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Indebtedness and Liquidity in Agriculture: A Long-term Sectoral Evidence from Turkey

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

Being indebted and the liquidity shortfalls could be the base for recreating debt in the circumstances of unavailable trade credit. Accessing to bank credit or other liabilities is rather a function of liquidity for all types of businesses. Excluding equities, we hereby aim to reveal a sectoral evidence by the help of other liabilities side contributors and liquidity indicators on to what extend a firm regenerates debt in the long-run depending on the general liquidity criteria. Therefore, we try to explore a sector specific long-term evidence on the agriculture sector in Turkey. The real sector statistics feed the study in terms of data. Data curation consists of calculating data series as averages of three years aggregate balance sheet totals in the agriculture sector of Turkey for the time span of 1996 and 2016. The methodology follows a path as testing regressions for the variables, presenting interchangeably significant results, affirming the assumptions of the regressions, tests on unit root and cointegration along with causalities. The findings of the study confirm self-creating reasons of being indebted with the impact of liquidity. The study represents three models which have total debt to total assets ratio, short-term bank credits to short-term liabilities ratio, and long-term bank credits to total assets ratio as dependent variables respectively. We have analyzed the effects of current ratio, acid-test or quick ratio and cash and cash equivalents ratio which are listed as leading liquidity indicators. Cash and cash equivalents and current ratio have been found significant on the liabilities in the early trials of regressive test models. However, except current ratio liquidity indicators all together failed in predicting. The

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results eventually confirm the importance of eminent liquidity criteria, both current ratio and acid-test ratio are significant on the selected variables of liabilities as an evidence for the agriculture sector of Turkey in the long-run. Nevertheless, acid-test ratio has rather strong and enduring effects. Since cash and cash equivalents have been determined as stationary at a different level, they could therefore have insignificant impact on being indebted for longer periods than time span of the study. Yet the creditors would better not to directly add a liquidity indicator in their decision process of creditability in a sector. Nonetheless, the novelty of the study also ensures that predicting total debt and bank credits of both short and long run might require the same liquidity indicators along with other liability side contributors which do not necessarily or directly consider the shareholders' equities in a sector specific atmosphere.

Keywords: Liquidity; debt; bank credits; agriculture sector; Turkey.

1. INTRODUCTION

Credits in terms of trade credit or bank credit along with the amount of equity as much as possible are the main financing alternatives for all firms of all scales and from all sectors. The firms could attain a level of being indebted in time. Nonetheless, being that much indebted and the liquidity shortfalls could be the base for recreating debt particularly in the circumstances of unavailable trade credit. There could appear difficulties in repeating the accessions to credit as the assets have already been used as collateral. Moreover, all struggle for accessing to bank credit or other liabilities have been, in the first place, a function of liquidity for all types of businesses.

Liquidity of any firm has been on the first spot not only for financial health but also for the ability to pay back the liabilities which include trade credit or bank credit in the relevant literature of business finance [1-16]. Financial ratios and sectoral averages in terms of indicators for liquidity and liabilities have been useful prognosing instruments, and the impact of liquidity indicators on liabilities could be primary to confirm the reliability of these indicators for any firm in any scale or sector [17-23]. The path to a potential bank credit is the level of creditability where positive liquidity measures and cash flow occur within the fluctuating circumstances [5,24-27]. The sectoral characteristics may differ in their evidence; however, the indicators of liquidity remain the same. The assets in the agriculture sector like any other sector depend on indebtedness in time [28]. Financing decisions in all sectors including agriculture, for decreasing leverage risks might be followed by new and financial ones and lenders' and creditors' attitudes may differ in time along with alterations on the pecking order in the liabilities including equities [29-31].

The study takes the liabilities of the businesses, excluding (shareholders') equities, with the liquidity indicators at the first three ranks of liquidity which is vital in the repayments. Thus, the study hereby aims to divulge a sectoral evidence by the help of those liabilities' side contributors and liquidity indicators. The quest is to explore to what extend a firm regenerates debt in the long-run depending on the general liquidity criteria.

Since the agriculture sector is among the main sectors for economic sustainability and self-sufficiency for any country, we have selected a specific sector, the agriculture sector in Turkey, and tried to discover a sector specific long-term evidence. The study is fed by the real sector statistics of the Central Bank of the Republic of Turkey (CBRT) in terms of data on liabilities and liquidity. For the study, data curation starts with the calculations of data series as averages of three years' aggregate balance sheet totals in the agriculture sector of Turkey for the time span of 1996 and 2016.

The methodology consists of testing potential regressions for the variables and representing a set of three models for which we followed a typical statistical procedure. We present the significant results of the models which are designed by using the selected variables interchangeably. We then confirm the fundamental assumptions for the regressive models. We further analyzed and assure the reliability of the models by conducting tests on unit root, and cointegration potential of the variables along with causalities therein.

The study represents three models which have total debt to total assets ratio, short-term bank credits to short-term liabilities ratio, and long-term bank credits to total assets ratio as dependent variables respectively. We have analyzed the effects of current ratio, acid-test

ratio, and cash and cash equivalents ratio which are listed as the leading liquidity indicators aiming to assess the power to satisfy short-term liabilities or liabilities up to one year for a firm. Though cash and cash equivalents have been found significant in the early trials of regressive test models, they failed in the unit root tests by being stationary at a different level.

The findings of the study approve self-creating reasons of being indebted with the impact of liquidity. The results eventually confirm the importance of eminent liquidity criteria, both current ratio and acid-test ratio are significant on the selected variables of liabilities in the evidence of agriculture sector of Turkey in the very long-run. Cash could therefore have a significant but misleading impact on being indebted in a sector, therefore the creditors would better not to directly add a liquidity indicator just because it lies at the upper ranks of liquidity indicators' list within their decision process of creditability. The study has the novelty by ensuring that predicting total debt, bank credits of both short and long run might require a selected set of liquidity indicators along with other liability side contributors which do not necessarily consider the shareholders' equities in a specific sectoral scene.

