

Intermediation Costs and Financial Fragility¹

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Abstract

This paper studies intermediation costs in credit markets within a dynamic Stiglitz and Weiss (1981) framework. The presence of intermediation costs increases the amount of risky projects therefore results in financial fragility. Moreover, for an open economy that has a perfectly liberal capital account, prudent firms finance their projects from foreign markets therefore shrinking the domestic credit markets. The theoretical predictions of our model gains support by Turkish data for the 1990 – 2005 period. Data suggests that an increase in intermediation costs results in an increase in non-performing loans, and an increase in foreign financing (shrinking of domestic credit markets). We argue that minimization of these costs improves financial soundness.

¹ Opinions expressed in this study are Authors' and do not represent the views of the Central Bank of Turkey

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1. Introduction

In August 2004, vice Prime Minister Abdüllatif Şener indicated the concerns for growing current account deficit and blamed the acceleration in the consumer credits as the main reason. The immediate “precaution” that was taken by the ministry of finance was to increase The Resource Utilization Support Fund (RUSF) on consumer credits by five percent from its previous level of 10 percent and eliminate it on commercial credits.³ The motivation had two aspects. One is to reduce the access to consumer credit through increasing the costs of funds and the other is the so called “signaling effect”, where agents are assumed to derive the motivation towards reducing current account deficit. According to the government the quick growth in consumer credits lead to two end - results. The first is the increase in financial fragility by increasing risks associated with the possible repudiation of consumer credits. The second is the increasing economic fragility through worsening of current account deficits. With growing demand for foreign goods, it is natural that imports increase and leading to greater deficits on current accounts.

In this study we will not discuss the justification for this policy, the targeting of current account deficit, but rather analyze the immediate and direct implications of intermediation costs to credit markets.

Financial intermediation is costly, the costs arise from asymmetric information between the lender and the borrower. The choice of the project by the borrower can only be known with a noise by the lender, therefore it is natural for the lender to require a risk premium for the borrower to pay. Higher willingness to pay for risk premium leads to an increase in the frequency of choices of riskier projects which may even lead to credit rationing (Stiglitz and Weiss, 1981). Another line of literature relies on the costly monitoring process. In the case of default, the lender must pay monitoring costs to repatriate assets, (Townsend, 1979). These costs create the wedge between the riskless rate and the cost of credit.

The risk premium that emerges in these two settings has important implications on the choice of projects and business cycle. An increase in the risk premium leads to amplification of the business cycle (Bernanke, Gertler and Gilchrist, 1999). There are two sorts of increase in the

³ RUSF is a non – tax deductions on the use of consumer and investment credit. It is reduced from 3% level to 0% on commercial credits lines. During the time a further raise of 10% was also in the agenda. During the writing of the paper it has not been implemented, yet.

risk premium, one is created endogenously in the system through the increase in the variance of the projects and the other exogenously introduced by government in terms of taxes or by lenders in terms of transaction costs. We call the latter intermediation costs.

We define intermediation costs as all taxes and other costs associated with banking intermediation. An increase in these costs induces an increase in the gross cost of borrowing, keeping the credit rate constant. These costs bear important implications on aggregate fluctuations. Besci, Wang and Wynne (1999) argue that small changes in these costs result in deviation from high to low – employment equilibrium and vice versa. In their multiple equilibria setting this shift is a result of intertemporal substitutability and distortionary due to changes in the relative prices. The issue is further discussed in the context of capital flows by İmrohoroğlu and Kumar (2004). They examine the variation in returns due to intermediation costs and are able to explain why middle-income countries attract higher capital flows. This in turn can be linked to the amplification of business cycles.

The next section describes the environment, which is followed by the theory of financial deepening. In section four the extent of the intermediation costs in Turkish banking sector. Section five tests the predictions of the theoretical model using Turkish data. Finally, section six concludes.

2. The environment

Our model is the dynamic setting of Stiglitz and Weiss. In this respect, we would like to represent the lead – lag relationship between the variables that allows us to easily shift to the regression analysis.

