In a sense, it is a classification of preferences and games. For instance, if the bank managers hold the strategy of not cooperating in the case where collateral's market value is over the total debt, the duration of NPL recovery will be longer than accepted, even if the debtor tries to cooperate. It is all the same when the debtor does not cooperate in such a situation. It is for the sake of the bank that the bank will recover its entire principal and the default interest. However, advocates of the debtor, guarantors and third parties may manipulate the decision making procedure. The guarantors may not want to pay the debt rather than the debtor. It may create pressure on the debtor and vice versa. The advocates naturally may look ways for lengthening the period with

new cases at the court. As new cases are in procedure, the attorneys' fees tend to increase. So it is an ethical dilemma for attorneys- earn more from clients or act according to best interests of their clients.

Briefly, even new determinants are added to the regression equation of the recovery period for NPLs, the standard error will still be too high in values as intention of others cannot be estimated and preferences of the debtor will be manipulated by other players.

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Appendix: Test Results on E-Views

Dependent Variable: NUMBER_OF_DAYS
Method: ML/QML - Poisson Count (Quadratic hill climbing)
Date: 02/01/13 Time: 01:36
Sample (adjusted): 1 1535
Included observations: 631 after adjustments
Convergence achieved after 8 iterations
Covariance matrix computed using second derivatives

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	1.385424	0.118354	11.70576	0.0000
LNCAP	0.684004	0.012707	53.83087	0.0000
LNCOL	-0.655929	0.012294	-53.35313	0.0000
LNCOL/LNCAP	4.260303	0.111522	38.20139	0.0000
OBLIGATION	0.897152	0.006493	138.1783	0.0000

R-squared	0.147645	Mean dependent var	416.7702
Adjusted R-squared	0.142198	S.D. dependent var	305.0559
S.E. of regression	282.5354	Akaike info criterion	228.0783
Sum squared resid	49971226	Schwarz criterion	228.1135
Log likelihood	-71953.71	Hannan-Quinn criter.	228.0920
Restr. log likelihood	-81763.61	LR statistic	19619.80
Avg. log likelihood	-114.0312	Prob(LR statistic)	0.000000

Dependent Variable: NUMBER_OF_DAYS
Method: ML - Negative Binomial Count (Quadratic hill climbing)
Date: 02/01/13 Time: 01:37
Sample (adjusted): 1 1535
Included observations: 631 after adjustments
Convergence achieved after 8 iterations
Covariance matrix computed using second derivatives

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	0.753642	2.514763	0.299687	0.7644
LNCAP	0.796507	0.270994	2.939201	0.0033
LNCOL	-0.765397	0.262802	-2.912444	0.0036
LNCOL/LNCAP	4.854562	2.385405	2.035110	0.0418
OBLIGATION	0.959858	0.159360	6.023190	0.0000
Mixture Parameter				
SHAPE:C(6)	-0.150757	0.051230	-2.942748	0.0033

R-squared	0.140382	Mean dependent var	416.7702
Adjusted R-squared	0.133505	S.D. dependent var	305.0559
S.E. of regression	283.9634	Akaike info criterion	13.99711
Sum squared resid	50397001	Schwarz criterion	14.03940
Log likelihood	-4410.088	Hannan-Quinn criter.	14.01353
Restr. log likelihood	-81763.61	LR statistic	154707.0
Avg. log likelihood	-6.989045	Prob(LR statistic)	0.000000

Dependent Variable: NUMBER_OF_DAYS
Method: QML - Negative Binomial Count (Quadratic hill climbing)
Date: 02/01/13 Time: 01:39
Sample (adjusted): 1 1535
Included observations: 631 after adjustments
QML parameter used in estimation: 1
Convergence achieved after 8 iterations
Covariance matrix computed using second derivatives

Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	0.752357	2.711391	0.277480	0.7814
LNCAP	0.796688	0.292192	2.726596	0.0064
LNCOL	-0.765582	0.283362	-2.701785	0.0069
LNCOL/LNCAP	4.855877	2.571945	1.888017	0.0590
OBLIGATION	0.959900	0.171816	5.586791	0.0000

R-squared	0.140373	Mean dependent var	416.7702
Adjusted R-squared	0.134880	S.D. dependent var	305.0559
S.E. of regression	283.7380	Akaike info criterion	14.00715
Sum squared resid	50397532	Schwarz criterion	14.04239
Log likelihood	-4414.257	Hannan-Quinn criter.	14.02084
Restr. log likelihood	-4438.286	LR statistic	48.05882
Avg. log likelihood	-6.995652	Prob(LR statistic)	0.000000