

**DETERMINANTS OF BANK PROVISIONS:
EVIDENCE FROM TURKEY**

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Cyclical movements might have an effect on a bank's profitability via loan-loss provisions. A borrower's payment capacity deteriorates in the contraction and improves in the recovery periods of an economy. Thus, an opposite cycle is expected in provisions with respect to the economic cycle. This study investigates this argument along with the exploration of the determinants of banking provisions in the Turkish banking sector. Both panel data and time series tools, specifically Pooled Ordinary Least Squares (POLS) and Ordinary Least Squares (OLS), together with statistical inference are used to conduct the econometric analysis. Consequently, in the Turkish case, it is found out that economic growth has a negative relationship with the loan-loss provisions while the foreign exchange rate has a positive one. Another main conclusion of the study is that bank-specific factors have no effect on provisions.

1. INTRODUCTION

During the last two decades, due to the absence of a stable macroeconomic environment, an efficient legislative-administrative framework, and a sound surveillance-supervision system, many financial crises have been experienced in the developing countries. Consequently, the importance of some prudential indicators, such as loan quality indicators, specifically nonperforming or restructured loans, provisions, profitability of banks and the quality of collateral were acknowledged in both the economic and finance literature.

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Bank provisions are one of the first reliable quantitative indicators of deterioration in loan quality and, at the same time, a key determinant of banks' earnings and profitability. Therefore, to be able to assess the soundness of the banking sector's financial structure, understanding the bank provisioning policy is important.

Bank provisions are held to cover both expected and unexpected losses according to the accounting standards of a country. In line with the Basel Capital Accord and subsequent amendments, provisions can be categorised into two subgroups, one of which is specific provisions that can only be made once borrowers are unable to meet their loan obligations and the other is general provisions that are held as precautionary measures for possible or latent losses not yet identified. In principle, provisions are held to compensate both expected and default losses on loans. But in practice, banks usually tend to avoid separating specific provisions before a credit risk is fully realised¹.

Depending on fluctuations in economic conditions, borrowers' payment ability changes over time. As indicated in several surveys, during a recovery or expansion period, borrowers' ability to debt service naturally increases and, therefore, credit risk falls. In contrast, loan defaults are likely to increase during recession or contraction periods. Therefore, the possibility of an increase in impaired credits also rises².

After the many devastating financial crisis experiences, there is a growing debate on the possible procyclical macroeconomic effects of provisioning policies. It is argued that provisioning experiences focusing on ex-post factors have played an important role in deepening those recent crises. Depending on this debate, in many countries, decision making authorities are trying to encourage banks to use more forward looking valuation methods and external credit risk models to avoid the possible excessive burden during economic downturns.

In a study on the countercyclicality of risk-based capital ratios, the Basle Committee (1999) examines potential effects of capital

¹ This definition reflects the ex-post rather than ex-ante provisioning policy. For further details on the differences between ex-post and ex-ante provisioning, see Cortavarria, Dziobek, Kanaya and Song (2000).

² For further information on the various factors affecting credit cycles and borrowers' payment ability, see Borio, Furfine and Lowe (2001).

requirements. It is noted that in recession periods, banks are more likely to incur higher levels of loan losses and, consequently, higher levels of loan-loss provisions than in the periods of strong economic performance³.

Other studies which reflect the countercyclicality of bank provisions are Hoggarth and Pain (2002) and Pain (2003). In these papers, seven and eleven major UK banks, respectively, are analysed using the pooled OLS method and results also support the view that the economic cycles have important effects on bank provisioning, i.e. as recessionary elements in an economy develop, loan-loss provisions account deteriorates.

As in other countries experiences, especially after the two consecutive rigorous financial crises, some supportive evidence has been observed that in Turkey also bank provisions have a countercyclical behaviour. As indicated in the study by Duvan and Yurtoğlu (2004), the provisioning policy of seven major Turkish banks supports the countercyclical behaviour of loan-loss provisions. In the said study, the authors focus directly on the relationship between provisions and GDP growth in Turkey using some statistical inference tools.

This study aims, basically, to extend and develop the study of Duvan and Yurtoğlu (2004). In addition to concentrating on the cyclical influences on the Turkish Banking Sector's loan-loss provisions, it aims to investigate some bank-specific factors that might have an effect on banks' provisions, such as the asset ratio of banks, the number of staff as well as a few selected macroeconomic variables. The authors believe that determining the behaviour of provisions is important to provide a sound policy prescription on this issue.

