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Capital Structure Determinants in Financial Institutions: Turkish Banking System

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Abstract

Capital is used to create liquidity and credit for banks. Each corporation strives for the optimal capital structure that maximizes its market value while minimizing its capital cost. Capital structure decisions are among the most critical for efficient risk management in banks. This paper aims to examine the determinants of capital structure and determine which of the capital structure theories have the power to explain the banking sector structure by focusing on the Turkish banking sector. Despite many studies on determining the capital structure of banking sector in the worldwide, these studies are limited for the sector in Turkey. Moreover, since studies in this area are usually concentrated on static models in Turkey, this paper contributes to fill the lack in the banking sectors' capital structure literature in Turkey by using dynamic model structure in which the form of the mechanism that generated the data in previous periods are important. In this paper, the asset structure of banks, size, non-debt tax shield, profit, tax level, liquidity, and cost of borrowing is analyzed as factors that affect the capital structure. It can be concluded that theories on capital structure fail to fully explain the capital structure of the banking sector.

Keywords: Capital Structure, dynamic panel data, banking sector, Arellano-Bond GMM, Arellano-Bond System GMM

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Finansal Kurumlarda Sermaye Yapısı Belirleyicileri: Türk Bankacılık Sistemi

Öz

Sermaye, bankalar için likidite ve kredi yaratmakta kullanılmaktadır. Her kuruluş piyasa değerini maksimum yaparken sermaye maliyetini minimum düzeye indiren en uygun sermaye yapısına ulaşmaya çalışmaktadır. Bankalarda sermaye yapısı kararları etkin risk yönetiminin önemli süreçlerinden birisidir. Bu makale, Türk bankacılık sektörüne odaklanarak, sermaye yapısının belirleyicilerinin incelenmesini ve sermaye yapısı kuramlarından hangisinin bankacılık sektörü yapısını açıklama gücüne sahip olduğunun tespit edilmesini amaçlamaktadır. Dünya'da bankacılık sektörünün sermaye yapısının belirleyicileri üzerine birçok çalışma yapılmasına karşın, Türkiye'de bu sektör için çalışmalar sınırlı kalmıştır. Ek olarak, Türkiye'de bu alanda yapılan çalışmalar genellikle statik modeller üstünde yoğunlaştığından, bu çalışma önceki zaman dilimlerinde veriyi üreten mekanizmanın önemli olduğu dinamik model yapısını kullanarak Türkiye'de bankacılık sektörü sermaye yapısı literatürüne ilişkin boşluğun doldurulmasına katkı sağlamaktadır. Makale 'de, bankaların varlık yapısı, büyüklüğü, borç dışı vergi kalkanı, karlılığı, vergi düzeyi, likiditesi ve borçlanmanın maliyeti sermaye yapısını etkileyen faktörler olarak alınmıştır. Sermaye yapısı kuramlarının tam anlamıyla bankacılık sektörünün sermaye yapısını açıklayamadığı sonucuna ulaşılmıştır.

Anahtar Kelimeler: Sermaye yapısı, bankacılık sektörü, dinamik panel veri, Arellano-Bond GMM, Arellano-Bond System GMM

Introduction

Capital structure refers to equity that is used in structuring and rating long-term loans and financing of assets. The theories that explain capital structure decisions of establishments cast light on the best forms of loan/equity capital merger and the variables that are affected. Classical capital structure theories attempt to show whether it is feasible to change establishment value by changing loan/equity capital merger while modern capital structure theories dwell on the variables affecting the capital structure decisions of establishments. The share of tangible assets in active assets, size, non-debt tax shield, profit, tax level, liquidity, and cost of borrowing are some of the variables that plays a determining role in capital structure decisions of companies.

Companies that have higher quantities of tangible assets or higher security value assets can receive loans under more favorable conditions. On the other hand, the fact that near-bankruptcy tangible assets have higher values than returning assets proves that asset structure is quite a critical factor in capital structure decisions. According to balance theory, companies whose security assets are limited are critically vulnerable to havoc in financial conditions. Companies that stand firm against financial instability can, receive loans under more favorable conditions by means of high credit scores accruing from a fall in bankruptcy costs (Ferri and Jones, 1979). In pecking order theory, if the issue is analyzed with respect to information asymmetry, when investors put their money in companies with tangible assets of high value, they face a weaker asymmetrical information problem. Hence, companies with higher amounts of tangible assets have lower debts by giving priority to financing with equity capital (Mazur, 2007). The total size of fixed assets in a company's active assets affects the level of high liquidity of companies. Companies with high liquidity levels can, since they are better able to meet their short-term liabilities, opt for higher borrowing rates. Pecking order theory would argue that companies with high liquidity levels receive fewer loans. In the event they use liquid assets to finance their investments, there emerges a negative relationship between liquidity levels and leverage rates.

The larger an enterprise is, the better are the opportunities available to them to increase their security assets; mitigate their vulnerability in the face of financial instability; and facilitate the chances of receiving loans and borrowing under lower interest rates. The trade-off theory posits that there is a positive relationship between the size of an enterprise and borrowing (Drobetz and Fix, 2003). Since asymmetrical information is lower in large companies, financing with equity resources is favored over borrowing, which means that according to pecking order

theory, the relationship becomes a negative one. Free cash flows that can arise in profitable establishments come with agency costs. For companies aiming to avoid this situation, borrowing makes even more sense and thus profitable corporations do use greater debt. Nevertheless, in pecking order theory, corporations that initially opt for financing via internal resources are, unlike other corporations, less inclined to borrow when they are already making a profit (Huang and Song, 2002). Not only the interest rate on loans but other financing expenses such as commission rates that are fixed expenses for corporations and endured for the sake of the granted loan, are also taken into account (Padron et al., 2005). Therefore, long as the cost of borrowing is low, one sees an increase in the debt-equity capital ratios of corporations.

