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Demands for Short-Run Assets and Liabilities in Brazil: a Portfolio Approach*

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Keywords: portfolio selection ; industrial firms.
JEL Code: G11; G30.

The study explores the behavior of the short run demands for assets and liabilities in the Brazilian industry during the 1990–1998 period based on portfolio theory. The implied set of demand equations is estimated for different sub-periods indicating that short-term demand patterns do not substantially differ when one compares the overall sample for 1990-98 and the sample pertaining a more stable period during 1994-98. Good support was found for explanatory factors referring to the stock of long term (non-choice) items and variables approximating the activity level of the firm and the economy. The responsiveness of short-run assets and liabilities to relative returns (costs) of those items was weaker than previous studies for the U.K (Hay and Louri (1989, 1991, 1996)).

O estudo explora o comportamento das demandas de ativos e passivos de curto prazo na indústria brasileira durante o período 1990–1998 com base na teoria de portfolio. O conjunto implicado de equações de demanda é estimado para diferentes sub-períodos Indicando que os padrões de demanda de curto prazo não diferem substancialmente quando se compara a amostra global para 1990-98 e a amostra referindo ao período mais estável de 1994-98. Foi obtido bom suporte para os fatores explicativos referentes ao estoque de ítems de longo prazo (não sujeitos à escolha) e variáveis aproximando o nível de atividade da firma e da economia. A sensibilidade dos ativos e passivos de curto prazo aos retornos (custos) relativos desses ítens foi mais fraca do que a evidência de estudos anteriores para o Reino Unido (Hay and Louri (1989, 1991, 1996)).

*The authors acknowledge research assistance from Marcos Lima and Rodrigo Zeidan and yet detailed comments from two anonymous referees, but the usual disclaimer applies.

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1. INTRODUCTION

Mean-variance modeling is a still influential framework in contemporary Corporate Finance [see e.g. Elton and Gruber (1995) and Brealey and Myers (1996) for comprehensive accounts]. In particular, the portfolio approach has led to a vast, predominantly normative literature pertaining firm's short-run assets and liabilities [see e.g. Gentry (1988)].[1]

The application of portfolio theory to industrial firms was pursued in a handful of papers applied to quoted and unquoted firms in the U.K. [see e.g. Hay and Louri (1989, 1991, 1996)]. Those studies also considered segmentations in terms of firm size and growth rate and obtained moderate support to the portfolio theory in terms of coefficients significance, expected signs and satisfaction of theoretical restrictions.

The emphasis of the aforementioned literature in terms of developed and stable economies can provide a significant motivation for undertaking similar studies in the context of developing countries. In particular, it is interesting to assess to what extent significant regimes shifts can induce different patterns in the short-run demands for assets and liabilities. In fact, the Brazilian economy has been subjected to strong regime shifts in the 90s. Most notably the trade liberalization and the price level stabilization [see e.g. MendonçadeBarros and Goldenstein (1997) and Moreira and Correa (1997) among others].

The present paper estimates a system of demand equations for short-run assets (liabilities) as a function of returns (costs) of choice items and the stock of non-choice items as implied by a portfolio model. It is worth investigating if the expected theoretical implications are tenable in the Brazilian case and whether the patterns of demands for short-run assets and liabilities possess distinctive features in a more stable environment. Furthermore, it is relevant to verify whether one can discern comparable results with respect to developed countries.

The paper is organized as follows. The second section presents a brief digression on portfolio theory in the context of balance sheet analysis. The third section discusses data construction and describes the empirical model to be implemented. The fourth section presents the empirical results pertaining the econometric demand analysis. The fifth and last section brings some final comments.

2. PORTFOLIO SELECTION MODELS: A BRIEF DIGRESSION

Portfolio selection analysis can provide a useful framework for assessing interdependencies among components of a firm's balance sheet.[2] Previous applications considered by Hay and Louri (1989, 1991, 1996) followed a similar setup as the adopted here. Essentially, a system of interdependent demands for aggregate classes of balance sheet components, choice and non-choice items, is formulated and estimated.

The negative exponential utility function in profits initially proposed by Freund (1956), depicts a conservative agent and has become the most usual standard in the previous studies. The implied (equivalent) expression for the expected utility in the case of normally distributed profits is given by:[3]

$$E(U_\pi) \; = \; \{\mu_\pi \; - \; 1/2\, b\, \sigma_\pi^2\} \tag{1}$$

where b and c denote positive parameters and π stands for profits, and with μ_π and σ_π^2 denoting the mean and variance of profits, respectively.