The rest of the paper is organised as follows: Section 2 discusses the recent facts about the Turkish banking sector's provisioning experience; Section 3 describes the data and analysis along with the estimated models and their resulting implications; Finally, Section 4 includes the conclusion and some relevant remarks.

³ See "Capital Requirements and Bank Behaviour: The Impact of the Basle Accord", (April 1999).

2. NON-PERFORMING LOANS AND PROVISIONING DEVELOPMENTS IN THE TURKISH BANKING SECTOR

In November 2000 and February 2001, the Turkish economy experienced two of the most painful financial crises in its history⁴. On the first days of these consecutive crises, Turkish Banks suffered from the realisation of both interest and exchange rate risks. But that was not all. In addition to these worsening initial impacts of the crises, the banking sector faced another crucial problem: the realisation of credit risk due to the erosion of the corporate sector's payment ability in the following periods.

To be able to handle these troubles, the Turkish authorities announced a challenging restructuring strategy for Turkish banks. This strategy was constructed over two key policies: one is to strengthen the capital structure of the vulnerable private and public banks and the other is to remove Non-performing Loans (NPL) from banks' balance sheets. To support this strategy, serious legislative amendments were made to relieve the banks' vulnerable financial position. Especially the Istanbul Approach, which is a corporate debt restructuring framework established in that period, provided an important stimulus for both banks and the real sector to recover from financial weakness⁵.

Depending on these comprehensive policies, the distortionary effects of NPL were gradually controlled after mid-2002 (as can be seen in Table 1).

Table 1. Developments in NPL and Provisions (as percentage)*

	Dec. 00	Sep. 01	Dec. 01	June 02	Sep. 02	Dec. 02	Mar. 03	June 03
NPL/Total Credits	12.4	20.5	41.4	34.3	31.1	21.2	18.0	18.1
Provisions/T. Credits	7.9	13.4	19.5	17.4	17.2	13.6	12.2	12.7

* Source: Banking Restructuring and Supervision Agency of Turkey.

⁴ As a clear indicator of the devastating effects of these crises, while there were 54 commercial banks in the Turkish Banking Sector at the end of 1999, this figure decreased to 34 by the end of November 2003.

⁵ For further information on progress in the restructuring of the Turkish banking sector, see IMF Country Reports for Turkey.

3. DATA AND MODELS

3.1. Data

Quarterly data, as available, are used in this study and the sample period is between the 4th quarter of 1996 and the 2nd quarter of 2003. Commercial Bank provisions are used as a dependent variable. Data for provisions belonging to 29 commercial banks were obtained from the Banking Restructuring and Supervision Agency of Turkey (BRSA).

Two concepts are critical in the modeling of the provisions. One is deciding which stock or flow forms of the provisions are to be used. Because of accounting principles, provisions appear both as a flow and a stock measure in banks' reporting statements. When the likelihood of a doubtful debt arises, a new charge (flow) is posted to the profit/loss account which is also added to the stock of provisions. Given this behaviour, the stock measure of provisions may cause misleading results. For instance, at a specific time, a large amount of write-offs in any one period may mean that the stock of provisions falls even though significant new doubtful debts have arisen. Therefore, the flow form of provisions has been preferred in this study. However, this choice leads to losing one period of observations. As another concept, provisions can be categorised into two subgroups (general and specific provisions). It is generally accepted that while specific provisions are held for expected and general provisions for unexpected losses, both provision groups indicate ex-post losses in practice. Therefore, the total provisions figure has been preferred and used in this study.

Although the main consideration of this paper is to examine the effect of economic growth on banking sector provisions, we included all possible explanatory variables in the analysis. The explanatory variables are picked up in terms of the most frequently employed variables in similar studies of the related literature. Explanatory variables are categorised into two groups. The first is made up of some macroeconomic indicators such as real Gross Domestic Product (GDP), treasury borrowing interest rate, foreign exchange rate (FX, TL/\$) and money supply (M2Y-Broad Money-M2- and Foreign Exchange Deposits). The second group includes bank-related indicators such as credit volume, total assets and some effectiveness indicators.