Another factors impinging on the capital structure of the corporations is taxes and non-debt tax shield. Since taxes are among the determinants of capital structure, the tax regime adopted by companies directly affects their capital cost and capital structuring. One of the biggest benefits of financing via loans is that the interest paid is deducted from corporate income tax. Corporations that are forced to pay higher taxes opt for borrowing to take advantage of the tax shield. According to trade-off theory, assuming corporations that raise their interest will opt for borrowing to take advantage of the debt tax shield, the relationship is positive. Taub (1975) reported that this negative relationship may be associated with another variable that is intimately linked to tax. MacKie-Mason (1990) obtained results that were not in accordance with the theoretical expectation of the relationship between the tax level and capital structure. By decreasing their pre-tax incomes, corporations use the income as a shield against tax. Higher non-debt tax shield opportunities for corporations add importance to the relative weight of foreign resources in their capital structure. The high levels of amortization rates indicate that the number of fixed assets that can be used as securities in borrowing is also high, which in effect allows the corporations to borrow even more (Bradley, Jarrell and Kim, 1984). Investment deduction that is utilized as a non-debt tax shield is associated with rising profitability. In cases where the corporate profit is high, there is a tendency to borrow to reduce the tax assessment (Gropp, 1997).

Rajan and Zingales (1995) demonstrated that in G7 states there is a positive relationship between tangible assets and leverage. Chen, Lensink, and Sterken (1998) identified a positive relationship between leverage and tangible assets and size but a negative relationship between profitability and leverage. Wiwattanakantang (1999) detected a positive relationship between leverage and tangible assets and size of corporations. Banerjee, Heshmati, and Wihlborg (2000) discovered that tangible assets and the size of a corporation positively affected the capital structure but negatively affected profitability. Fama and French (2002) explored a positive

relationship between the size of corporation and leverage. It was also discovered that the pecking order and trade-off theories failed to fully explain the capital structure of corporations but did partially explain. Chen (2004) drew attention to the negative relationship between profitability and corporation size and debt but a positive relationship between tangible assets and debt. Akhtar (2005) pointed out that in multinational and domestic corporations, profitability and size were significant determinants of financial leverage. Zou and Xiao (2006) identified a positive relationship between size and share of fixed assets and financial leverage. Sayılgan, Karabacak, and Küçükkocaoğlu (2006) stated that there was a negative relationship between the debt levels of corporations and profitability, and between the debt tax shield and capital structure. Demirhan (2007) found that tax and borrowing cost had no effect on capital structure. Korkmaz, Albayrak, and Karataş (2007) found that the non-debt tax shield had a positive effect on capital structure. They could detect no significant relationship between capital structures and size, tax level, and growth rate.

Companies need a sufficient level of capital in addition to a capital structure that befits their operations to sustain their operations. While theories of capital structure provide a framework for analyzing bank capital structure, the fundamental differences between banks and nonfinancial firms should not be ignored. In capital structure decisions of banks, with regard to the merger of equity capital and foreign resources there are certain differences compared with companies in the real sector. The banking sector, as one of the implementers of economy policies and as one of the leading financial corporations, is a pivotal sector in the financial system via its payment and transfer system. The healthy functioning of the banking sector, which has a critical position in the financial system, relies heavily on its interaction with the current financial system. Since the banking sector provides significant financial means to the real sector, any potential adversities that may emerge in capital structure decisions are indirectly mirrored in the real sector. Since financial and nonfinancial companies save their capital for a variety of purposes, banks as well as other financial actors are excluded in the theories put forth to explain capital structures. The capital deposited in banks is mostly unused for financial activities but act as a shield against risk-bearing active assets (Peura and Keppo, 2003). The amount of equity resource that banks must save are specified by the regulatory authorities and their standards are strictly complied with. Foreign resources are basically composed of deposits and national/international loans. They account for a large part of the total resources of banks. Owing to the standard requirements concerning capital structure of banks, they are required to take part in mandatory as well as non-compulsory processes in capital structure decisions. Mandatory capital structure decisions are composed of the arrangements introduced by the

regulatory boards on the capital adequacy ratio. Non-compulsory capital structure decisions are similar to capital structure decisions taken in nonfinancial companies (Iwarere and Akinleye, 2010). Orgler and Taggart (1981) found out that by virtue of the tax advantage gained from deposits and low costs of agency, leverage rates are higher in banks. Osterberg and Thomson (1990) pointed out that the capital structures of financial companies differed from those of nonfinancial companies. Gropp and Heider (2007) demonstrated that the variables in the capital structures of nonfinancial companies were equally and significantly important for banks as well.