[1] A different strand of the literature, however, emphasizes the relevance of positive models for the portrayal of firm's behavior and recognize the interdependence among the different items of the firm's balance sheet [see e.g. Parkin (1970) and Courakis (1974, 1975, 1988)].

[2] Courakis (1988, 1989) provide a critical overview of the relevant literature.

[3] See e.g. Mood et al. (1987) for useful results on the log-normal distribution that justify expression 1

Next, one needs to establish the distinction between choice and non-choice components of a balance sheet that will basically reflect the decision horizon associated with a given balance sheet component.[4] We define the vector denoting the total value of the portfolio as V that can thought in terms of the concatenation of the sub-components V_Z and V_K that respectively denote the choice and non-choice terms. The portfolio decision can be summarized in terms of the maximization of expression 1 subject to the restriction that assets must be equal to liabilities:

$$MaxE(U_\pi) = m_e V - 1/2bV^{'}SV \;\; s.t. \;\; I_Z^{'}V_Z + I_K^{'}V_K = 0 \tag{2}$$

where m_e represents the vector of expected returns, that can be partitioned in terms of the choice sub-component m_Z and non-choice sub-component m_K, m_eV denotes the expected profits, S denotes the variance-covariance matrix of returns, $V^{'}SV$ stands for the variance-covariance matrix of expected profits, and $I_Z^{'}$ and $I_K^{'}$ represent vectors of ones.

The solution of the previous program leads to the following expression:[5]

$$V_Z \; = \; b^{-1}Gm_Z \; - \; H\,V_K \tag{3}$$

It defines a set of linear demand equations of balance sheets' components that comprise two blocks. First, the demand for a given choice asset depends on the expected returns on all choice assets (m_Z) with the G matrix indicating the sensibility of the former with respect to the latter. G is Z by Z matrix where Z denotes the number of choice components. Second, the demand for each asset depends on the stock of non-choice assets with the H matrix indicating the corresponding response patterns is a Z by K matrix where K represents the number of non-choice components.[6] In addition to the basic structure implied by expression 3 a set of restrictions from demand theory is considered, specifically (see Hay and Louri (1989), p. 155, for details):

(a) Simmetry of matrix G: this follows from the symmetry of the S matrix;

(b) Homogeneity: the relative demands of choice components should not be affected by equal changes in the corresponding ratios of returns;

(c) Cournot aggregation: all components' adjustments should be consistent with keeping the balance sheet in balance after any changes in returns;

(d) Non-negative own rate coefficients: the increase in the expected return of a choice component will not cause a reduction in the stock of the referred component;

(e) Engel aggregation: any change in the stock of a non-choice component implies changes in the demands for choice components which add up to the initial change.

Cournot and Engel aggregation restrictions are direct consequences of the balance sheet constraint and therefore are not testable, whereas the remaining restrictions are associated with specific coefficients restrictions to be assessed in terms of the econometric estimation. In the next section, we will consider an empirical variant of the basic theoretical model just considered together with the restrictions described above. The exact meaning of the aforementioned restrictions will be made clear later in section 3.2 after specific notation is established.

[4]The decision horizon for this short-run portfolio model is implicitly 1 year (the reference period of our data). Long-run aspects are embodied in terms of the stock of non-choice assets.

[5]The expressions indicating how the G and H matrices relate to the sub-components of the variance-covariance matrix of returns are provided in the appendix I of Hay and Louri (1989).

[6]In empirical applications actual figures for returns of choice items are considered despite the expectation character implied by theory. This feature indicates a strong rationality assumption of this framework.

3. DATA AND EMPIRICAL IMPLEMENTATION

3.1. Data Sources

The main data source for the present study is the databank of the 1000 largest companies in Brazil [Center for Entrepreneurial Studies-Getulio Vargas Foundation] which includes annual balance sheets and results accounts data for both quoted and unquoted firms.[7] The chosen sample period was 1990-98, for which an unbalanced panel of firms was generated for the transformation industry. The overall sample included a maximum of 260 firms in a given year with a total of 2248 observations.

