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THE EFFECTS OF EQUITY-FINANCED LONG-TERM ASSETS ON LIQUIDITY IN THE AGRICULTURE SECTOR OF TURKEY

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Abstract

This study aims to conduct a typical regression methodology on the long-term data of the agriculture sector in Turkey. The regressive model represents current ratio as the dependent variable, and it uses the ratios of short-term liabilities on total liabilities, bank credits payable in the short-term on short-term liabilities, bank credits payable in the long-term on total assets, and long-term assets on (shareholders') equities as the independent variables. The tests are executed by using the averages of aggregate totals of the businesses from all scales in the sector in three years' averages from 1998 until 2016. The findings statistically ensure and depict that the framework indicator of liquidity or the current ratio depends not only on the bank credit used or the level of short-term liabilities, which is not surprising, but also on the ratio of long-term assets on equities. If the businesses enrich their equities level in financing of long-term assets, the liquidity favors. The independent variable of long-term assets to equities ratio, which rather reflects the long-term movement of current ratio better than the other variables, deeply affects the level of better liquidity as significantly as other control variables of the study. As a conclusion, better liquidity could profoundly be a lagging result of better equity-type financing of the total assets. The outcomes of the study will expectedly signal the decisions and policies of agriculture sector in Turkey by the long-term evidence presented here.

Key Words: Ratio analysis, current ratio, equities, long-term assets, bank credits.

JEL Classification: G20, G30, G40, M40.

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I. INTRODUCTION

The relevant literature has ever since visited the financial ratios and their analysis in terms of liquidity and current ratio (Beaver, 1966; Altman, 1968; Altman and Narayan, 1997; Coyle, 2000a; Coyle, 2000b; Chong and Yi, 2011; Acikgoz et al., 2018a; Acikgoz et al., 2018b). Bank credit usage along with financing decisions for the assets and other alternatives have also been on the spot (Burkart and Ellingsen, 2004; Michalski, 2008; Ponikvar et al., 2009; Psillaki and Eleftheriou, 2015; Keefe and Yaghoubi, 2016).

Financial ratios have been beneficial because of their prognostic ability of financial ratios with the use related financial facts (Johnson, 1979; Ak et al., 2013) especially for predicting failure (Wilcox, 1971) and industrial averages could be considered as targets for those ratios (Lev, 1969). The current ratio is the leading liquidity indicator and it has always been referred in the credit worthiness and general financial analysis of the businesses. Current ratio can be explained simply as the ratio of "current" assets on "current" or short-term liabilities. Current ratio is relatively among the most commonly visited criteria which is tried to be revealed in the business finance literature, yet there is a need to present evidence on current ratio with equities (shareholders' equity). The set of financial ratios are searched for their effects on equities (Phillips, 1999), however the effect of equities level remains unrevealed with evidence on a sectoral basis. This study aims at this very gap in the long-term evidence for the level or lagging effects in both short and long-run. Since bank credits are forming the most part of the liabilities, current ratio is also found to be economically important in terms of high frequency of violations as much as net worth (Dichev and Skinner, 2002) as a covenant and it has rather a uniform definition than the cash flow and leverage (Demiroglu and James, 2010). In the relevant literature, there is also rejecting evidence for the pecking order theory or external debt to tradeoff or optimal debt approach (Shyam-Sunder and Myers, 1999), and there is also evidence which more likely supports for the agency cost and efficiency-risk hypothesis for being indebted (Margaritis and Psillaki, 2010). Moreover, pecking order theory is found stronger in issuing decisions whereas the alternative traditional tradeoff is in repurchasing decisions (De Jong et al., 2011). Yet for the firms having more liquidity, the capital structure may result in less leverage (Sarlija and Harc, 2012). Liquidity might not necessarily affect short-term debt as well (Handoo and Sharma, 2014). As a comparison in between the current ratios of private equity financed firms, there are significant differences amongst European countries where firms with similar sizes and across industries or sectors are taken into consideration (Chesini and Giaretta, 2014). Financial leverage adds much to the firm's performance under competitive circumstances (Fosu, 2013), however the indebtedness may also have negative effects thereafter (Salim and Yadav, 2012). Pecking order might remain powerful only for the short run where cash flow or liquidity has signaling effects along with profits in agriculture sector (Zhao et al., 2008). Pecking order and tradeoff theories both have descriptive power on capital structure respectively, yet liquidity might rather support pecking order theory in Turkey for a set of publicly listed firms (Guner, 2016). Thus, many variables are in the scene as potential indicators for liquidity. This study, however, aims to present an evidence for the effects of financing decisions on liquidity for the agriculture sector for which the appearance has been stayed unrevealed in the literature for the long-term in Turkey. Therefore, we try to discover the influences of selected variables or a set of financial ratios along with equities on current ratio as the general liquidity appearance of the businesses in a sector specific scene. Beside the increase in wealth and profit share as expectations of the shareholders, equity-based financing is healthier and rather timely for long-term assets because the cost of liability-based financing is generally expensive for the firms. Does equity-based financing have lagging effects on the critical indicators of financial analysis? This question is taken for the side of liquidity, which is always the first step in any type of financial assessment in terms of ratio analysis, in this study. One may claim that the control on the level of short-term liabilities could be enough for paving the way in order to reach better liquidity indicators. We hereby add the original long-term side financing alternative, the equities, into the never-ending discussion of liquidity. Thus, the aim of the study is conducting a methodology in terms of a new regression model to reveal the nexus of all balance-sheet financing alternatives in the agriculture sector of Turkey. The model has current ratio as the dependent variable, and it also credits the ratios of short-term liabilities on total liabilities, short-term bank credits on short-term liabilities, long-term bank credits on total assets, and long-term assets on equities as the independent variables. The study also checks quick ratio, cash and cash equivalents ratio with long-term assets on total assets ratio in the testing phase of the represented model. However, their contribution appeared to be insignificant. On the raw data of agriculture sector in Turkey for the time span of 1998-2016, the study uses a data set collaborated from the calculations on the long-term series of the variables for which the tests are executed by using the averages of last three years' total averages of the businesses from all scales in the sector from 1996 until 2017 from the real sector statistics of Central Bank of Turkey (CBRT).