We have a continuum of firms with a portfolio of projects to invest. Firms do not have enough resources to finance these projects, therefore they would like to have access to credit markets to cover the rest of the costs. Each of these projects can be differentiated by the riskiness that they incorporate. Firms have full information about the riskiness of the projects but not the lenders. Though, lenders have a prior on the distribution. In an environment where interest rates are increasing, firms are more inclined to choose riskier projects since these involve higher returns in good times. Therefore, given the distribution, banks can deduce the riskiness

of the projects by comparing the average return in the market to the one that firms are willing to pay.

Let's denote the average return in credit markets with r^* and call it the optimal interest rates for banks. In other words in a perfectly competitive banking sector, r^* describes the zero profit condition. Let's denote intermediation costs with t , therefore we can decompose the optimal interest rate as the real rate of return, r , and the transaction costs. This relationship is presented in equation (1).⁴

$$r^* = r + t \quad (1.1)$$

With zero intermediation costs the optimal interest rate will be equal to the real rate of return. Denote the riskiness of projects with λ and the firm's net return on a project is G which is unobservable by the bank. Therefore, for a firm and project pair we can write the cumulative distribution function with $F(G, \lambda)$ with an associated probability distribution function $f(G, \lambda)$. Let's assume that the number of risky projects increase with increasing λ .

When the firm borrows, B , with a gross payment $(1+r+t)$, it will default on the project if it's return and the collateral, C , that they provide is less than the total cost of borrowing.

$$B_t(1+r_t+t_t) \leq C_t + G_t \quad (1.2)$$

Therefore, bank's net return can be represented as

$$\kappa_{t+1}(G, r^*) = \min[G_t + C_t, B_t(1+r_t+t_t)] \quad (1.3)$$

Equation 3 implies that the net return to the bank is decreasing in intermediation cost. We will prove this in two steps. The first step is that for any interest rate, only those who choose riskier projects ($\lambda > \lambda^*$) are willing to borrow from the bank. This is a result of the increase in expected return with increasing risks. Therefore, only riskier projects can finance the borrowing costs.

⁴ Let's assume that riskless rate is zero.

The net return to the borrower is the comparison of the loss of collateral in case of default and the payment that will be made if there is no default. Equation 4 displays this comparison.

$$\pi_{t+1}(G, r) = \max[G_t - B_t(1 + r_t + t_t), -C_t] \quad (1.4)$$

Notice that λ^* guarantees zero return for borrowers,

$$\Pi_{t+1}(r^*, \lambda^*) = \int_0^\infty \max[I_t - B_t(1 + r_t^* + T_t), -C_t] dF(g, \lambda^*) = 0 \quad (1.5)$$

The second step to is the increase in risks (λ^*) with intermediation cost. Simply take the partial derivative of Equation 5 with respect to t:

$$\frac{d\lambda^*}{dt_t} = \frac{B_t \int_{(1+r_t+t_t)B_t-C_t}^\infty dF(G, \lambda^*)}{d\Pi_{t+1} / d\lambda^*} > 0 \quad (1.6)$$

The numerator on the right hand side is positive. The bounds on the integral is found by the firms who can pay back their debt. The denominator is positive as a function of chain rule. To demonstrate that we need to make use of the assumption that increasing risks lead to increases in return from projects. In Equation 4 we showed that net return to the borrower is a positive function of the net return to the project. This concludes our second step.

As can be seen by Equation 6, we can safely conclude that increasing intermediation costs reduces the return to lenders and therefore, deteriorates banks' balance sheets. The reason is with increasing costs only the firms with riskier projects are the pool of firms that will demand credit.

3. The Theory of Financial Intermediation

The immediate impact of increasing intermediation costs is the worsening of the financial position of the borrower. As described in the previous section this increase also worsens the financial position of the bank. Financial institutions are very well developed to be able to offer various borrowing instruments. Therefore, with severe competition in the sector they

will offer the least costly instruments to attract borrowers. One alternative to domestic financing is the foreign borrowing. Financial institutions can avoid the costs incurred by taxes by utilizing this alternative.