Table 1 indicates the structure of an aggregate balance sheet. We follow mainly the account specificities of Brazilian system of accounts. A basic difference from Hay and Louri studies concerns the treatment of investment in physical capital as a choice component. [8]

3.2. Empirical Model

The set of equations to be estimated is presented by expression 3 where a set of additive stochastic disturbances can be considered. The set of explanatory variables is listed next. The classification in terms of choice and non-choice items directly relates to the notion of a planning period that given annual data availability is set at 1 year. Items that have a broader decision horizon will be denominated as non-choice. The specification of the system below closely follows the previous literature. Hay and Louri (1996), however, contrasts with Hay and Louri (1989, 1991) by considering investment as a non-choice item given the planning period rationale just mentioned. In the present study, we also exclude investment as a choice item.[9]

$$V = Gm_Z + HV_K + Jx \tag{4}$$

where a set of other economic control variables as given by vector x (and with corresponding coefficients' matrix J) augments the theoretical equation system given by expression 3. The coordinates of vectors V, m_Z, V_K and x follow the ordering indicated in the list of variables that is presented below.

Moreover, the imposed theoretical restrictions previously discussed assume the particular forms described below, where i denotes a unit vector:

- Cournot and Engel aggregation: $i'G = 0i, i'H = i$ and $i'J = 0$. Those restrictions indicate that for each column the coefficients add up to 0 and 1 in the G and H matrices respectively.
- Symmetry and homogeneity: $G_{ij} = G_{ji}\ \forall i, j$ and $G_{i5} = -[G_{i1} + G_{i2} + G_{i3} + G_{i4}]$ for every row of matrix G.
- Non-negative own rate coefficients: the restriction requires that the elements in the diagonal of the G matrix should be non-negative. Next the variables used in expression 4 are described.

Balance sheet choice items (dependent variables)

[7] Quoted firms could, in principle, be associated with a separation between ownership and management that could undermine the motivation of utility maximization adopted in the portfolio framework. However, as mentioned by Hay and Louri (1991, 1996) based on quoted firms, those are likely to indirectly comply with the stock holders interests. in order to avoid future loss of control. That could be associated, for example, with a hostile take-over.

[8] We believe, however, that the decisions relating to additions in physical capital are likely to consider a decision horizon broader than 1 year and therefore include such category as part of a non-choice component. Moreover, one should stress that such account includes, in our case, all long-run assets.

[9] Beyond the conceptual motivation, it is worth noting that construction of investment figures as the rate of change of permanent assets is controversial and would imply the loss of one year in the sample.

.DST change in inventories;

.LC short run loans contracted through the financial system;

.TD trade debt, essentially refers to credit extended to customers;

.TC trade credit;

.WK working capital.

Balance sheet non-choice items

.SL inventories balance at the beginning of the period;

.KL long run assets;

.LL long run liabilities;

.SH shareholders funds;

Returns (Costs) of choice items

.DIF return on inventories measured as the difference between the inflation in terms of the general price index (IGP-DI) and the one associated with the wholesale price index (both obtained from the Getulio Vargas Foundation);

.CL costs of loans: measured by the real interest rate, charged by banks, for loans relating to horizons between 7 and 30 days. The rates were obtained from several issues of Jornal do Commercio and Gazeta Mercantil (annual rates generated upon end of month averages);

.CD return on net trade credit as measured by real return on 60 days pre-fixed certificates of deposits obtained from Boletim do Banco Central do Brasil (several issues) and Conjuntura Econômica, 53 (10), 1999;

.RTB buying rate for trade bills averaged over the year less inflation, where the rates were obtained from several issues of Jornal do Commercio and Gazeta Mercantil (annual rates generated upon end of month averages);

.HM return on working capital measured in terms of the real interest rate for short-term bank loans ("hot money"), where the rates were obtained from several issues of Jornal do Commercio and Gazeta Mercantil (annual rates generated upon end of month averages).

Other Control Variables

.BC business cycle variable capturing the capacity utilization of the firm defined as the ratio between gross revenue and total assets;

.GDP dummy variable relating to the behavior of the gross domestic product of the economy, which assume a value of 1 if one observed positive growth in comparison with the previous year and 0 otherwise;

.EP dummy variable that assumes value 1 if any stabilization plan took place in that year and 0 otherwise. This variable captures uncertainties associated with sudden change of rules in the economy.

.NPD number of non-performing debts as provided by SERASA (a private rating agency in Brazil). This variable may approximate an environment that is favorable to credit rationing.