2. MATERIALS AND METHODS

The abbreviations used in the study for the variables which are all taken in percentages of their denominators are given below:

STBC/STL : Short-Term Bank Credit to Short Term Liabilities Ratio
LTBC/TA : Long-Term Bank Credit to Total Assets Ratio
TD/TA : Total Debt to Total Assets Ratio
CR : Current Ratio
ATR : Acid-Test Ratio
C&CER : Cash and Cash Equivalents Ratio

After testing potential regressions for the variables, the model design trials were resulted in three different models in which the selected variables of liabilities are used interchangeably. The models are as follows:

Model A:

$$Y_{STBC/STL\,it} = \beta_0 + \beta_1 x_{CR\,it} + \beta_2 x_{ATR\,it} + \beta_3 x_{TD/TA\,it} + \beta_4 x_{LTBC/TA\,it} + \varepsilon_{it}$$

Model A predicts STBC/STL as the dependent variable by a constant (β_0) and a set of independent variables on liquidity (CR and ATR) and other liability side variables (TD/TA and LTBC/TA) and error terms as (ε_{it}) excluding equities. Therefore, the effect of trade credits is considered with the TD/TA ratio.

Model B:

$$Y_{LTBC/TA\,it} = \beta_0 + \beta_1 x_{CR\,it} + \beta_2 x_{ATR\,it} + \beta_3 x_{TD/TA\,it} + \beta_4 x_{STBC/STL\,it} + \varepsilon_{it}$$

Model B similarly takes LTBC/TA as the dependent variable, and independent variables are CR, ATR, TD/TA, and STBC/STL.

Model C:

$$Y_{TD/TA\,it} = \beta_0 + \beta_1 x_{CR\,it} + \beta_2 x_{ATR\,it} + \beta_3 x_{STBC/STL\,it} + \beta_4 x_{LTBC/TA\,it} + \varepsilon_{it}$$

Model C considers TD/TA as the dependent variable, and in this model the independent variables are therefore CR, ATR, LTBC/TA, and STBC/STL respectively. C&CER has also found significant as an independent variable with the assistance of current ratio in the testing regressions at the draft versions of the research (Table 1). However, the liquidity indicators in all together models failed in predicting and C&CER could not be determined stationary at the same level with other variables of the study. Thus, we continued with the models which include CR and ATR and other liability side control variables. Each model design or equation uses the variables of agriculture sector in Turkey from 1996 to 2016. The data series are taken as last three years' averages of aggregate sectoral balance sheet data from 1998 to 2016. The study uses Sector A or the agriculture sector in real sector archives and statistics of CBRT for the variables [32]. The study provides the data series of three years' averages for businesses of all scales in the agriculture sector in Turkey from 1998 up to 2016 for each set of three years which are ranging from 48 to 283 firms within the time span of 19 years which is the maximum time span available in the data of CBRT. The study tests each model equation for the data series as in Acikgoz et al. [22,23,33].

For the results and discussion section in the study, we first depict the significant results in terms of brief summaries and details of the regressive models including variance inflation factors for collinearity and by checking the serial correlation and heteroscedasticity along with normality [34-39] for a Least Squares (LS) NLS

and ARMA, or ANOVA method [40-46]. We have also conducted Philips Perron tests for unit root and group common and individual unit root [47-50,42,51], Johansen cointegration and Granger causality. The series are determined as I(1) series except C&CER. We have also determined lag length and detected cointegrating equations within the variables as a result of single equation cointegration tests in Engle Granger with Akaike info criterion at max lag. We have executed Johansen cointegration tests and single-equation cointegration tests by an unrestricted cointegration rank test with both trace and maximum Eigenvalues along with a VAR (Vector Autoregression), diagnostics in terms of inverse roots and VAR Granger causality or Block exogeneity Wald tests at the lag selected [52-67].

All three models ensure the eminence and significance of CR and ATR on bank credits or total debt in the long-run. However, error correction models will be helpful for further analysis in which a Vector Error Correction Model (VECM) can be designed for an utmost equation including error corrections [60,68-70].

3. RESULTS AND DISCUSSION

Liquidity indicators as a relatively small set of measures could be adequately useful in terms of financial analysis without sector-specific considerations including agriculture [71,72]. However, they could not be significant one by one in predictions. Though the robust and significant results for current ratio and acid-test ratio, the findings of this study confirm that cash could not be a reliable predictor in the very long-run [73]. Regarding its relatively eminent levels in the long-run within all sectors, we have decided to reveal the indebtedness in terms of liquidity for the agriculture sector in Turkey [74,22]. Current ratio, acid-test or namely quick ratio, and cash and cash equivalents ratio are the leading set of liquidity indicators. Among these indicators, the famous current ratio is the control variable for all kinds of liabilities whether it is trade credit or bank credit. The ease of financial access has the businesses of today favor increasing amounts of bank credit in their financing. Current ratio is also seen as a sensitive measure for any vital violations along with net worth [75] and as a covenant [76]. Thus, current ratio deserves to be the main control variable in multi-variate assessments. Acid-test ratio has rather been a function of the level for inventories held and their impact on liquidity and cash flow in time [4,5,77]. On the other hand, liabilities especially in the short-term may promote different liquidity settings along with the accumulation on net working capital in terms of trade credit to bank credit ratio [78,79]. Nonetheless, the partial considerations in an aggregate sector such as agriculture may also differ in terms of its subsectors.