We present the findings of the research which statistically ensures that the vital liquidity criterion current ratio expectedly depends on the bank credit used or the level of short-term liabilities, however it significantly depends on the ratio of long-term assets on equities as well. Therefore, the outcomes depict that enriching the level of equities in the financing of long-term assets will favor liquidity in general. The beginning figures of the study summarize that the independent variable of long-term assets to equities ratio reflects better the long-term movement of current ratio than the other selected variables. Nevertheless, the tables of the statistical tests in the study also ensure that equity financing of long-term assets profoundly affects the level of better liquidity as significantly as other control variables of the study. We hereby evaluate the effects of equity financing in long-term assets on the most general indicator of liquidity i.e. current ratio in the long-run. The results ensure that equity financing degree over long-term assets of the businesses in the agriculture sector of Turkey more significantly affect liquidity than bank credit used. Additionally, its effects are as significant as the level of short-term liabilities which is the crucial measure of liquidity as being the main denominator among all liquidity indicators.

II. METHODOLOGY

The variables of the study are given as their abbreviations in the nomenclature below:

Nomenclature (all ratios are in percentages):

CR	: Current Ratio
STL/TL	: Short Term Liabilities to Total Liabilities Ratio
STBC/STL	: Short Term Bank Credit to Short Term Liabilities Ratio
LTBC/TA	: Long Term Bank Credit to Total Assets Ratio
LTA/E	: Long Term Assets to Equities Ratio
LTA/TA	: Long Term Assets to Total Assets Ratio
QR	: Quick Ratio
C&CER	: Cash and Cash Equivalents Ratio

The study presents its regression model in order to reveal the nexus of all balance-sheet financing alternatives in the agriculture sector of Turkey. By the help of the calculations and contemporary statistical software (EViews 9) on the raw data, the study also checks quick ratio, cash and cash equivalents ratio with long-term assets on total assets ratio in the testing phase of the represented model. However, their contribution appeared insignificant. We have first tested all the variables given in the nomenclature in the beginning phase of study, and we eventually found that CR, STL/TL, STBC/STL, LTBC/TA, and LTA/E are all significantly regressive as dependent variables in their group. The first attempts of creating a regression model showed that each of those variables could be used as the dependent interchangeably with the rest as the independents. Then, we have taken CR as the dependent variable. Afterwards, we have concentrated on the liquidity indicator CR. We followed the fundamental statistical methodology of regression and we added further analysis including unit root, cointegration, granger causality, and variance decomposition.