In our setup let's assume that there are two types of borrowing instruments, domestic, B , which includes intermediation taxes and foreign, O , with associated gross rates of returns R and P . These instruments are gross substitutes in lender's and borrower's portfolios. Denote the total credit demand with T , therefore we can represent the cost minimization problem of the borrower as follows,

$$\min_{\{B, O\}} T = RB + PO \quad (1.7)$$

The demand correspondent to the minimization problem is given below,

$$\left[\begin{array}{l} \text{if } R \leq P \text{ then } \left(B = \frac{T}{R}, O = 0 \right) \\ \text{if } R > P \text{ then } \left(B = 0, O = \frac{T}{P} \right) \end{array} \right] \quad (1.8)$$

If we combine Equation 2 and 7, and denote total credit supply with M we will obtain the equilibrium in credit markets.

$$M = \int_0^{\infty} \frac{T}{\min\{R, P\}} dF(G, \lambda) \quad (1.9)$$

Notice that R includes intermediation costs. In the short-run an increase in intermediation costs will increase the gross cost of borrowing for domestic financing. This will shift credit contracts from domestic to foreign financing. This in turn will shrink domestic credit markets and worsen financial deepening.

4. Taxes and other Burden on Intermediation process

The taxes on financial contracts are in part a shock, which affects the conditions of intermediation contracts. If a tax on intermediation process is levied after a deposit and loans contract made, it would change tax burden of saving holders and user of loans. This is because of the usual practice in taxation: taxes are paid after the payment is made.

Turkish banks have always been heavily taxed (Table 1). Moreover, since taxes are a percentage of the interest rates, the high and volatile inflation and interest rates increased the tax burden. In 2002 total taxes paid due to intermediation process were YTL 10.9 billion that accounts for five percent of total asset and 30.1 percent of total net worth of the banking sector. The decomposition of the burden among the borrowers and lenders is also striking. The total payment made by banks were YTL 3.2 billion and depositors paid YTL 7.7 billion (Türkan et al, 2003).

There are three types taxations in intermediation process. 1) Withholding taxes and fees that are levied on depositors (fees were terminated by the end of 2003) 2) Indirect taxes on banks in terms of reserve and liquidity requirements 3) Banking and insurance transaction tax and resource utilization support fund fees paid by the borrowers. These taxes have significantly raised the spread between net income paid to depositors and the cost to the borrowers.

The tax and other burdens on intermediation process series that we display on figure one includes the withholding tax, reserve requirement, banking and insurance transaction taxes (BIT), resource utilization support fund (RUSF) and other fees. We observe that especially in the post 2001 crisis period they all entered into a declining trend due to the decline in interest rates.⁵

Our data is monthly for the period was used to analyze the effects of tax and other burden on the non-performing loans. We regressed the model on the entire sample and sub-sample. In the regression, we excluded the period of 1986:07 and 2002:06 due to the inconsistency of the non-performing loans series. During this period, 21 private banks were transferred to Savings

⁵ The intermediation cost variable is both affected by the magnitude of deposit and credit nominal interest rates. The withholding tax is a percentage of deposit interest rates and BIT and RUSF are calculated as a percentage of credit market interest rates. On the other hand, reserve requirement is simply a percentage of the total deposit level.

Deposit Insurance Fund (SDIF). The loans of these banks were firstly transferred to non-performing loans. Later, these loans were restructured with the Istanbul Approach. In order to help private sector companies, which became insolvent due to the financial crises in 2001, continue to operate and re-gain solvency, a legal framework for restructuring of their debts to the financial sector (The Istanbul Approach) was introduced by the BRSA. In accordance with the “Financial Restructuring Framework Agreements” (FRFA) and through tying these agreements to “Financial Restructuring Contracts” within three years as from the date of their approval by the BRSA, restructuring or rescheduling of bank receivables has become possible. Additional financing to debtors, if necessary, may also be provided under the approach (BRSA, 2003). About 5 billion USD of non-performing loans was restructured with Istanbul Approach. To the regression results, the non-performing loans are associated with the tax and other burden on the intermediation process in the both entire sample and sub-samples.

Annual data was used to display the transition of domestic loans to foreign loans. The data was obtained from Central Bank of the Republic of Turkey.

DC is proxied by RatioLN displays the share of the long term-external borrowing of domestic private sector in loans used from domestic banks, FC is proxied by RatioFX displays the share of the long term-external borrowing of private sector in foreign currency loans used from domestic banks.