Table 1 and Table 2 reflect respectively the brief summaries of the models which have all robust and significant results along with summaries including the coefficients, probabilities, covariances, and centered variance inflation factors excluding the regressions named as Test 1 to 6.Except C&CER, the data series are found all as I(1) in Table 3. Table 4 informs on the confirmed assumptions of all model (Model A, B, and C) regressions which are tested fundamentally on serial correlation,

Table 1. Brief summaries of the model A, B, and C along with tests 1 to 6

Model	Dependent	Independents	Adj. R square	DW	Sign.
A	STBC/STL	CR, ATR, TD/TA, LTBC/TA	0.7839	1.7987	0.000**
B	LTBC/TA	CR, ATR, TD/TA, STBC/STL	0.8918	1.6563	0.000**
C	TD/TA	CR, ATR, STBC/STL, LTBC/TA	0.8900	1.8215	0.000**
Test 1	STBC/STL	CR, C&CER, TD/TA, LTBC/TA	0.8191	1.8452	0.000**
Test 2	LTBC/TA	CR, C&CER, TD/TA, STBC/STL	0.8910	1.5532	0.000**
Test 3	TD/TA	CR, C&CER, STBC/STL, LTBC/TA	0.8804	1.6248	0.000**
Test 4	STBC/STL	CR, ATR, C&CER, TD/TA, LTBC/TA	0.8064	1.8902	0.000**
Test 5	LTBC/TA	CR, ATR, C&CER, TD/TA, STBC/STL	0.8906	1.7165	0.000**
Test 6	TD/TA	CR, ATR, C&CER, STBC/STL, LTBC/TA	0.8854	1.8527	0.000**

***. 0.01 significance. LS: Least Squares (NLS and ARMA) where the dependent variable is followed by the independent variables with ARMA and PDL terms or ANOVA tests*

Table 2. Summaries of the model A, B and C

Model	Independents	Coefficients	Prob.	Coef. variance	Centered VIFs
	C	91.86649	0.0006		
A	CR	-0.341521	0.0039	0.009783	6.712241
	ATR	0.294908	0.0276	0.014393	2.632076
	TD/TA	-1.103787	0.0011	0.072027	5.296366
	LTBC/TA	1.244019	0.0000	0.024573	2.161359
	C	-74.30607	0.0000		
	CR	0.292270	0.0002	0.003475	4.509573
B	ATR	-0.240329	0.0112	0.006768	2.341001
	TD/TA	0.953216	0.0000	0.019182	2.668100
	STBC/STL	0.657655	0.0000	0.006867	1.081842
	C	78.79818	0.0000		
	CR	-0.306679	0.0000	0.001417	2.164911
C	ATR	0.231380	0.0072	0.005430	2.210948
	STBC/STL	-0.495699	0.0011	0.014527	2.693849
	LTBC/TA	0.809754	0.0000	0.013843	2.711194
	C	95.58807	0.0002		
	CR	-0.315941	0.0013	0.006175	5.062935
Test 1	C&CER	0.326257	0.0070	0.010698	2.082736
	TD/TA	-0.990120	0.0007	0.052303	4.595760
	LTBC/TA	1.146421	0.0000	0.018375	1.931387
	C	-81.70638	0.0000		
	CR	0.274932	0.0002	0.003067	3.952023
Test 2	C&CER	-0.246999	0.0118	0.007288	2.229674
	TD/TA	0.911781	0.0000	0.018457	2.548705
	STBC/STL	0.729490	0.0000	0.007440	1.163617
	C	89.04833	0.0000		
	CR	-0.297133	0.0000	0.001463	2.054053
Test 3	C&CER	0.232576	0.0137	0.006823	2.274743
	STBC/STL	-0.578147	0.0007	0.017833	3.039280
	LTBC/TA	0.836694	0.0000	0.015542	2.797643
	C	96.07258	0.0003		
	CR	-0.329252	0.0039	0.008820	6.756083

Model	Independents	Coefficients	Prob.	Coef. variance	Centered VIFs
Test 4	ATR	0.053062	0.7816	0.035129	7.172051
	C&CER	0.286470	0.1288	0.031201	5.675175
	TD/TA	-1.020078	0.0017	0.067179	5.515075
	LTBC/TA	1.165768	0.0000	0.024338	2.389973
	C	-78.92062	0.0001		
	CR	0.295472	0.0003	0.003526	4.525169
Test 5	ATR	-0.136305	0.3488	0.019668	6.727427
	C&CER	-0.133200	0.3750	0.021026	6.407502
	TD/TA	0.942558	0.0000	0.019533	2.686617
	STBC/STL	0.695813	0.0000	0.008670	1.350639
	C	82.48117	0.0000		
	CR	-0.311085	0.0000	0.001521	2.230460
Test 6	ATR	0.163003	0.2257	0.016424	6.417659
	C&CER	0.090758	0.5214	0.018967	6.602836
	STBC/STL	-0.532988	0.0017	0.018340	3.263608
	LTBC/TA	0.825109	0.0000	0.014968	2.813235

*LS Results, ANOVA, **. 0.01 significance. All centered VIFs lie within the interval 0 to 10 and ensure no collinearity*

Table 3. Phillips-Perron unit root test for series at the level and at the first differences

Series	At the level		At the first differences	
	Adj. t-Stat	Prob. *	t-Statistic	Prob. *
CR	-0.247544	0.5829	-4.103682	0.0004
ATR	-0.590919	0.4472	-2.861611	0.0070
TD/TA	-0.092146	0.6382	-3.522381	0.0015
STBC/STL	0.781592	0.8732	-4.354168	0.0002
LTBC/TA	0.358237	0.7774	-5.448848	0.0000
C&CER	-2.089007	0.5170	-2.752869	0.2306