Table 2. Definitions of Variables Used in the Analysis

<i>Provisions</i>	Provisions for 29 commercial banks
<i>GDP</i>	Real GDP (1987 Prices)
<i>Price</i>	GDP Price Deflator (1987=1)
<i>Interest rate</i>	Treasury borrowing compounded interest rate
<i>Exchange Rate</i>	TL / \$
<i>M2Y</i>	Broad Money Supply
<i>Assets</i>	Total assets as a share of total Turkish commercial banking sector (effectiveness indicator)
<i>Number of Staff</i>	Number of staff per branch (effectiveness indicator)

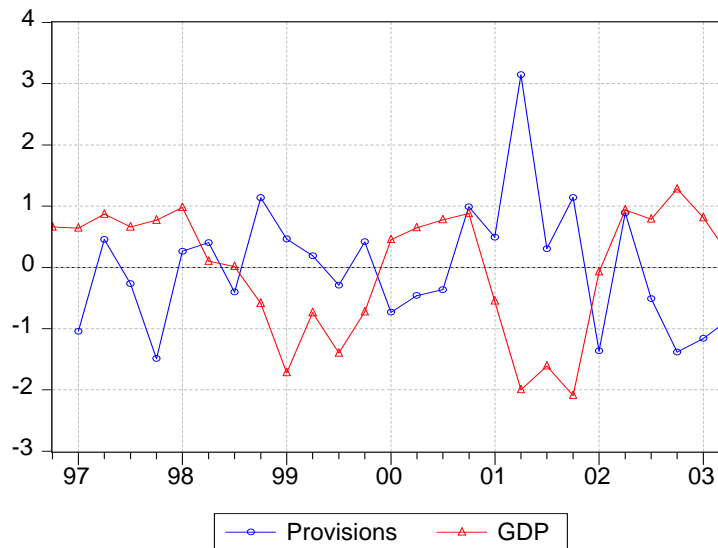
As a main explanatory variable of the analysis, GDP growth rate is used in the models. In the literature, there are some indications of a negative relationship between economic growth and banking provisions. To explore this relation, we initially analysed the correlation between these two variables using aggregate provisions including all analysed banks. The correlation coefficient for these variables is about -0.56 . This shows a significant negative relationship that is consistent with the literature and also supportive of the results of Duvan and Yurtoğlu (2004). Graph 1 also supports this countercyclical behaviour.

We also tried to figure out the effects of other macroeconomic variables such as FX rates, interest rates and broad money supply. The correlation coefficient between aggregate provisions and FX rate is almost 0.59. This suggests a positive relationship between them that can also be seen in Graph 2. This result is not fully consistent with the economic theory. As is usually expected, depreciation in domestic currency prompts foreign demand for domestic goods and stimulates economic growth. Hence, depreciation in domestic currency should decrease the loan-loss provisions. However, due to the lack of a stable economic growth path in Turkey for several years, both private firms and the financial sector have found a profit incentive to take FX risk in their balance sheets, especially during the boom period of the economy. Therefore, such open positions have an enormous distortionary effect on the financial sector while the economy is in the down period of the cycle. Another study by Berument and Paşaoğulları (2003) also concludes that exchange rate increases are recessionary. Thus, it could be expected that the exchange rate increases the loan-loss provisions in the Turkish case.

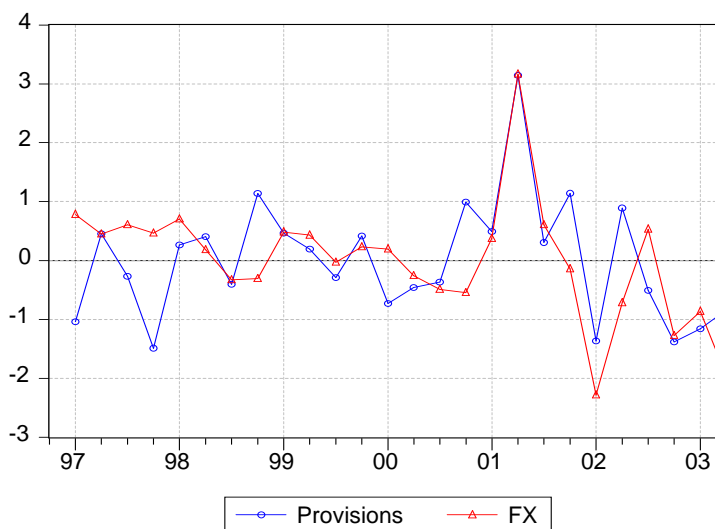
In terms of interest rate, we have tried real and nominal rates in the models. The correlation coefficients for real and nominal interest rates are 0.22 and 0.18 respectively. M2Y is another possible explanatory variable, having a correlation coefficient of 0.37, that is included in the analysis.