5. Empirical Application

To move onto the empirical stage, we need to have a representation of model predictions. We believe that non – performing loans (NPL) is a good candidate for proxying the total transactions of firms that default (Figure 3). We can represent this relationship below,

$$NPL_{t+1} = \omega(\lambda_t) \quad (1.10)$$

Therefore the assumption implies $\omega'(\lambda) > 0$. Equation describes a possible non – linear relationship between NPL and λ . An increase in risky projects lead to the increase in projects under default a period later. The model prediction is that increase in the transaction costs leading to an increase in NPL. We can test this hypothesis with the following linear regression. The only possible problem with this regression is to obtain an unbiased estimator. We have to decompose the interest rate into intermediation costs and the rate of return. The rate of return then will control of the change in the pool of risky projects by changes in the interest rates. We use *spread* variable to control for this latter effect. This variable is the difference between the deposit and credit rates. If the model is true the coefficient beta in which is the parameter for intermediation costs has to be positive. Moreover, it will be unbiased. The results are presented in Table 2. As expected we find a positive and significant β coefficient.

$$NPL_t = c + \sum_{i=1}^I \alpha NPL_{t-i} + \phi spread_{t-1} + \beta T_{t-1} + u_t \quad (1.11)$$

The second implication of the model is the worsening of financial deepening with rising intermediation costs. Applying a similar strategy as in Equation 1.11, we can run the following regression. The left hand side variable is the ratio of foreign financing to domestic financing, we expect the coefficient η to be positive. The results are presented on Table 3 and indicate that a change of the intermediation costs on the credit market positively affect the long term external borrowing of the domestic private sector.

$$\left(\frac{FC}{DC} \right)_t = c + \eta T_{t-1} + \mu spread_{t-1} + \varepsilon_t \quad (1.12)$$

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Table 1: Tax Burden of Intermediation Process*

Deposit Interest Rate	% 20.0
Net Deposit Interest Rate Taken by Savings Holders (Excluding withholding tax, Fund Tax and Special Transaction Tax)	% 16.0
Cost to Banks of Loans, which would be Extended to Real Sector (Reserve requirement, Liquidity, deposit insurance premium, BRSA Premium, Banking & Insurance Transaction Tax, Resource Utilization Support Fund (RUSF), Stamp Tax, Fees, etc. – under condition zero Profit of Banks and 3 percent of RUSF)	% 25.5
Cost to Banks of Loans, which would be Extended to Real Sector (Reserve requirement, Liquidity, deposit insurance premium, BRSA Premium, Banking & Insurance Transaction Tax, Resource Utilization Support Fund (RUSF), Stamp Tax, Fees, etc. – under condition zero Profit of Banks and 0 percent of RUSF)	% 24.9
Cost of Tax and other Burden Related with Intermediation (under condition 3 percent of RUSF)	% 9.5
Cost of Tax and other Burden Related with Intermediation (under condition 0 percent of RUSF)	% 8.9

*: Our calculations based on Turkan et al. 2003.

Table 2 – Regression Results**(Endogenous Variable: Share of the non-performing loans in total loans)**

Period	1990-2004	1994:01-1998:06	2002:06- 2004:10
Constant	-0,74** (0,36)	-0,39*** (0,08)	1,04 (1,99)
Burden_{t-1}	0,02** (0,01)	0,02*** (0,003)	0,39** (0,16)
Lag₍₋₁₎	1,02*** (0,01)	0,93*** (0,03)	0,72*** (0,10)
Observations	177	54	29

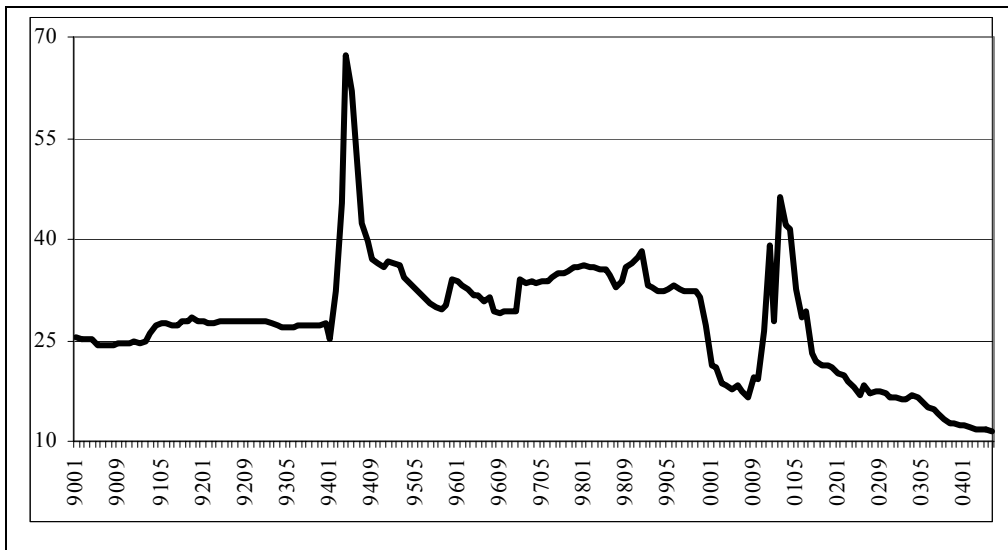
*: 10 percent, **: 5 percent, ***:1 percent. The numbers in parenthesis display standard deviation.