*Phillips-Perron test statistic results and critical values at level and first differences for trend and intercept. Null Hypothesis: Series has a unit root. Exogenous: Constant, Linear Trend. Bandwidth: 0-8 (Newey-West) using Bartlett kernel *MacKinnon [62] one-sided p-values. Probabilities and critical values are calculated for 20 observations and they may not be accurate for a sample size of 17-18 [51]. Note that C&CER has a probability of 0.0010 at the level of second differences. Thus, C&CER is stationary at a different level than the other variables*

Table 4. Confirmation on the assumptions for the model regressions

Model	Test	Prob. *
A	Breusch and Godfrey Serial Correlation LM with Obs*R-squared Prob.Chi-Square (2)	0.9148
	Breusch, Pagan and Godfrey Heteroscedasticity with Obs*R-squared Prob.Chi-Square (4)	0.0587
	JarqueBera Test: Prob.	0.4388
B	Breusch and Godfrey Serial Correlation LM with Obs*R-squared Prob.Chi-Square (2)	0.6226
	Breusch, Pagan and Godfrey Heteroscedasticity with Obs*R-squared Prob.Chi-Square (4)	0.0843
	JarqueBera Test: Prob.	0.7102
C	Breusch and Godfrey Serial Correlation LM with Obs*R-squared Prob.Chi-Square (2)	0.5566
	Breusch, Pagan and Godfrey Heteroscedasticity with Obs*R-squared Prob.Chi-Square (4)	0.2093
	JarqueBera Test: Prob.	0.5089

No serial correlation, heteroscedasticity, and normality as p values > 0.05 [34-39]

heteroscedasticity, and normality respectively. Nevertheless, no unit root is detected for the group of the series at the first differences level of the identical variables of the Model A, B, and C (Table 5).

Since all criteria demonstrated the same positive results for lag 2, we have first tested an unrestricted VAR model with the group at lag 1 to 2, however the AR roots were unacceptable though the significant results of VAR Granger causality or Block exogeneity Wald tests. We then decided to provide a VAR model at lag 1 to 1 which is much reliable in terms of AR roots and particularly for the nature of the variables on liquidity and we decided on lag 1 as the lag length criteria for further analysis (Table 6).

The tests, which seek for cointegration or a long-term validity for the models, assure that there exists cointegrating equations for the sections of no deterministic trend, no deterministic trend (restricted constant), linear deterministic trend, linear deterministic trend (restricted), and quadratic deterministic trend, respectively in between the variables (Table 7). Thereafter, we have conducted single equation cointegration tests for the group of variables so as to explore which variable is the dependent of the significant equations along with the lags respectively. The findings depict that both bank credit terms of liabilities appear in the dependents of potential cointegrating equations where CR confirms its role as a control variable along with ATR as an eminent factor (Table 8).

Nevertheless, we followed the impulse tests for CR and ATR, the liquidity variables along with the responses of our dependent variables for each model. Fig. 1a and b depict that ATR has stronger and enduring impulse on TD/TA. Both CR and ATR have decreasing impulses on short-

term bank credits (Fig. 1c and d). They have increasing effects at the beginning then both have long-term bank credits decrease in time and the impulse of ATR is effective relatively longer as well (Fig. 1d and f). These results in Fig. 1a to f emphasize the importance of inventories as a liquidity facet, therefore indebtedness of this very sector depends much on ATR which has a relatively powerful impulse potential on total debt and bank credits in the agriculture sector, regarding the responses to Cholesky innovations [60,84].

Table 5. Group unit root test for the variables at first differences

Group	Method	Statistic	Prob.**	Cross-sections	Obs
	Null: Unit root (common)				
CR,	Levin, Lin and Chu t	-4.77501	0.0000	5	78
ATR,	Breitung t-stat	-1.82417	0.0341	5	73
TD/TA,	Null: Unit root (individual)				
STBC/STL,	Im, Pesaran and Shin W-stat	-4.29030	0.0000	5	78
and LTBC/TA	ADF - Fisher Chi-square	34.7564	0.0001	5	78
	PP - Fisher Chi-square	47.0279	0.0000	5	85

*Group unit root tests at first differences level for individual intercept and trend. ** Fisher tests use an asymptotic Chi-square distribution, other tests assume asymptotic normality [47,49,50,42,51,48]. Sample: 1998-2016.: Exogenous variables: Individual effects, individual linear trends. Maximum lag. Automatic selection of lag length based on AIC: 0 to 3 with the selection of Newey-West automatic bandwidth and with Bartlett kernel [80,81,82]*

Table 6. Lag order selection

Lag	LogL	AIC	SC	HQ
0	-280.6224	31.73582	31.98314*	31.76992
1*	-247.6999	30.85555*	32.33950	31.06016*

** Lag order selected at VAR, Lag 1 to 1 and 1 to 2 identical results [53,54,58,57,64,60,61]. Exogenous variables: C. Sample: 1998-2016. Included observations: 18. Abbreviations are as follows; AIC: Akaike information criterion; SC: Schwarz information criterion; and HQ: Hannan-Quinn information criterion*

Table 7. Summaries of Johansen cointegration tests for groupof the series

Data trend	None	None	Linear	Linear	Quadratic
Test type	No intercept no trend	Intercept no trend	Intercept no trend	Intercept trend	Intercept trend
Trace	2	3	3	4	5
Max-Eig	2	3	3	4	3

Group cointegration summary. Number of cointegrating equations. Critical values based on MacKinnon-Haug-Michelis [63]. Sample (adjusted): 2000-2016. Lags interval (in first differences): 1 to 1.Included observations: 17 after adjustments. Both Trace and Max-Eigenvalue tests ensure the existence of cointegrating equations at 0.05 level for the sections of no deterministic trend, no deterministic trend (restricted constant), linear deterministic trend, linear deterministic trend (restricted), and quadratic deterministic trend, respectively. Note that trace test indicates 5 cointegrating equations for quadratic deterministic trend [83,66]