Finally, it is worth mentioning that all balance sheets components were expressed as ratios of total assets. Furthermore assets are entered with a positive sign and liabilities with a negative sign.

4. ECONOMETRIC ESTIMATION AND RESULTS

The system of equations just described is characterized by potentially interrelated errors in the different equations and therefore it is important to consider a system estimator. Engel and Cournot aggregation restrictions directly follow from the equilibrium in the balance sheets. Those restrictions imply that the equations are not independent and In the present estimation the WK equation was excluded. We consider the full information maximum likelihood estimator (FIML) that possesses the convenient property that the estimates are invariant to the choice of the excluded equation. The coefficients of the omitted equation can be recovered upon the aforementioned aggregation restrictions and the linearity of the restrictions facilitates the calculation of the standard errors upon the relevant elements of the variance-covariance matrix for the parameters. The system of 4 equations is estimated with 10 less parameters that would prevail under an unrestricted estimation in terms of 6 restrictions related to symmetry and 4 restrictions referring to homogeneity. Given the former restrictions the related coefficients are recovered by means of the homogeneity restriction for the particular equation.[10]

The estimation was implemented for two sample periods. First, we considered the overall sample with 1935 observations during the 1990-98 period. This estimation takes advantage of a larger sample but includes periods of economic instability and stability. Second, we consider a smaller sample with 802 observations during the 1994-98 period. This period was characterized by the price level stability brought by the Real stabilization plan, the continuation of a more liberal environment following previous trade liberalization movements and yet the beginning of the privatization processes and related regulatory institutional setup. This presents a sharp contrast with the previous inflationary scenario and therefore provides an interesting opportunity for examining the optimal portfolio allocation of industrial firms under different degrees of uncertainty. All estimations were implemented with the software Eviews 5.0. Next, we present the empirical results for those two sample periods.

Overall sample

It is worth mentioning that the system of equations was estimated with equation specific intercepts and sectoral dummies. The latter coefficients were all highly significant, but the sectoral dummies were, as a rule, non-significant. This point is interesting as sector-specific portfolio allocation patterns could be a source of concern that led authors of previous studies to pursue sector-specific estimations despite the limited number of observations. The evidence in this study, however, does not seem to ascribe any evident role for sector-specific factors in determining portfolio choice.[11]

The first preliminary verification refers to the validity of the symmetry and homogeneity restrictions. For that purpose, we consider a likelihood ratio test. The test statistic was $\chi^2(10) = 14.158$ (p-value: 0.1659). One cannot therefore reject the validity of the symmetry and homogeneity restrictions. In order to obtain a first crude approximation of the goodness of fit for the model it is worth mentioning the values for the adjusted R^2. The values were respectively 0.99, 0.41, 0.54 and 0.30 for the DST, LC, TD and TC. The overall adjustment, however, does not preclude the prevalence of a large number of non-significant coefficients as can be noted from the inspection of the table 2.

The results are presented in table 2. Starting with the matrix G, one observes a weak support for portfolio theory. In fact, 5 out of 15 coefficients are significant at the 5% level. The main expected result accruing from the theoretical model is that the demand for a choice asset should move in the same direction of the corresponding return and that the demand for a choice liability should vary in

[10] The recovery of the coefficients of the WK equation follows from the adding up conditions in each column of matrices G and J (that should add to 0) and H (that should add to 1). Moreover, given the linearity of the restrictions the standard errors can be obtained by the operation of sums of variances and covariance terms obtained from the variance-covariance matrix for the estimated coefficients.

[11] The coefficients for the intercepts and sectoral dummy variables are not reported for conciseness but can be provided upon request.

opposite direction to the associated cost. The coefficients in the main diagonal of matrix G should therefore be non-negative. In the forthcoming comments we will consider the 5% as the reference for the analysis. Only one diagonal coefficient referring to return in inventories (DIF) was significant but displayed, however, a negative sign.