Capital structure decisions make it feasible to finance investment opportunities that banks need to maintain their activities. Among the most important computations in capital structure decisions are the leverage ratio, which shows to what extent total assets are financed by foreign resources, and the debt- equity ratio, which indicates the share of foreign resources vis-à-vis equity. Affirmative developments in the banking sector allow a widening in business volume in banks and easier access to funding sources. If development is projected, banks follow a more flexible policy in their finance decisions and use higher quantities of foreign resources. If some form of shrinkage is expected, banks focus on financing via equity to minimize potential risks. The capital structures of banks are vulnerable to domestic financial conditions, sectoral structure, and the individual features of banks. The organizational structure of banks, their legal structure, size, asset structure, liquidity status, profit potential, credit rating, fulfilling past liabilities, and relevant attributes collectively play a role in shaping the capital structure. If the activity leverage of banks is low, the activity leverage level is used to forge capital structure decisions, since particular importance is paid to financial leverage. As one of the most important factors that directly affect market prices, competition is also influential in capital structure decisions. The emergence of foreign banks in national markets because of globalization fuels the competition amid banks but shrinks profit margins.

Banks are very effective in restructuring the economy and ensuring long-term sustainable macroeconomic stability in Turkey, where the banking sector is a major player of markets and a financial instrument of organized markets. Since Turkey faces a shortage of nonbanking financial institutions, banks are literally the main pillars of the financial system and the economy operates on the principle of collecting public savings and distributing them to different areas of use. In the Turkish banking sector, public banks receive wider portion in the sector owing to both their active assets and capital size, impede other banks from competing in the domestic market. In a reflection of the national and international fluctuations in the Turkish economy, citizens are more likely to favor public capital banks that offer greater trust. Owing to the lack of deposits, private or foreign-capital small banks that have entered the market may

eventually take an aggressive approach. Another problem in the Turkish banking sector is the absence of public intervention. In Turkey, such intervention emerges indirectly via public banks and directly via legal regulation. The key limitation in the designation of capital structures of banks are legal enforcements. In Turkey, given the great importance in the banking sector, the Basel Criteria stipulated by the Basel Committee on Banking Supervision are enforced. The regulation basically aims to prevent banks from over-borrowing and ensure they save risky assets equal to a certain size of their capital, thus making it easier to measure their capital adequacy. Within this framework, the banking sector in Turkey is attempting to comply with European Banking Standards. The aim of enforcing the Basel III criterion, in the banking sector, is to enhance the quality and quantity of capital and forge a capital buffer. Asarkaya and Özcan (2007) analyze the capital structure of the Turkish banking sector and demonstrate that variables are positively related with capital adequacy ratio. Çağlayan and Şak (2010) found that while size and market to book have positive impact, tangibility and profitability have negative impacts on the book leverage.

Banks' capital structure is a factor of the nature of their operations as well as the economic and politic factors in a country, especially in developing countries such as Turkey. Owing to high real interest rates, even with the reduction in inflation, underdeveloped capital markets and financial problems, the capital structure decisions of Turkish banks have become the focus of attention. Although the capital structure theory has been examined extensively, there are few studies that use the dynamic panel data approach to cover the banking sector, especially in Turkey. This paper aims to examine the determinants of Turkish banks' capital structure by using dynamic panel data analysis between 2005:Q1-2013:Q1 quarter periods and to detect whether the main theories can explain the capital structure of the Turkish banking sector. Within the context of this paper, the share of tangible assets in total active assets is used to denote the asset structure of banks. The share of net profit in total active assets is used as the profitability variable while the logarithm of total active assets is used for size of companies. The ratio of paid tax to pre-tax profit is taken as the tax variable. The share of amortization expenses in total active assets is termed as the non-debt tax shield. While borrowing cost is indicated as the ratio of financial expenses to total debt indicates, liquidity is computed as the proportion between temporary investment and temporary expenses. The equity-debt ratio, or the share of utilized foreign resource vis-à-vis equity is employed as the capital structure variable.

The theories on, and the factors affecting, the capital structure is presented in the introduction section. After detailing the dynamic panel data models used to find out the capital

structure determinants in the first section, the results of the estimated models are interpreted in the second section. The last part is dedicated to a discussion of findings.

1. Econometric Methodology

In panels where the lagged value of the dependent variable is included in the sampling as an independent variable, where all the independent variables are not totally exogenous, where despite the absence of heteroscedasticity and autocorrelation among data there is variance and autocorrelation that individually change in the data, where there is a linear relationship, the panel fixed and random effect models cannot yield significant results (Roodman, 2006). In static models, the attributes of the estimator designated for the prediction of parameters depend heavily on individual effects. In dynamic models, however, what matters is the form of the mechanism that generated the data in earlier periods. Since a particular financial behavior in a specific period is dependent largely on previous experiences and former behavior styles, in the analysis of financial relationships, it is imperative to treat lagged values of variables as explanatory factors. In a dynamic panel data model,

$$y_{it} = \gamma y_{i,t-1} + x'_{it}\beta + z'_i\rho_1 + \eta_i + \varepsilon_{it}$$

y_{it} stands for observed dependent variable during t time for the ranked i individual; x_{it} stands for explanatory variables; z_i stands for time-independent additional explanatory variables; η_i stands for individual effects; ε_{it} stands for the unobservable error value; i = 1,…, N stands for unit dimension; and t = 1,…,T stands for time dimension. Dynamic panel data models are grouped as distributed lagged panel data models and autoregressive panel data models. Owing to the inconsistency of the results obtained via estimation methods, an instrumental variable is used instead of a lagged dependent variable (Cameron and Trivedi, 2005). If the unit effect in the error term is correlated with one of the lagged dependent variables, the hypothesis of the random effects model is biased; therefore, in dynamic models it is not appropriate to use random effects' estimators. Hence, in the estimation of dynamic panel data models, the method that takes unit effect as well as the correlation between unit effect and independent variable into consideration, the fixed effects and first differences are harnessed. Anderson and Hsiao (1981) showed that in dynamic models, by using first differences, the unit effect can be excluded. To eliminate individual effects, the difference with respect to a previous time period is taken into effect:

$$y_{it} - y_{i,t-1} = \gamma\left(y_{i,t-1} - y_{i,t-2}\right) + \left(x'_{it} - x'_{i,t-1}\right)\beta + \varepsilon_{it} - \varepsilon_{i,t-1} \quad (1)$$