Table 8. Summaries of single equation cointegration tests for group of the series

Level	Dependent	Lag	Observations
None	ATR	1	17
None	STBC/STL	1	17
Constant	CR	1	17
Linear trend	CR	1	17
Linear trend	STBC/STL	0	18
Linear trend	LTBC/TA	0	18
Quadratic trend	CR	1	17

Significant results only at 0.05 level. Group of the series, Engle-Granger cointegration test results for single equations on a dependent variable within the group. Automatic lags specification based on Akaike info criterion (maxlag=3). Sample: 1998-2016. Included observations: 17-19. Number of stochastic trends in asymptotic distribution: 5 [53,54,58,59]

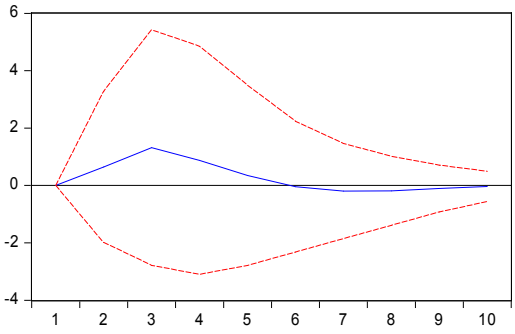

Fig. 1a. Response of TD/TA to CR

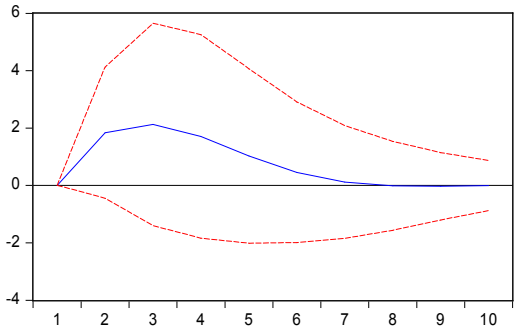

Fig. 1b. Response of TD/TA to ATR

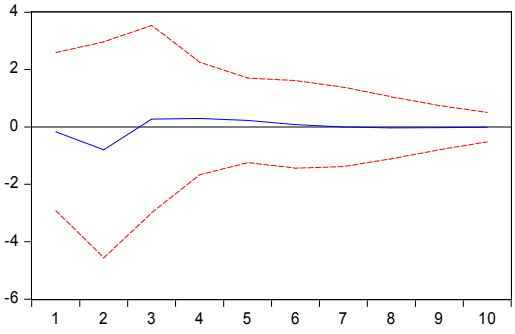

Fig. 1c. Response of STBC/STL to CR

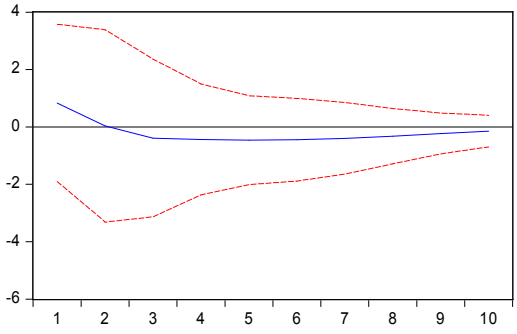

Fig. 1d. Response of STBC/STL to ATR

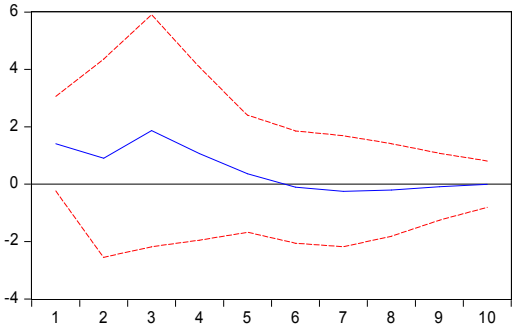

Fig. 1e. Response of LTBC/TA to CR

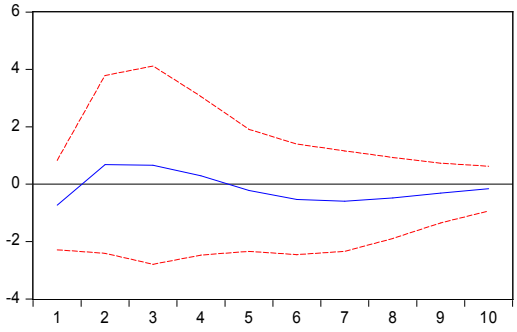

Fig. 1f. Response of LTBC/TA to ATR

Fig. 1a, 1b, 1c, 1d, 1e and 1f. Responses to Cholesky innovations of selected impulses

**Responses on dependent variables TD/TA, STBC/STL, and LTBC/TA to Cholesky one s.d. innovations -/+ 2 s.e. after impulses of CR or ATR at an unrestricted VAR 1 to 1[60,84]*

Since liquidity indicators also help predicting the level of equities, as a result of healthy liquid assets those indicators will expectedly promote the accumulation of equity with respect to bank credit used. Therefore, any targeted level of equity accumulation could only be realized with a vision which substitutes bank credit usage in the times of higher results in the liquidity assessments [85].

This study therefore confirms the significance of leading liquidity indicators which has been demonstrated on equities in [85] and it is also in accordance with the affirmative lagging effects of equities on liquidity [86], on both short- and long-term bank credit as well as on total level of debts over total assets, assuring the significance of current ratio and acid-test ratio in the agriculture sector of Turkey for the long-run in the hereby given evidence of the three models designed for the study; total debt to total assets ratio, short-term bank credits to short-term liabilities ratio, and long-term bank credits to total assets ratio as the dependent variables.