The off-diagonal coefficients of matrix G represent the interaction between assets and liabilities. A negative coefficient for the rate of return of asset j in the equation of asset i indicates that both are substitutes in terms of risk and return. The results with that respect were mixed in terms of the significant coefficients, as two of those are positive and two are negative. Let's examine some specific coefficients that revealed to be statistically significant ($G_{12} = G_{21}$, $G_{13} = G_{31}$, $G_{24} = G_{42}$ and $G_{25} = G_{52}$). The first referred coefficient indicates that the cost of loans (CL) negatively impacts changes in inventories (DST) and the return to inventories (DIF) negatively impacts short-run loans (LC). The second coefficient indicates that return on net trade credit (CD) exerts a positive impact on changes in inventories and that returns to inventories positively affects the willingness to extend credit to customers (TD). The third coefficient shows a negative effect trade credit cost (RTB) on the amount of short-run loans and yet a negative impact of the cost of loans on the willingness to obtain credit from suppliers (TC). The fourth coefficient indicates a positive influence of return on working capital (HM) on the willingness to rely on loans and a positive effect of the cost of loans on the willingness of increasing working capital. The former refer to current assets minus current liabilities and once more the effects are sensible. The results for the significant coefficients make sense but the links between the sales and marketing behavior (especially in terms of trade credit and debt) and funding sources like loans and working capital were not as clear as in the U.K. case. In fact, even for that developed country, the G matrix results was indeed the weak point of the estimation with several non-significant coefficients. The results for the Brazilian case were somewhat worse indicating low responsiveness of short-run assets (liabilities) to relative movements in returns (costs).

The coefficients of the H matrix captures the responsiveness to the stocks of non-choice assets. One needs to exercise extra care in interpreting the coefficients of that matrix as negative values were attributed to the liabilities variables and therefore those should be interpreted in reverse form The results are more satisfactory from a statistical point a view, as in that case, 15 out of 20 coefficients are significant with mixed signs. In conceptual terms the expected signs of the coefficients are not as clear cut as those from the G matrix. Some results are predictable like the positive dependence of changes in inventories to the initial stock of inventories. Another interesting results are that the availability of shareholder funds (SH) negatively affect credit extended to customers. No drastic contrasts emerge in comparison to the studies for the U.K.

The J matrix indicates the effects of the additional control variables. In that case, one obtained 10 out of 20 significant coefficients that displayed a plausible sign in different occasions. The variables proxying business cycle and stabilization plan (BC, GDP and EP) appear to be relevant in many cases, but the proxy for non-performing debts (NPD) does not seem to exert any influence in the portfolio decisions. In particular, it is worth mentioning the positive effect of the activity level of the firm (BC) on and on the willingness to extend credit to customers. These results are consistent with previous empirical evidence but the evidence for the economy activity level variable (GDP) exhibits some contrast with the studies for the U.K. The significance of 3 coefficients related to the stabilization plan variable (EP) indicates that macroeconomic uncertainty can have some effect on portfolio decisions. This point will motivate the consideration of the sub-sample mostly characterized by price-level stabilization and a more competitive environment.

In general, we can observe a satisfactory performance of the portfolio model in terms of the stock of non-choice items (as reflected in the H matrix) and other control variables (as reflected in the J matrix). The results, however, are somewhat poor in the case of the returns (costs) of choice assets (liabilities) as indicated by the estimated parameters for the matrix G. In fact, even in earlier studies for the U.K. the results were only regular with respect to that matrix. The authors advanced the possibility of measurement errors with reference to the relevant interest rates faced by firms. For example, the

cost of loans (CL) might not be reflecting the true cost of obtaining loans since collaterals charged by banks are not included in that measure, these additional requirements can become important in a credit rationing setting. Moreover, since the data set used in this study refers to large firms one can suspect that the relevant interest rates are not perfectly observable.[12]

Next, we consider the estimation of that portfolio model in the context of a more stable period and the corresponding results are presented in table 3.

1994-98 Period

In principle, we expected that a more stable environment should favor the performance of the portfolio model and eventually generate results that are closer to those obtained for developed countries. A first assessment for the portfolio framework relates to the test of the symmetry and homogeneity restrictions. The results are not encouraging in this case as one obtains the test statistic $\chi^2(10) = 234.244$ (p-value: 0.000) that would recommend the rejection of those restrictions. It is worth mentioning that previous works only provided partial support for those restrictions as indicated by the works of Hay and Louri (1989, 1991) and outright rejection in the study of Hay and Louri (1996). Even though, the partial results did not discourage previous researchers, one must exercise caution on interpreting the results for this sub-sample and the analysis will be more cursory Once more as a rough approximation, the adjusted R^2 were respectively 0.22, 0.37, 0.58 and 0.30 for the DST, LC, TD and TC.