As bank-specific explanatory variables, which are also cross-sectional units, personnel numbers per branch and assets ratio (assets of bank i /total assets of 29 banks) are considered. These variables are regarded as efficiency indicators for the banks assuming that efficiency has an effect on provisions.

Graph 1. Growth Rates of Provisions and GDP (Normalised)



In the literature, there are some additional possible explanatory variables such as household capital and income gearing, corporate capital gearing, net interest rate margins and bank-specific share of loans and advances to particular sectors. Unfortunately, data for household capital and income gearing, corporate capital gearing and net interest rate margins are available for the Turkish economy. Additionally, the bank-specific share of loans and advances to particular sectors are confidential data in Turkey. Therefore, those variables are disregarded in this analysis.

Graph 2. Growth Rates of Provisions and FX (Normalised)

As the integration order of variables is important for the methods used, the unit root test is applied for all indicators. According to the pooled unit root test, provision and personnel ratio series are integrated at order one while the asset ratio series is integrated at order zero $-I(0)$. For time series variables, ADF test results are presented in Table 3.

Table 3 ADF Test Results for Time Series Variables

Variable	ADF Test Statistic		1 % Critical Level	5 % Critical Level
	Level	First Difference		
GDP	-1.18	-3.68**	-3.73	-2.99
Price Deflator	-2.15	-3.38**	-3.73	-2.99
FX	-1.74	-2.74***	-3.73	-2.99
M2Y	-2.20	-3.44**	-3.73	-2.99
Nominal Interest Rate	-1.54	-4.00*	-3.73	-2.99
(a) *** Stationary at 1 % level ** Stationary at 5 % level * Stationary at 10 % level				
(b) Without trend and seasonality, and lag effects are considered.				

According to the unit root test, all time series variables are integrated at order one $-I(1)$. Unit root tests are applied for the natural logged form of all variables except asset ratio and interest rates because they are in percentage form. Therefore, in the modeling stage, stationary variables

are used in logged form while nonstationary variables are used also in the first difference form.

3.2. Models

The analysis consists of two parts: the first is a panel data and the second a time series analysis. The panel data analysis is used to investigate the determinants of provisions using bank-specific data in the sample period between 1996:4 and 2003:2. As stated above, because the flow form of variables is used in the model, our sample period is reduced to 1997:1 - 2003:2. The basic estimation strategy is to pool the observations across banks and apply the regression analysis on the pooled sample. That is, a pooled OLS (POLS) equation will be estimated in the form of:

$$y_{it} = \beta_0 + \beta_1 X1_t + \beta_2 X2_t + \beta_3 X3_t + \beta_4 X4_t + \beta_5 X5_t + \beta_6 X6_{it} + \beta_7 X7_{it} + u_{it} \quad (1)$$

where,

- y_{it} = Provisions for bank i at time t
- $X1_t$ = GDP growth at time t
- $X2_t$ = Price at time t
- $X3_t$ = Nominal Interest Rate at time t
- $X4_t$ = Foreign Exchange Rate (TL / \$) at time t
- $X5_t$ = M2Y at time t
- $X6_{it}$ = Assets Ratio for bank i at time t (asset of bank i/total assets of 29 banks)
- $X7_t$ = Number of staff for bank i at time t
- u_{it} = Disturbances

The advantage of pooling is that more reliable estimates of the parameters in the model can be obtained. It is a valid procedure if there is reason to believe that the relationship between the variables is stable across cross-section units. But the disadvantage of pooling is that any heterogeneity across banks reveals itself in the unexplained residuals. As in other countries experiences, our data set gives evidence that Turkish banks show similar response to cyclical movements. Therefore, we assumed that the relationship between provisions and growth is stable across banks and that is why we decided to apply the pooled OLS estimation method. Additionally, we have assumptions of contemporaneous exogeneity and no linear dependency among the

explanatory variables for the population model. Another important point is that the White Heteroskedasticity–Consistent Variance-Covariance Matrix is used in estimations.

In this context, we have estimated two equations using POLS, one of which is dynamic and the other static. Equation (1) shows the static model specification. In the dynamic specification, bank provisions are assumed to depend partly on their own past observations and so the model specification can be shown as follows:

$$y_{it} = \beta_0 + \beta_1 X_{1t} + \dots + \beta_7 X_{7it} + \delta_1 y_{i(t-1)} + \dots + \delta_4 y_{i(t-4)} + u_{it} \quad (2)$$

The results of the static model estimation are presented in Table 4 while those of the dynamic estimation are in Table 5.