4. CONCLUSIONS

All the three models designed for the study; which have total debt to total assets ratio, short-term bank credits to short-term liabilities ratio, and long-term bank credits to total assets ratio as dependent variables respectively, assure the significance of current ratio and acid-test ratio in the evidence of the agriculture sector of Turkey for the long-run. Though being listed in the leading liquidity indicators, cash and cash equivalents ratio has been found significant in the testing models only with current ratio in the early trials of regressive test models. Nevertheless, the liquidity indicators all together failed to predict liabilities in the evidence of agriculture sector. As only cash and cash equivalents' series have been determined stationary at a different level, they might have unreliable impact on being indebted for longer periods than the time span of the study.

The results lead to approve that there are self-creating reasons of being indebted with the impact of liquidity as all liability side variables selected for the study could have been used interchangeably. The findings eventually confirm the importance the two famous and eminent liquidity criteria, current ratio and acid-test ratio which are significant on the selected variables of liabilities in the evidence of the agriculture sector of Turkey in the long-run. CR and ATR as the liquidity variables have effects along with the responses of our dependent variables for each model. However, ATR has a stronger and enduring impulse on TD/TA. Both CR and ATR have decreasing impulses on short-term bank credits. They have increasing effects at the beginning then both have long-term bank credits decrease in time and the impulse of ATR is found relatively longer. Thus, inventories have lagging effects for the indebtedness which depends much on ATR in time regarding the responses of total debt and bank credits in the agriculture sector of Turkey. We may conclude that working capital or current ratio and inventories or acid-test ratio have linear and quadratic deterministic trends with a sum of relative impact on the financial structure of agricultural businesses in Turkey.

Some of the leading liquidity criteria might therefore have insignificant impact on being indebted in a sector, therefore the creditors would better not to straight forwardly add a liquidity indicator in their decision process of creditability, just because that indicatoris at the upper ranks of liquidity indicators' list. Could the same liquidity indicators be required for predicting total debt, bank credits of both short and long run? The study gives the evidence with an affirmative response. Thus, a sector specific set of circumstances may lead the assessments to being sensitively selective in the indicators.

Regarding the findings which, we believe, will be helpful for the reconsiderations on the set of liquidity indicators, each sector might require a different set for a thorough assessment. Even though the study has some limitations such as selecting a specific sector and using aggregate averages on local data in terms of ratios, the results will expectedly serve as a new start for testing the designated models in other sectors or countries.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Beaver WH. Financial ratios as predictors of failure. Journal of Accounting Research. 4 (Empirical Research in Accounting: Selected Studies). 1966;71-111.
2. Altman, EI. Financial ratios, discriminant analysis and the prediction of corporate bankruptcy. The Journal of Finance. 1968; 23(4):589-609.
3. Altman, EI, Narayan, P. An international survey of business failure classification models. Financial Markets, Institutions and Instruments. 1997;6(2):1-57.
4. Coyle, B. Corporate credit analysis. Glenlake Publishing Company Ltd, Chicago, London, New Delhi, AMACOM, American Management Association (AMA) Publications, The Chartered Institute of Bankers, New York; 2000a.
5. Coyle, B. Cash flow forecasting and liquidity. Glenlake Publishing Company Ltd, Chicago, London, New Delhi, AMACOM, American Management Association (AMA), The Chartered Institute of Bankers, New York; 2000b.
6. Al-Attar, A, Hussain, S. Corporate data and future cash flows. Journal of Business

Finance and Accounting. 2004;31(7-8): 861-903.
7. Burkart M, Ellingsen T. In-kind finance: A theory of trade credit, The American Economic Review. 2004;94(3):569-590.
8. Drever M, Hutchinson P. Industry differences in the determinants of the liquidity of Australian small and medium sized enterprises. Small Enterprise Research. 2007;15(1):60-76.
9. Min JH, Lee Y. A practical approach to credit scoring. Expert Systems with Applications. 2008;35:1762-1770.
10. Michalski G. Operational risk in current assets investment decisions: Portfolio management approach in accounts receivable. Agric. Econ. – Czech. 2008; 54(1):12-19.
11. Ponikvar N, Tajnikar M, Pusnik K. Performance ratios for managerial decision-making in a growing firm. Journal of Business Economics and Management. 2009;10(2):109-120.
12. Chong B, Yi H. Bank loans, trade credits, and borrower characteristics: Theory and empirical analysis. Asia-Pacific Journal of Financial Studies. 2011;40:37-68.
13. Abdou HA, Pointon J. Credit scoring, statistical techniques and evaluation criteria: A review of the literature. Intelligent Systems in Accounting, Finance and Management. 2011;18:59-88.
14. Chen T, Liao H, Lu C. A flow-based corporate credit model. Rev Quant Finan Acc. 2011;36:517-532.
15. Psillaki, M, Eleftheriou, K. Trade credit, bank credit and flight to quality: Evidence from French SMEs. Journal of Small Business Management. 2015;53(4):1219-1240.
16. Keefe MO, Yaghoubi M. The influence of cash flow volatility on capital structure and the use of debt of different maturities. Journal of Corporate Finance. 2016;38:18-36.
17. Lev B. Industry averages as targets for financial ratios. Journal of Accounting Research. 1969;7(2):290-299.
18. Wilcox J. A simple theory of financial ratios as predictors of failure. Journal of Accounting Research. 1971;9(2):389-395.
19. Johnson, WB. The cross-sectional stability of financial ratio patterns. Journal of Financial and Quantitative Analysis. 1979; 14(5):1035-1048.
20. Philips, TK. Why do valuation ratios forecast long-run equity returns, Will the high returns of the last two decades persist? Journal of Portfolio Management. 1999;25(3):39-44.
21. Ak BK, Dechow PM, Sun Y, Wang AY. The use of financial ratio models to help investors predict and interpret significant corporate events. Australian Journal of Management. 2013;38(3):553–598.
22. Acikgoz AF, Apak S, Demirkol C. Non-cash components of net working capital: A long-term outlook of the agriculture sector in Turkey. International Balkan and Near Eastern Social Sciences (IBANESS) Conference Series, Tekirdag, Turkey, Proceedings Book. 2018a;64-72.
23. Acikgoz AF, Demirkol C, Apak S. Net working capital versus marketing in agriculture sector of Turkey. Editor: Anna Haritonova. LAP Lambert Academic Publishing, International Book Market Service Ltd., Omni Scriptum Publishing Group, Beau Bassin, Mauritius; 2018b.
24. Steyn W, Hamman, WD, Smit E. The danger of high growth combined with a large non-cash working capital base. South African Journal of Business Management. 2002;33(1):41-47.
25. Sohn SY, Kim YS. Behavioral credit scoring model for technology-based firms that considers uncertain financial ratios obtained from relationship banking. Small Business Economics. 2013;41:931-943.
26. Dasgupta S, Li EXN, Yan D. Inventory behavior and financial constraints: theory and evidence (November 26, 2017). Asian Finance Association (Asian FA) 2014 Conference Paper; 27th Australasian Finance and Banking Conference 2014 Paper; Swedish House of Finance Research Paper No. 16-17; 2014.
(Revised on 3 December 2017)
Available:https://ssrn.com/abstract=2395018
27. Apak S, Acikgoz AF, Erbay ER, Tuncer G. Cash vs. net working capital as strategic tools for the long-term relation between bank credits and liquidity: Inequalities in Turkey. Procedia-Social and Behavioral Sciences. 2016a;235:648-655.
28. Stekla J, Grycova M. The relationship between profitability and capital structure of the agricultural holdings in the Czech Republic. Agric. Econ. – Czech. 62. 2016; (9): 421-428.
29. Collins RA. Expected utility, debt-equity structure, and risk balancing. American