Although there is correlation between $y_{i,t-2}$ and $y_{i,t-1} - y_{i,t-2}$, there is no correlation with $\varepsilon_{it} - \varepsilon_{i,t-1}$. To predict γ and β, $y_{i,t-2}$ is used as the instrumental variable of $y_{i,t-1} - y_{i,t-2}$. Since other explanatory variables are not correlated with $x'_{it} - x'_{i,t-1}$ and $\varepsilon_{it} - \varepsilon_{i,t-1}$, $x'_{it} - x'_{i,t-1}$ is used as the instrumental variable. The equation then is as follows:

$E(y_{i,t-2}(\varepsilon_{it} - \varepsilon_{i,t-1})) = 0$

When the instrumental variables are correlated with the explanatory variables, they must not be correlated with the error term. Equation (1) can be written in matrix form as $\Delta y = \gamma \Delta y_{-1} + \Delta X\beta + \Delta\varepsilon$ and the instrumental variable matrix is defined as $= [y^* \Delta X]$. Thus, the instrumental estimators

$$\begin{bmatrix} \hat{\gamma}_{IV} \\ \hat{\beta}_{IV} \end{bmatrix} = \left[Z'[\Delta y_{-1} \Delta X] \right]^{-1} Z' \Delta y \qquad (2)$$

are consistent for γ, β parameters. Such an instrumental variables method offers a consistent estimation of dynamic panel data models but produces inefficient estimators (Arellano and Bond, 1991). If error terms of the first difference model are constant variance and with no autocorrelation, Anderson and Hsiao's estimator is a better choice for estimation. However, since first difference error terms are generally negatively autocorrelated, it is more appropriate to employ Arellano and Bond's (1991) Generalized Method of Moments (GMM) estimator.

Arellano and Bond (1991), suggested the use of all valid lagged variables as instrumental variables in dynamic panel data models and presented the GMM. The GMM estimator is based on the moments method that is founded on the principle of equating sampling and population moments. The difference GMM approach, aimed at eliminating specific effect components, deals with the model within the framework of the first differences of variables and employs independent variables' lagged values as instrumental variables (Soto, 2009). Lagged dependent variables are integrated into fixed- and random-effect models. It is suggested that to integrate time-relevant observations into panel data models, they must exceed the number of explanatory variables in the model. Even if there is no sequential connection, the presence of lagged endogenous variables in the model may trigger correlation problems in the error term in the model. Arellano and Bond (1991) showed that for $y_{i,t-1} - y_{i,t-2}$ there may be other instrumental variables aside from $y_{i,t-2}$. If $y_{i,t-2-j}$, j = 0, 1,…variable meets the $E[y_{i,t-2-j}(y_{i,t-1} - y_{i,t-2})] \neq 0$ and $E[y_{i,t-2-j}(\varepsilon_{i,t-1} - \varepsilon_{i,t-2})] = 0$ conditions, so all $y_{i,t-2}$, $y_{i,t-3}$, …,$y_{i,0}$ variables can be valid instrumental variables for $y_{i,t-1} - y_{i,t-2}$. The Arellano-Bond GMM estimator is obtained as:

$$\begin{bmatrix}\hat{\gamma}\\ \hat{\beta}\end{bmatrix} = ([\Delta y_{-1}\Delta X]'W')(W(I_N \otimes G)W')^{-1}(W[\Delta y_{-1}\Delta X])^{-1}$$

$$* ([\Delta y_{-1}\Delta X]'W')(W(I_N \otimes G)W')^{-1}(W\Delta y)$$

If autoregressive parameters are too many or the variance of unit effect by ratio of residual error is too high, the estimator may be weak.

Another dynamic model estimator based on GMM method is the GMM approach developed by Arellana and Bover (1995). A first difference equations system GMM estimator, besides using y_{it}'s lagged levels as instrumental variables, it allows the use of y_{it}'s lagged differences as instrumental variables in level equations. This approach stems from merging difference equations with level equations. As seen in the first differences equation, the difference of the period prior to current period is ignored; instead the difference of the all potential future values of one single variable is computed. Hausman and Taylor (1981) showed