Table 3 – Regression Results (Period: 1991-2003)

Endogenous Variable	RatioLN	RatioFX
Constant	-0,48** (0,20)	-0,55 (0,34)
Burden_{t-1}	0,02** (0,01)	0,03** (0,01)
Observations	13	7

** : 5 percent. The numbers in parenthesis display standard deviation.

Figure 1: Taxes and Other Burdens on Intermediation*



*: Our calculations.

Figure 2

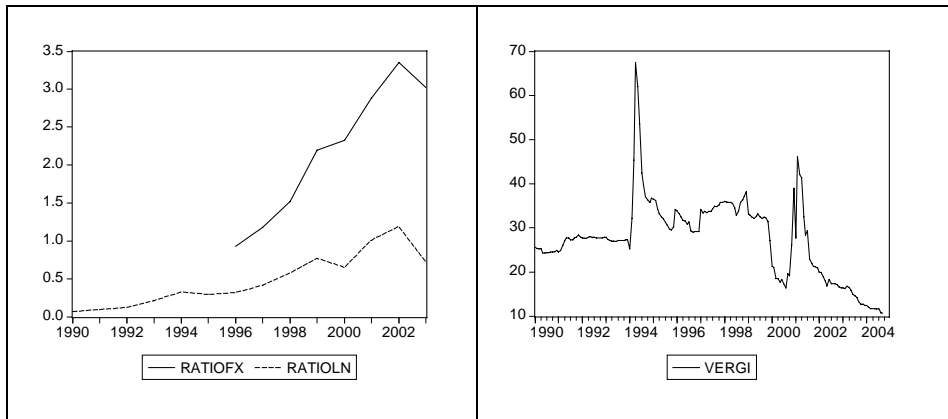
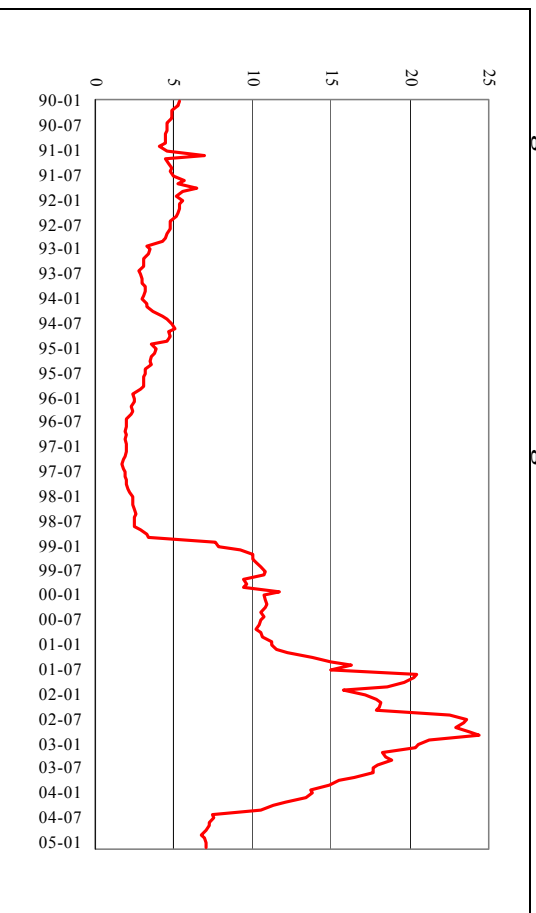


Figure 3: Non-Performing Loans/Gross Loans



Source: CBRT