Journal of Agricultural Economics. 1985; 67(3):627-629.
30. Frank MZ, Goyal VK. Testing the pecking order theory of capital structure. Journal of Financial Economics. 2003;67:217-248.
31. Featherstone AM, Wilson CA, Kastens TL, Jones JD. Factors affecting the agricultural loan decision-making process. Agricultural Finance Review. 2007;67(1):13-33.
32. CBRT. CBRT (Central Bank of the Republic of Turkey), Real Sector Statistics, Archives, Data, 1999-2017; 2019. Available:http://www.tcmb.gov.tr (Retrieved from on 11th of March 2019)
33. Acikgoz, AF, Demirkol, C, Apak, S. The effects of liquidity on inventory: Evidence form forestry products subsector in Turkey, Eurasian Journal of Forest Science. 2018c; 6:98-110.
34. Breusch TS. Testing for autocorrelation in dynamic linear models. Australian Economic Papers. 1978;17:335-355.
35. Godfrey L. Testing against general autoregressive and moving average error models when the regressors include lagged dependent variables. Econometrica. 1978a;46:1293-1302.
36. Breusch TS, Pagan AR. Simple test for heteroscedasticity and random coefficient variation. Econometrica (The Econometric Society). 1979;47(5):1287-1294.
37. Godfrey LG. Testing for multiplicative heteroscedasticity. Journal of Econometrics. 1978b;8:227-236.
38. Jarque CM, Bera AK. Efficient tests for normality, homoscedasticity and serial independence of regression residuals. Economics Letters. 1980;6:255-259.
39. Jarque CM, Bera AK. A test for normality of observations and regression residuals. International Statistical Review. 1987;55: 163-172.
40. Pearson K. Notes on the history of correlation. Biometrika. 1920;13:25-45.
41. Fisher RA. Statistical methods for research workers. Oliver & Boyd., Edinburgh; 1925.
42. Fisher RA. Statistical methods for research workers. 4th edition, Edinburgh: Oliver & Boyd; 1932.
43. Durbin J, Watson, GS. Testing for serial correlation in least squares regression. Biometrika. 1950;37:409-428.
44. Durbin J. Testing for serial correlation in least squares regression when some of the regressors are lagged dependent variables. Econometrica. 1970;38:4410-4421.
45. Durbin, J, Watson, GS. Testing for serial correlation in least squares regression III. Biometrika. 1971;58:1-19.
46. Kutner MH, Nachtsheim CJ, Neter J, Li W. Applied linear statistical models. 5th edition, McGraw-Hill-Irwin, New York; 2005.
47. Levin A, Lin CF, Chu C. Unit root tests in panel data: Asymptotic and finite-sample properties. Journal of Econometrics. 2002; 108:1-24.
48. Breitung J. The local power of some unit root tests for panel data, in B. Baltagi (ed.), Advances in econometrics, Vol. 15: Nonstationary panels, panel cointegration, and dynamic panels, Amsterdam: JAI Press:. 2000;161–178.
49. Im, KS, Pesaran, MH, Shin, Y. Testing for unit roots in heterogeneous panels. Journal of Econometrics. 2003;115:53-74.
50. Dickey DA, Fuller WA. Distribution of the estimators for autoregressive time series with a unit root. Journal of the American Statistical Association. 1979;74:427-431.
51. Phillips PCB, Perron P. Testing for a unit root in time series regression, Biometrika. 1988;75:335-346.
52. Granger CWJ. Investigating causal relations by econometric models and cross-spectral methods. Econometrica. 1969;37(3):424-438.
53. Akaike H. Information theory and an extension of the maximum likelihood principle. In: Petrov BN, Csaki F, Eds., Second International Symposium on Information Theory, Budapest. 1973;267-281.
54. Akaike H. A new look at the statistical model identification. IEEE Transactions on Automatic Control.AC-19. 1974;716–723.
55. Granger CWJ, Newbold P. Spurious regressions in econometrics. Journal of Econometrics. 1974;2:111-120.
56. Brown RL, Durbin J, Evans JM. Techniques for testing the constancy of regression relationships over time. Journal of the Royal Statistical Society. 1975; 37(2):149-192.
57. Schwarz G. Estimating the dimension of a model, Annals of Statistics. 1978;6:461-464.
58. Akaike H. A bayesian extension of the minimum AIC procedure of autoregressive model fitting. Biometrika. 1979;66(2):237-242.
59. Engle, RF, Granger, CWJ. Co-integration and error correction: Representation,