$y_{it} = \gamma y_{i,t-1} + x'_{1it}\beta_1 + x'_{2it}\beta_2 + z'_{1i}\rho_1 + z'_{2i}\rho_2 + \eta_i + \varepsilon_{it}$

equation for i=1,…N and t = 1,…,T. When $\alpha_{it} = \eta_i + \varepsilon_{it}$ is defined, x_{1it} is time dependent exogenous variables not correlated with η_i, x_{2it} is time dependent exogenous variables correlated with η_i, z_{1i} is time independent exogenous variables not correlated with η_i,z_{1i}: time independent exogenous variables correlated with η_i. There is no correlation between $w_i = [x'_{i1}, x'_{i2}, \dots, x'_{iT}, z'_i, y_{i0}, \dots, y_{i,t-2}]'$ and $\varepsilon_{i,T} - \varepsilon_{i,T-1}$ or between $m_i = [x'_{i11}, x'_{i21}, \dots, x'_{iT1}, z'_{i1}]'$ and $\bar{\alpha}_i$. Breusch, Mizon and Schmidth (1989) argues that as there is no correlation between $\tilde{x}_{2it} = x_{2it} - \bar{x}_{2i}$ and $\bar{\alpha}_i$ when $m_i = [x'_{i11}, x'_{i21}, \dots, x'_{iT1}, \tilde{x}_{2i1}, \tilde{x}_{2i2}, \dots, \tilde{x}_{2iT}, z'_{i1}]'$

$$m_i = \sum_{i=1}^{N} M_i H \begin{bmatrix} y_{i,1} - \gamma y_{i,0} + x'_{1i1}\beta_1 + x'_{2i1}\beta_2 + z'_{1i}\rho_1 + z'_{2i}\rho_2 \\ y_{i,2} - \gamma y_{i,1} + x'_{1i2}\beta_1 + x'_{2i2}\beta_2 + z'_{1i}\rho_1 + z'_{2i}\rho_2 \\ \vdots \\ y_{i,T} - \gamma y_{i,T-1} + x'_{1iT}\beta_1 + x'_{2iT}\beta_2 + z'_{1i}\rho_1 + z'_{2i}\rho_2 \end{bmatrix}$$

According to the definition above, γ and β parameters' GMM estimation are γ and β values that minimize $\bar{m}'A\bar{m}$ expression. The best candidate for the A matrix is $\bar{m}$'s covariance matrix. If the covariance matrix is unknown, it is feasible to use a consistent estimator. If σ_ε^2 and σ_η^2 parameters are taken as, respectively, consistent $\hat{\sigma}_\varepsilon^2$ and $\hat{\sigma}_\eta^2$ estimators, $\hat{\Sigma} = \hat{\sigma}_\varepsilon^2 I_T + \hat{\sigma}_\eta^2 I_T I'_T$, then Arellano and Bover GMM estimator is obtained as:

$$\begin{bmatrix}\hat{\gamma}\\ \hat{\beta}\end{bmatrix} = ([y_{-1}X]'M')\left(M\left(I_N \otimes \hat{\Sigma}\right)M'\right)^{-1}(M[y_{-1}X])^{-1} * ([y_{-1}X]'M')\left(M\left(I_N \otimes \hat{\Sigma}\right)M'\right)^{-1}(My)$$

Arellano and Bover (1995) and Blundell and Bond (1998) created additional moment conditions in which the lagged difference of dependent variables are octagonal to error levels. Blundell and Bond (1998) put forth the idea that the difference GMM has a weak estimation

power in finite sampling, the coefficient estimations are biased, and the estimation power of system GMM is stronger. Therefore, weak stationarity limits are added to the preliminary conditions that allow the use of a system GMM estimator.

Within the scope of this paper, the effects of banks' capital structure determinants is examined by using GMM and system-GMM approach to give insight in future decisions on capital structure.

2. Impact of Capital Structure Determinants on Turkish Banking System

Capital structure comprises the merger of long-term debt and equity capital as they appear in the balance sheet. In Turkey, owing to the low level of development in capital markets, lack of transparency, scarcity of capital, and financial instability, it is difficult for banks to take on long-term debts. Therefore, in this paper, the ratio of total debt to equity is utilized as the capital structure variable. We use the dynamic panel data method to detect the extent to which the level of exposure capital structure (CS) is shaped by asset structure (AS), profitability (P), size (S), tax (T), non-debt tax shield (NDTS), borrowing cost (BC), and liquidity (L) which are listed as factors specific to banks. In this paper, sector balance sheets issued by the Banking Regulation and Supervision Agency (BRSA) have been consulted for the 2005:Q1-2013:Q1 quarter periods that covers the 2008 global financial crisis. Deposit-domestic private, deposit-public, deposit-foreign, participation, and development-investment banks operating in Turkey have been examined to detect how capital structure determines the structure of banks. Before initiating the statistical analysis of time series, we must examine if the process that creates data is stationary in time. To test for correlation among units, we conduct panel unit root tests in the two groups.

Table 1. Panel Unit Root Test Results

	CS		AS		P	S	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(0)	I(1)
Breitung	1.05	-6.17*	1.57	-4.05*	-2.76*	0.67	-6.59*
Im-Pesaran-Shin	-0.01	-9.48*	-1.16	-6.24*	-12.2*	0.20	-10.9*
FisherP-Perron							
Inverse χ^2	13.20	127.7*	18.71*	75.75*	128.3	8.83	151.2*
Inverse normal	-0.06	-10.0*	-0.92	-6.45*	-10.06	-0.01	-11.03*
Inverselogit	-0.04	-16.04*	-1.35	-9.26*	-16.11	-0.01	-18.99*
Modifiedinv. χ^2	0.71	26.33*	1.94*	14.70*	26.46	-0.26	31.59*
Fisher D-Fuller							