Starting with the G matrix, one observes 7 out of 15 coefficients that are statistically significant but with regard to the diagonal coefficients only 3 are significant. Once more, return on inventories (DIF) has an unexpected negative effect on the change in inventories (DST) whereas one obtains an expected positive effect of the return on net trade credit (CD) on trade debt (TD) and of the buying rate for trade bills (RTB) on trade credit (TC). One observes, a larger number of significant off-diagonal coefficients and for example it is worth mentioning the negative effects of the proxy for trade credit cost on trade debt In other words if it becomes more expensive to obtain credit from suppliers one will be more reluctant to extend credit to customers.

The effects of the stocks on-choice items on portfolio allocation are captured by the H matrix. One can observe that 18 out of the 20 estimated coefficients were significant and with many plausible results. The results for this sub-samples are qualitatively similar to those from the overall sample in terms of the coefficients' signs.

Finally, additional control variables are considered in the J matrix that had 13 out of 20 coefficients as statistically significant. Once more, the variables referring to the activity level of the firm and the economy (BC and GDP) and to the stabilization plan (EP) appear to have relevant effects. In many case, the signs were as expected. For example, the change in inventories and the level of trade debt positively responded to those variables. As a rule, however, non-performing debt does not seem to exert relevant effects on portfolio allocation. The results, in terms of the coefficients' signs, are partially coincident with the estimates from the overall equation. An important difference, however, is the effect of activity level in trade debit and trade credit.

The results in terms of statistical significance and sensible coefficients' signs are slightly better for this sub-sample but one cannot detect a markedly distinct pattern of portfolio allocation under a more stable environment as would in principle be expected.

[12] Rather than disappointing the result is quite suggestive for a developing country in Brazil plagued with interest rates among the highest in the world. In fact, high levels of interest rates may induce credit rationing as an equilibrium phenomenon by creating an adverse selection effect [see Stiglitz and Weiss (1981)] and some changes in the balance sheet can to some extent be non-responsive to interest rate differentials. Of course this possibility needs further investigation, but even in a stable economy like the U.K. Hay and Louri (1996) had suggested the possible prevalence of credit crunch.

5. FINAL COMMENTS

The present paper aimed at approaching the balance sheet of Brazilian industrial firms in terms of a portfolio selection model. The investigation was motivated by the possibility that the patterns of portfolio allocation in a developing country like Brazil could differ if compared with stable economies like the U.K.. In that sense, one also considered the estimation during a more stable and competitive period like 1994-98.

The evidence indicated a good support for portfolio theory in terms of the dependence on the stocks of non-choice items and other control variables. The responsiveness short-run assets to assets returns was even weaker than the partial result obtained by Hay and Louri (1989, 1991, 1996).

Relevant extensions to the present analysis relate to the possible relevance of additional control variables that refer to sector specific characteristics as for example the import tariff level. The possible heterogeneity among different industrial sectors awaits further investigation in the context of portfolio framework adopted in the present paper.

Another possible route for future research relates to verifying to what extent the empirical results are robust to the functional form assumption. In fact, the linearity of the demand system is implied by the negative exponential utility function. Additional exploration with alternative functional forms in the context of balance sheets is essentially absent from the literature. Those extensions would imply not only more complex estimation procedures but also more intense data availability requirements that are beyond the scope of the present work.

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Table 1 – Simplified Balance Sheets Structure

ASSETS	LIABILITIES
Choice	**Choice**
Trade debt (TD)	Trade credit (TC)
Net additions to stocks in the current period (DST)	Short-term loans (LC)
Working capital (WK)	
Non-choice	**Non-choice**
Stocks from the previous period (SL)	Long-term loans (LL)
Net physical assets (KL)	Shareholders funds (SH)

Table 2 – Econometric Estimates - Overall Sample (No. of observations: 1935)