estimation and testing. Econometrica. 1987;55(2):251-276.
60. Lutkepohl H. Introduction to multiple time series analysis. Springer. New York, USA; 1991.
61. Lutkepohl H. Vector autoregressive and vector error correction models, in H. Lutkepohl, M. Kratzig (eds), Applied Time Series Econometrics. Cambridge University Press, Cambridge, UK. 2004; 86–158.
62. MacKinnon JG. Numerical distribution functions for unit root and cointegration tests. Journal of Applied Econometrics. 1996;11(6):601-618.
63. MacKinnon JG, Haug A, Michelis L. Numerical distribution functions of likelihood ratio tests for cointegration. Journal of Applied Econometrics. 1999;14 (5):563-577.
64. Sims CA. Macroeconomics and reality. Econometrica. 1980;48(1):1-48.
65. Johansen S. Statistical analysis of cointegration vectors. Journal of Econ. Dynamics and Control. 1988;12:231-254.
66. Johansen S. Likelihood-based influence in cointegrated vector autoregressive models. Oxford University Press Oxford; 1995.
67. Pesaran MH, Shin Y. An autoregressive distributed-lag modelling approach to cointegration analysis. Econometric Society Monographs. 1998a;31:371-413.
68. Lutkepohl H. New Introduction to multiple time series analysis, New York: Springer-Verlag; 2007.
69. Pesaran MH, Shin Y, Smith RJ. Structural analysis of vector error correction models with exogenous I(1) variables. Journal of Econometrics. 2000;97:293-343.
70. Sun L, Ford JL, Dickinson DG. Bank loans and the effects of monetary policy in China: VAR/VECM approach. China Economic Review. 2010;21:65-97.
71. Novak J, Suvova H, Vondracek J. Multivariate statistical methods as a tool of financial analysis of farm businesses. Agric. Econ. 2002;48(1):9-12.
72. Pindado J, Rodrigues LF. Parsimonious models of financial insolvency in small companies. Small Business Economics. 2004;22:51-66.
73. Pinkowitz L, Stulz RM, Williamson R. Do U.S. firms hold more cash than foreign firms do? Rev. Financ. Stud. 2016;29(2): 309-348.
74. Acikgoz AF, Apak S, Erbay ER. A long-term appraisal of the corporate liquidity dynamics in the selected nonfinancial sectors: Evidence from Turkey. International Balkan and Near Eastern Social Sciences (IBANESS) Conference Series, Faculty of Economics, October 28-30, 2016, University of St. Kliment Ohridski, Prilep – Republic of Macedonia, Proceedings Book. 2016;101-107.
75. Dichev ID, Skinner DJ. Large-sample evidence on the debt covenant hypothesis. Journal of Accounting Research. 2002;40: 1091-1123.
76. Demiroglu C, James CM. The information content of bank loan covenants. The Review of Financial Studies. 2010;23(10): 3700-3737.
77. Apak, S, Acikgoz AF, Erbay, ER. The nexus of corporate liquidity dynamics and bank credit usage in the long-term: The case of cash in Turkey. Journal of Global Strategic Management. 2016b;10:125-133.
78. Acikgoz AF, Apak S. A long-run and broadening credit perspective of the businesses in Turkey: Trade credit to bank credit ratio in the short-term, International Balkan and Near Eastern Social Sciences (IBANESS) Conference Series, Kırklareli, Turkey, Proceedings Book. 2017a;152-159.
79. Acikgoz, AF, Apak, S. Trade credit to bank credit ratio vs. liquidity on the way to generate net working capital. VI. International Balkan and Near Eastern Social Sciences (IBANESS) Congresses Series, 2017, University of Agribusiness and Rural Development - Bulgaria & University St. Kliment Ohridski Faculty of Economics - Macedonia, Ohrid – Republic of Macedonia, Proceedings Book: 2017b; 75-83.
80. Andrews, DWK. Heteroskedasticity and autocorrelation consistent covariance matrix estimation. Econometrica. 1991;59 (3):817-858.
81. Newey WK, West KD. A Simple, positive semi-definite, heteroskedasticity and autocorrelation consistent covariance matrix. Econometrica. 1987;55(3):703-708.
82. Newey WK, West KD. Automatic lag selection in covariance matrix estimation. Review of Economic Studies. 1994;61: 631-653.
83. Johansen S. Estimation and hypothesis testing of cointegration vectors in Gaussian vector autoregressive models. Econometrica. 1991;59:1551-1580.

84. Pesaran H, Shin Y. Impulse response analysis in linear multivariate models. Economics Letters. 1998b;58:17-29.
85. Acikgoz AF, Demirkol C, Apak S. Evidence for the reliance of equities on liquidity and bank credit in the agriculture sector in Turkey. Alatarim. 2019;18(2):144-154.
86. Acikgoz AF, Demirkol C, Tac, U. The effects of equity-financed long-term assets on liquidity in the agriculture sector of Turkey. International Review of Economics and Management. 2019;7(1):74-94.

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