Inverseχ^2	12.90	84.15*	20.18	48.08*	165.5	-10.88	64.61*
Inverse normal	-0.24	-7.59*	-1.41	-4.55*	-11.32	-0.11	-6.54*
Inverselogit	-0.28*	-10.56*	-1.80	-5.57*	-20.77	-0.18	-8.11*
Modifiedinvχ^2	0.64	16.58*	2.27	8.51*	34.78	0.19	12.21*
Pesaran's CADF	0.09	-4.26*	-1.24	-3.81*	-3.72*	0.35	-4.84*
	BC		L		T	NDTS	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)	I(0)
Breitung	-1.61	-5.23*	-1.69*	-6.77*	-1.61	-5.2*	-1.69*
Im-Pesaran-Shin	-0.07	-10.1*	-0.19	-11.5*	-0.07	-10*	-0.19
FisherP-Perron							
Inverseχ^2	9.11	151.2*	8.66	161.4*	126.4*	149.1*	239.40*
Inverse normal	-0.14	-11.08*	-0.19	-11.60*	-10.06*	-11.1*	-14.53*
Inverselogit	-0.13	-18.99*	-0.17	-20.27*	-15.87*	-18.7*	-30.05*
Modifiedinv.χ^2	-0.1	31.58*	-0.29	33.87*	26.03*	31.10*	51.29*
Fisher D-Fuller							
Inverseχ^2	7.59	81.27*	9.89	63.82*	143.4*	219.1*	203.71*
Inverse normal	0.39	-7.51*	0.05	-6.43*	-10.70*	-13.8*	-13.28*
Inverselogit	0.37	-10.2*	0.02	-8.00*	-18.60*	-27.5*	-25.57*
Modifiedinvχ^2	-0.53	15.94*	-0.02	12.03*	29.83*	46.76*	43.31*
Pesaran's CADF	-0.31	-6.01*	-0.60	-3.41*	-2.99*	1.15	-3.34*

* Indicates significance level above 5%

Since in Table 1 only a general AR parameter is allowed, two models have been analyzed: one where the unit means are included but trend is excluded, and the other, where both unit means and trend are included; if a one period lag occurs, both models were treated. Within trend option, the Breitung unit root test shows that capital structure, asset structure, corporation size and borrowing cost are not stationary. In the second group, panel unit roots allow for an autocorrelation coefficient for each single unit instead of a common autocorrelation coefficient; according to the Im-Pesaran-Shin unit root test, capital structure, asset structure, corporation size, borrowing cost and corporation liquidity order are not stationary. According to the Fisher Perron test, the inverse χ^2 and modified inverse χ^2 test statistics show that borrowing cost, corporation liquidity, capital structure, corporation size and profitability are not stationary. According to inverse normal and inverse logit tests, capital structure, asset structure, corporation size, borrowing cost, profitability and corporation liquidity are not stationary. As per the Fisher D-Fuller test, the inverse χ^2 and modified inverse χ^2 test statistics prove that borrowing cost, corporation liquidity, capital structure, corporation size, profitability and asset structure is not

stationary in the intercept and trend model. In inverse normal and inverse logit tests, borrowing cost, corporation liquidity, asset structure, profitability and size are not stationary in the intercept and trend model. Pesaran CADF test results demonstrate that only profitability and tax variables are stationary. Since there are disparities among Breitung, Im-Pesaran-Shin, Fisher ADF, and Fisher Philips-Perron test results, the Pesaran CADF test results that are reliable in the presence of the inter-unit correlation main hypothesis cannot be ignored only for tax and profitability. In Table 1, the capital structure, asset structure, size, borrowing cost, liquidity and non-debt tax shield variables' first stationarity were examined and it was concluded that the variables are first order difference stationary. We use the GMM method suggested by Arellano-Bond (1991) and the Arellano-Bover/Blundell-Bond system-GMM method developed in the studies of Arellano-Bover (1995), and the Blundell-Bond (1998) method, since both methods take into account the time series feature and minimize the likelihood of biased results. Panel data regression models are based on the assumption that there is cross-sectional independency among units but there is dependency among cross-sectional units. Failure to outline a cross-sectional dependency hypothesis may provide consistent but inefficient estimations and bias in the estimated standard errors. Therefore, in this paper, we consider robust errors in the estimation.

Table 2. Arello and Bond Estimation Results

		GMM		GMM (Rob. Std. Err.)	
Variables	Coefficient	Std. Dev.	P > |z|	Robust Std. Dev.	P > |z|
CS(-1)	-.1229518	0.068	0.06	0.039	0.00
CS(-2)	-.1614853	0.065	0.01	0.057	0.00
L	-.0355408	0.027	0.19	0.024	0.14
L(-1)	.0444565	0.019	0.02	0.007	0.00
AS	-.1014925	0.058	0.08	0.100	0.31
AS(-1)	-.1167036	0.060	0.05	0.029	0.00
NDTS	.0673489	0.016	0.00	0.016	0.00
T	.0120508	0.020	0.56	0.027	0.65
T(-1)	-.0454683	0.016	0.00	0.023	0.05
P	-.0908564	0.019	0.00	0.025	0.00
S	.5347666	0.087	0.00	0.110	0.00
BC	-.0736193	0.049	0.14	0.036	0.04
Waldχ^2 test		92. 4*		32.28*	
Sarganχ^2 test		143.8			
Arellano-Bond test		Order 1	-6.67*	-1.713**	
		Order 2	0.41	0.27	