G MATRIX

	DIF	CL	CD	RTB	HM
DST	-0.0003	-0.0001	0.0002	9.09E-05	1.06E-04
	(0.0000)	(0.0128)	(0.0001)	(0.1225)	(0.9946)
LC	-0.0001	-4.86E-06	-7.02E-05	-0.0002	3.93E-04
	(0.0128)	(0.9593)	(0.3926)	(0.0255)	(0.0135)
TD	0.0002	-7.02E-05	3.03E-05	-0.0002	3.99E-05
	(0.0001)	(0.3926)	(0.8293)	(0.1309)	(0.9218)
TC	9.09E-05	-0.0002	-0.0002	0.0003	2.81E-05
	(0.1225)	(0.0255)	(0.1309)	(0.0992)	(0.9796)
WK	1.06E-04	3.93E-04	3.99E-05	2.81E-05	-5.67E-04
	(0.9946)	(0.0135)	(0.9218)	(0.9796)	(0.8809)

p-value in parenthesis

H MATRIX

	SL	KL	LL	SH
DST	-1.0008	-0.2370	0.0270	0.0299
	(0.0000)	(0.0000)	(0.1909)	(0.0147)
LC	0.0004	-0.0689	-0.2966	-0.3496
	(0.9839)	(0.0000)	(0.0000)	(0.0000)
TD	0.0015	-0.3114	0.0640	0.0639
	(0.8955)	(0.0000)	(0.0042)	(0.0000)
TC	-0.0010	0.0553	-0.1784	-0.1504
	(0.9320)	(0.0000)	(0.0000)	(0.0000)
WK	1.9999	1.5620	1.3840	1.4062
	(0.9863)	(0.0000)	(0.0000)	(0.0000))

p-value in parenthesis

J MATRIX

	BC	GDP	EP	NPD
DST	0.0415	-0.0077	0.0303	2.63E-05
	(0.0000)	(0.1291)	(0.0000)	(0.7274)
LC	0.0121	-0.0116	0.0214	0.0001
	(0.0003)	(0.0897)	(0.0018)	(0.0878)
TD	0.0160	-0.0139	0.0071	0.0001
	(0.0001)	(0.0409)	(0.3093)	(0.2001)
TC	-0.0158	-0.0125	-0.0028	-1.95E-05
	(0.0000)	(0.0490)	(0.6446)	(0.8424)
WK	-0.0538	0.0457	-0.0560	-0.0002
	(0.0000)	(0.0500)	(0.0006)	(0.5761)

p-value in parenthesis

Table 3 – Econometric-1994-98 (No. of observations: 802)

G MATRIX

	DIF	CL	CD	RTB	HM
DST	-0.0017	-0.0005	0.0006	0.0021	-0.0005
	(0.0004)	(0.0016)	(0.1070)	(0.0084)	(0.2499)
LC	-0.0005	2,00E-05	0.0007	-0.0006	-0.0005
	(0.0016)	(0.6005)	(0.0053)	(0.0659)	(0.5410)
TD	0.0006	0.0007	0.0021	-0.0066	0.0013
	(0.1070)	(0.0053)	(0.0072)	(0.0024)	(0.7822)
TC	0.0021	-0.0006	-0.0066	0.0098	-0.0040
	(0.0084)	(0.0659)	(0.0024)	(0.0136)	(0.5344)
WK	-0.0005	-0.0005	0.0013	-0.0040	0.0037
	(0.2499)	(0.5410)	(0.7822)	(0.5344)	(0.4296)

p-value in parenthesis

H MATRIX

	SL	KL	LL	SH
DST	-0.4865	-0.1706	0.0020	0.0067
	(0.0000)	(0.0000)	(0.9185)	(0.5642)
LC	-0.1624	-0.0964	-0.3566	-0.3328
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
TD	-0.1462	-0.3103	0.0565	0.0617
	(0.0000)	(0.0000)	(0.0299)	(0.0000)
TC	0.0783	0.0865	-0.1199	-0.1159
	(0.0066)	(0.0000)	(0.0000)	(0.0000)
WK	1.7168	1.4908	1.4180	1.3803
	(0.0000)	(0.0000)	(0.0000)	(0.0000)

p-value in parenthesis

J MATRIX

	BC	GDP	EP	NPD
DST	0.0133	0.1281	0.1173	0.0002
	(0.0025)	(0.0000)	(0.0000)	(0.0000)
LC	0.0105	-0.2776	-0.2774	0.0002
	(0.1123)	(0.0000)	(0.0000)	(0.0620)
TD	0.0224	0.3596	0.3579	5E-05
	(0.0000)	(0.0000)	(0.0000)	(0.3090)
TC	-0.0212	-0.1537	-0.1721	9E-05
	(0.000)	(0.0161)	(0.0000)	(0.9233)
WK	-0.0250	-0.0564	-0.0257	-5.4E-04
	(0.0102)	(0.3730)	(0.5782)	(0.9007)

p-value in parenthesis