Table 4. Estimation Results for Static Equation

Dependent variable: Provisions			
Regressors	Coefficient	t- statistic	P-value
GDP	-0.928 (0.290)	-3.19	0.001
Price	0.277 (0.196)	1.41	0.158
FX	0.479 (0.105)	4.57	0.000
Personnel Ratio	0.009 (0.112)	0.08	0.937
Asset Ratio	0.177 (0.145)	1.22	0.222
Nominal Interest Rate	0.040 (0.038)	1.07	0.284
Constant term	-0.114 (0.092)	-1.24	0.213
Observations (T): 26 Number of id (N): 29 R ² : 0.046 Adjusted R ² : 0.035 F Statistic for joint significance: 3.91 (P-value: 0.000071)			
Note: Standard errors are given in parentheses under the coefficients. First difference and logged forms are used for Provisions, GDP, Price, FX and Personnel ratio. Asset ratio is in logged level form. First difference of interest rate is used (logarithm form of interest rate is not used since it shows percentages).			

There are two important points related to the panel data estimations. Firstly, we have a small cross-section sample size ($N = 29$) relative to the time dimension ($T = 26$). This is a problem that causes the relatively poor results of the POLS estimations. But we were constrained by the data available for the Turkish banking sector and also we did not want to decrease the time dimension of the data. Therefore, we assumed those results are not weak enough and we also considered the OLS estimation, which is described in the next section, as a test for this issue. The other point is that the M2Y variable has caused some multicollinearity problems and so we decided to exclude it from our analysis.

Static estimation results show that there is a significant negative relationship between economic growth and provisions: a 1 % decrease in GDP growth leads to an 0.92 % increase in the growth rate of provisions. This result supports other country studies as in Pain et al. In addition to GDP growth, FX is another important variable affecting provisions. A 1% increase in foreign exchange rate increases the growth rate of provisions by 0.48%, which indicates the presence of a positive relationship between these two variables. All other variables are insignificant. Therefore, one can conclude that real GDP and foreign exchange rate variables are the only determinants of banking provisions in Turkey.

Table 4 shows the estimated equation including all possible explanatory variables. When insignificant variables are excluded from the equation, coefficients of GDP growth and FX do not change considerably and they seem robust. Another point is that a serial correlation test has been conducted⁶ and it was proved that there was no serial correlation problem for that static equation. Further, it should be noted that seasonal dummy variables are used to capture the seasonal effects in the data.

In the dynamic equation estimation, we have added 4 lags of the dependent variable because we have quarterly data and we think that past realisations can have an effect up to one year. However, we disregarded the insignificant lagged dependent variables. As shown in Table 5, only the second lag has a significant coefficient. This could

⁶ Fitted residuals of the equation have been obtained and were inserted into the equation as a lagged variable and then the coefficient test was applied.

mean that banks show tolerance to their customers for impaired credits up to six months.

The other foundations of the dynamic equation are largely similar to the static equation. The main difference is a slight decrease in the coefficient of GDP. Obviously, null hypothesis of being equal to one is rejected in the dynamic equation while it cannot be rejected in the static equation according to the Wald coefficient test. However, there is still a significant negative relationship between economic activity and banking provisions.

Table 5. Estimation Results for Dynamic Equation

Dependent variable: Provisions			
Regressors	Coefficient	t- statistic	P-value
GDP	-0.641 (0.308)	-2.07	0.038
Provisions (-2)	0.123 (0.032)	3.81	0.000
Price	0.208 (0.207)	1.00	0.317
FX	0.516 (0.112)	4.60	0.000
Personnel Ratio	-0.031 (0.122)	-0.25	0.800
Asset Ratio	0.154 (0.169)	0.91	0.363
Nominal Interest Rate	0.053 (0.041)	1.29	0.196
Constant Term	-0.061 (0.096)	-0.63	0.527
Observations (T): 24 Number of id (N): 29 R ² : 0.063 Adjusted R ² : 0.049 F Statistic for joint significance: 4.43 (P-value: 0.000005)			
Note: Standard errors are given in parentheses under the coefficients. First difference and logged forms are used for Provisions, GDP, Price, FX and Personnel ratio. Asset ratio is in logged level form. First difference of interest rate is used (logarithm form of interest rate is not used since it shows percentages).			