* 5%, ** 10% level of significance

As for capital structure, the impact from its own lags and other variables are as shown in Table 2. The two-period earlier effect of capital structure is found to be significant. The effect of a one- period earlier effect of liquidity state on capital structure is significant and positive. A

one period earlier effect of asset structure is significant. Asset structure and profitability have a negative effect on capital structure. A one-period earlier effect of tax state on capital structure is found to be significant and negative. Non-debt tax shield and size are significant whereas borrowing cost is insignificant. Non-debt tax shield and size variables have positive effects on capital structure. As the robust estimation results in Table 2 demonstrate, parameter estimations are identical. The only difference is that instead of standard errors, robust standard errors have been used. Capital structure is negatively affected by its own lags. A one-period earlier state of liquidity positively affects capital structure. A one-period earlier state of asset structure is significant and negative while a one-period earlier state of tax has a negative effect on capital structure. A closer analysis of robust error estimation results reveals that in addition to non-debt tax shield and size variables, borrowing cost is also significant. Non-debt tax shield and size variables have a positive effect on capital structure but borrowing cost and profitability have negative effects. In Arellano and Bond (1991) dynamic panel data model estimations, there are a number of modeling tests that can be harnessed with the GMM technique. In Table 2, an analysis of the Wald test conducted to test the significance of the entire model shows that both models are, in general, significant. Since estimations conducted in GMM methods are tested via instrumental variables, it is expected that these variables truly represent real variables (over- identifying restrictions). The Sargan test has been used to identify whether the instrumental variables used for estimation are sufficient and we found the over-identifying restrictions to be valid. Table 2 shows the first and second order autocorrelation test results that test the residuals of the first difference model in dynamic panel data models. For GMM to be efficient, second stage autocorrelation must not be present. Arellano and Bond's autocorrelation test results show that in both models, there is a first stage negative autocorrelation in estimations but no second stage autocorrelation.

While making estimations using the system dynamic panel data estimation method, the method developed by Roodman (2006) makes it feasible to obtain consistent estimators in the presence of heteroskedasticity and autocorrelation. When the specification of lag structure is flexible, it becomes possible to model the endogeneity of variables. In system-GMM estimation, as is the case of GMM estimation, certain tests on modeling are required. To that end, as in GMM, first the Wald test and then the Sargan test is used. The Sargan test is employed to detect if over-identifying restrictions of instrumental variables used in GMM estimation are valid or not. If the tools used are exogenous, residuals are not correlated with explanatory variables. In GMM estimation, the difference-Sargan test is conducted to see the validity of instrumental variables integrated into the model. This test is calculated via two distinct Sargan

tests that are computed via the difference between system-GMM and difference-GMM estimations. This test has the difference-Hansen test version, which is consistent in the presence of heteroskedasticity too. Over-identifying restrictions are tested via the Sargan test and difference-Sargan tests. If robust estimators are used, Wooldridge robust score test and difference-Hansen test are put to use.

Table 3. Arello and Bover/Blundell and Bond Estimation Results

		GMM		GMM (Rob. Std. Err.)	
Variables	Coefficient	Std. Dev.	P > |z|	Std. Dev.	P > |z|
CS(-1)	-.0594163	0.064	0.35	0.056	0.29
CS(-2)	-.141667	0.063	0.02	0.074	0.05
L	-.0395928	0.027	0.14	0.030	0.19
L(-1)	.05217	0.019	0.00	0.006	0.00
AS	-.1310822	0.056	0.02	0.093	0.16
AS(-1)	-.1468255	0.058	0.01	0.026	0.00
NDTS	.0501216	0.015	0.00	0.023	0.03
T	.0307342	0.014	0.03	0.018	0.11
T(-1)	-.0403238	0.014	0.00	0.017	0.01
P	-.0403238	0.009	0.00	0.011	0.00
S	.5280058	0.083	0.00	0.144	0.00
BC	-.0714046	0.048	0.14	0.039	0.07
Waldχ^2 test		82.28*		22.45*	
Arellano-Bond test		Order 1	-5.84*	-1.75**	
		Order 2	0.52	0.42	
Sarganχ^2 test		167.73*		167.73*	
Hansenχ^2 test				0.00	
		Difference-in-Sargan		Difference-in-Hansen	
GMM instruments for levels		Excluding Group	167.2*	0.00	
		Difference	0 .57	0.00	
iv(L AS NDTS T S P BC)		Excluding Group	159.9*	0.00	
		Difference	7.84	0.00	

* 5%, ** 10% level of significance

Table 3 demonstrates the factors that are, according to the Arello-Bover/Blundell-Bond estimation results, relevant to capital structure. A two-period earlier effect of capital structure is found to be significant and negative. A one-period earlier effect of liquidity on capital structure is significant and positive. Asset structure with a one-period lag negatively affects capital structure. The tax state has positive and significant effect on capital structure but its lagged effect has negative impact. Non-debt tax shield and size are significant but borrowing cost is insignificant. Non-debt tax shield and size variables positively affect capital structure.