As in the static equation, FX has a significant effect while other variables have insignificant coefficients. Again, this equation in Table 5 includes all the possible explanatory variables, and significant coefficients do not change much when we exclude insignificant variables. Besides, we do not have a serial correlation problem also in the dynamic model.

In the second part of this section, time series tools have been used based on the aggregate banking sector data to find out whether the results of both parts support each other. Therefore, a multivariate regression model has also been estimated as follows:

$$y_t = \beta_0 + \beta_1 X_{1t} + \beta_2 X_{2t} + \beta_3 X_{3t} + \beta_4 X_{4t} + \beta_5 X_{5t} + \beta_7 X_{7t} + u_t \quad (3)$$

where variable names are the same but show aggregate numbers of the bank-specific variables for the whole sector. Because we did not work with individual bank-specific data here, the asset ratio has not been used in the OLS estimation since their sums equal to 1. We have used the White-Heteroskedasticity Consistent Standard Errors and Covariance estimation in the OLS, the results of which are presented in Table 6.

As shown in Table 6, both times series analysis and panel data analysis give almost the same results. The OLS estimation mainly shows a significant negative relationship between economic growth and provisions. Specifically, a 1.0% decrease in GDP causes a 1.26% increase in provisions. This coefficient was -0.93 and -0.64 in the panel data static and dynamic equations respectively.

When we apply the Wald coefficient test, we cannot reject the null hypothesis that the coefficient of GDP growth is equal to 1. As we reject this hypothesis in the dynamic POLS estimation, we cannot do the same in the static POLS.

On the other hand, another similar result between the OLS and POLS estimations is that FX is a significant explanatory variable for the provisions in Turkey. It can be said that efficiency indicators are not significant variables for the provisions as a result of the OLS estimations, which is also consistent with the POLS estimations. Additionally, inflation rate has no significant effect on provisions.

Table 6. OLS Estimation Results

Dependent variable: Provisions			
Regressors	Coefficient	t- statistic	P value
GDP	-1.260 (0.618)	-2.04	0.061
Price	0.316 (0.470)	0.47	0.512
FX	1.024 (0.281)	3.64	0.002
Nominal Interest Rate	0.034 (0.065)	0.53	0.604
Personnel Ratio	-0.023 (0.015)	-1.55	0.144
C	0.361 (0.432)	0.83	0.418
Observations (T): 26 R ² : 0.89 Adjusted R ² : 0.80 F Statistic for joint significance: 10.2 (P-value: 0.000069)			
Note: Standard errors are given in parentheses under the coefficients. First difference and logged forms are used for Provisions, GDP, Price, FX and Personnel ratio. First difference of interest rate is used (logarithm form of interest rate is not used since it shows percentages).			

The F-statistic for joint significance shows that the overall equation is significant at 1%. Also there is no serial correlation problem in the equation.

Although we have some constraints in terms of the POLS estimation, the results of the OLS have verified those of the POLS estimation. Therefore, we can conclude that provisions in the Turkish banking sector are mainly determined by economic growth rate and foreign exchange rate.

4. CONCLUSIONS

The loan-loss provisions have an important impact on banks' publicised profits and capital. Since most borrowers' payment capacity deteriorates during economic contraction periods and improves during recovery periods, a similar cycle should be expected in the provisions. This relationship has been analysed econometrically for many countries and

the sufficient evidence found indicates that this countercyclical movement is valid for those countries⁷.

The econometric analysis applied in this paper confirms that the provisions of 29 Turkish banks depend negatively on GDP growth. Provisions are also found to increase when TL/\$ exchange rate rises. But bank-specific factors do not play a role for provisions in Turkey. Although those factors have an effect on provisions in other country applications, we cannot verify the same foundations for Turkey. We believe that the evidence found in this study on loan-loss provisions can be useful while elaborating provision policies in Turkey.

One important point related to the foundations of this paper is that there are some variables that can be used to explain provisions but we could not include them in this study. The main reasons for that are either that they are not available or they are not publicised. Therefore, it must be stated that those variables may cause some differences in the results of this analysis. This point can be used for further evaluations about this subject.

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⁷ See Pain (2003), Hoggarth and Pain (2002), Asea (1998), and Cortavarria, Dziobek, Kanaya and Song (2000).

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