The robust estimation results in Table 3 show that parameter estimations are identical. Capital structure is negatively affected by its own lags. A one period earlier state of liquidity positively affects capital structure. In robust estimation results, one difference is that a one period earlier effect of asset structure and tax state is significant and negative. An examination of robust error estimation results shows that aside from the non-debt tax shield and size variables, borrowing cost is also significant. Non-debt tax shield and size variables have a positive effect on capital structure but borrowing cost has a negative effect. Table 3 shows that in both designated models, the Wald statistics is significant and there is first-stage negative autocorrelation but no second-stage autocorrelation. Sargan test results demonstrate that over-identifying restrictions are not valid. In addition, according to the difference-Sargan tests used to test the validity of more robust instrumental variables, the main hypothesis is acknowledged to be true for both level and GMM equality. As the robust standard error estimators show, there is first-stage negative autocorrelation but no second-stage autocorrelation. Sargan test result rejects the main hypothesis; hence, the over-identifying restrictions are not valid. According to robust Hansen test results, over-identifying restrictions and instrumentals are valid. In difference-Hansen tests however, for all the tools used in both the level and GMM equations, the main hypothesis cannot be rejected.

Findings and Remarks

As banks are financial corporations that use foreign resources as their first resources of funding and possess high leverage of debt, their capital structures remain substantially critical. Unlike for other corporations, the management systems of banks, which provide the basic foundations of the financial system and national economy, are constantly supervised. On the one hand, banks are forced to comply with a set of legal restrictions but on the other, as a result of their importance and the prevailing competition in the market, they are required to effectively manage their resources. To assist banks in managing their capital structure effectively, it is imperative to specifically identify the factors impinging upon the capital structure.

Within the scope of paper, the interaction between the variable have been tried to be determined by using a dynamic structure. It is attempted to isolate the sustainable portion of short-term foreign resources utilized in the financing of the Turkish banking sector, long-term foreign resources, factors that influence the capital structure through the use of equity and the specific capital structure theories that cast light on the banking capital structure dominating in Turkey. By using sector balance sheets for the 2005:Q1-2013:Q1 quarter periods, which especially covers the 2008 global financial crisis, the BRSA banks in the sector were

categorized under five groups. In this paper, using the system-GMM estimation technique, the non-debt tax shield, size, profitability, borrowing cost, the debt-equity ratio of two periods earlier, liquidity state of one period earlier, asset structure, and tax level are decided as the factors that play a role in banks' capital structure.

Since banks with a high level of tangible assets focus more on financing via equity, they operate at lower levels of debt. Thus, a negative relationship between debt ratio and asset structure is found. Since liquidity ratio stands for riskiness, banks with a high liquidity ratio are better able to take on short-term liabilities, which in effect create a positive relationship between their liquidity and debt ratios. Compared with other financial corporations, bankruptcy costs in banks constitute only a minor portion of their market value. Hence, a negative relationship is predicted between size and bankruptcy, which indicates that a positive relationship exists between size and capital structure. This positive relationship means that as the size of banks grows, they turn toward larger portions of foreign resources and face fewer challenges in receiving funds. In parallel with the climb in profitability, more attention is directed to resources and less debt is favored. Since profit-making banks are not urgently in need of borrowing, a negative relationship is seen between the debt- equity ratio and profitability. The nature of bank liabilities constitutes a difference between banks and other industries. Banks have most of their funds as deposits, which gives them a tax advantage. While the cost of producing is tax deductible to the banks, the benefits from the services are tax free to the depositors. Besides, the probability and cost of bankruptcy for banks is less common than in other industries since banks are more closely regulated and supervised than any other industry. In system-GMM estimation, in line with the relevant literature, the effect of the tax on capital structure is found to be positive and significant. Nonetheless, the effect of a one period lag is negatively significant. Robust estimation results show that although the tax variable is statistically insignificant, a one period earlier effect of the tax state is significant and negative. Findings obtained show a negative relationship between these two variables for the banking sector in Turkey. These findings contradict previous empirical studies.

The period in question covers the global economic crisis that Turkey is also affected. Decreasing the tax assessment via borrowing makes sense only if corporations possess high levels of taxable profits. While banks collect funds via deposits and borrowings, they create assets with credits and securities. In times of crises, however, this order is disrupted. As a result of the instability in domestic and foreign markets and a high perception of risk, market operations get diverted. On the other hand, problems in the markets pull revenues down. Thus, it is feasible to say that the global crisis witnessed during a specific period could have been the

obstacle to the generation of taxable profits. Furthermore, the effect of the agency factor may have been the driving force behind the relationship between tax and capital structure. In terms of pecking order theory, lack of information flow in the market drives the banks during times of crises to meet their funding needs primarily from internal funds. Furthermore, non-debt tax and leverage ratio are negatively related by both of the theories. While this finding contrasts with empirical studies in Turkey, a positive relationship is projected between the non-debt tax shield variable and capital structure since tax saving is an impetus to the tax shield. So long as borrowing cost is low, the leverage ratio climbs and a negative relationship emerges between borrowing cost and finance costs which, in effect, gives rise to an increase in the debt- equity resource ratio. In this paper, the ratio of amortization expense to total assets is used as a non-debt tax shield. Higher depreciation ratios come with fewer growth options in investment portfolios and relatively more tangible assets, this then implies a positive relation between them.

In this paper, the size variable fits into trade-off and agency costs theory and the profitability and asset structure variables fit into the pecking order theory so it is feasible to conclude that the pecking order and trade-off theories are not adequate to explain the capital structure of banks operating in Turkey but can partially explain the capital structure on the basis of these variables. Banks are sensitive to systematic risks and face high operating and financial risks owing to the structure of the financial system and political uncertainty in developing countries such as Turkey. Alternative capital structure theories should also be tested in future studies by taking account country-specific characteristics.

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