The research results ensure multi autocorrelation, normality, and heteroscedasticity along with collinearity assumptions on the level (Breusch, 1978; Godfrey, 1978a; Breusch and Pagan, 1979; Godfrey, 1978b; Jarque and Bera, 1980; Jarque and Bera, 1987) for a Least Squares (LS) NLS and ARMA, or ANOVA method (Pearson, 1920; Fisher, 1925; Fisher, 1932; Durbin and Watson, 1950; Durbin, 1970; Durbin and Watson, 1971; Kutner et al., 2005). The results of the model in the linear regression with the variables at the level are presented in detail. We have run ADF (Augmented Dickey Fuller) tests for unit root along with group common unit root (Levin et al., 2002; Im et al., 2003; Dickey and Fuller, 1979; Fisher, 1932; Phillips and Perron, 1988), single-equation and Johansen cointegration tests, VAR, Granger Causality, and VAR Granger Causality and/or Block Exogeneity Wald Tests. The series are determined as I(1) stationary series and we detected linear and quadratic cointegration with intercept therein. The model design suggests that each variable of the group is required, and they are all significantly effective on CR in different dimensions. The tests also include lag length (Akaike, 1973; Akaike, 1974; Akaike 1979; Schwarz, 1978; Lutkepohl, 1991; Lutkepohl, 2004) and inverse roots of AR along with stability diagnostics on the regression with the level variables (Granger, 1969; Granger and Newbold, 1974; Brown et al., 1975; Sims, 1980; MacKinnon, 1996; MacKinnon-Haug-Michelis, 1999; Engle and Granger, 1987; Johansen, 1988; Johansen, 1995; Pesaran and Shin, 1998; Pesaran et al., 2000).

Nevertheless, a further study direction might be the designation of a Vector Error Correction Model (VECM) model and the execution of relative Wald tests to ensure the causality among the variables of LS, VAR and VECM models for a better equation design including error corrections (Sun et al., 2010). The model concentrates on CR as the dependent variable, and it also credits the ratios of STL/TL, STBC/STL, LTBC/TA, and LTA/E as the independent variables. We use the aggregate raw data of agriculture sector in Turkey for the time span of 1998-2016 from the real sector statistics of Central Bank of Turkey (CBRT). We calculated a data set for the long-term series of the variables for which the tests use the averages of last three years aggregate data of the 2,222 businesses from all scales in the agriculture sector of Turkey from a total of 6,666 firms represented from 1999 until 2017. Note that the three-year averages of 1998 are for the years 1996, 1997, and 1998 and so on up until the year 2016 (CBRT, 2019). We executed a similar methodology as in Acikgoz et al. (2018c) with calculations on the raw data of the variables as in Apak et al. (2016) and Acikgoz et al. (2018a).

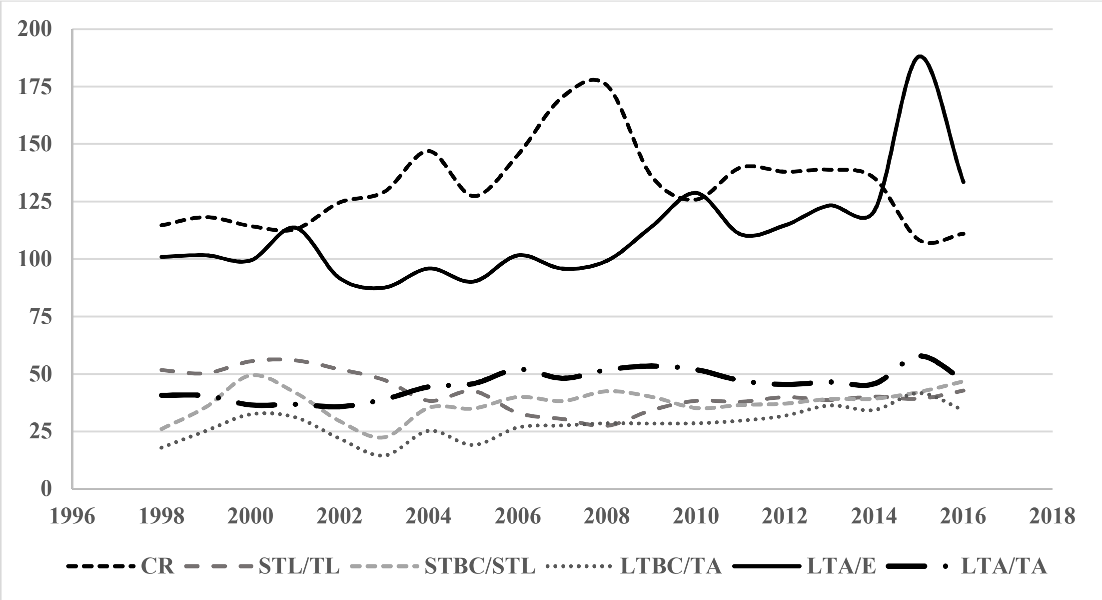
The model equation (I) is as follows:

$$Y_{CR\,it} = \beta_0 + \beta_1 x_{STL/TL\,it} + \beta_2 x_{STBC/STL\,it} + \beta_3 x_{LTBC/TA\,it} + \beta_4 x_{LTA/E\,it} + \varepsilon_{it} \quad (1)$$

III. FINDINGS AND DISCUSSION

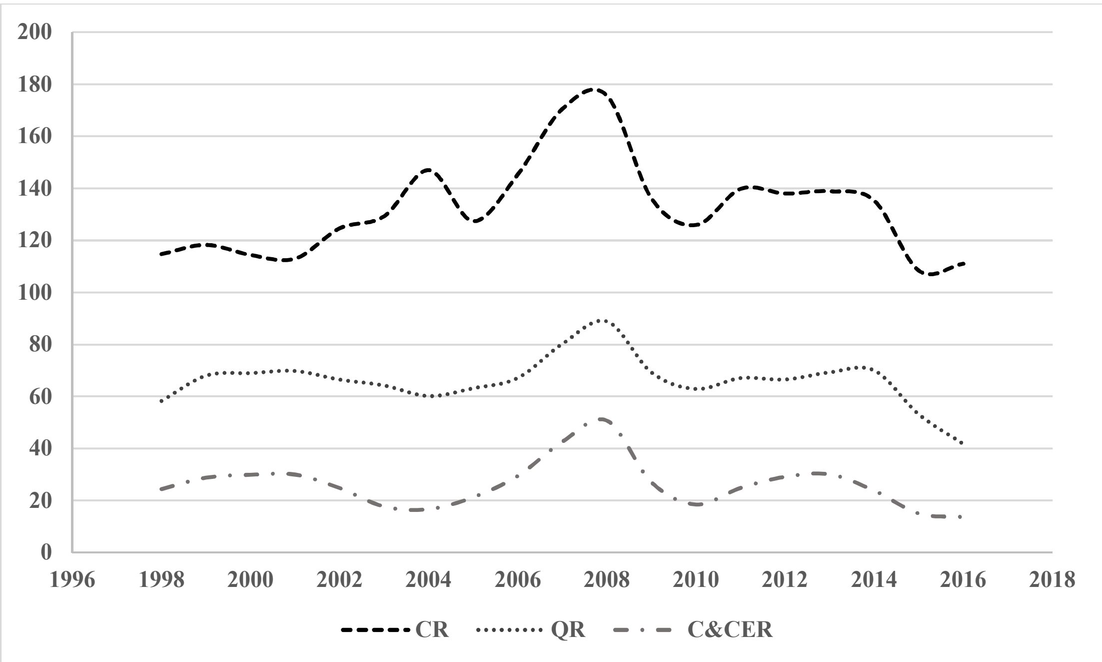
To reveal the effects of the selected variables on CR, we first exhibit the movements of the ratios in the long-run. Figure I displays CR and LTA/E which both have more sinuous curves while other variables or STL/TL, STBC/STL, LTBC/TA, and LTA/TA appear rather steady or firm in the long-run. The movement of LTA/TA impressively ensures that the investments on LTA remain around the half of the TA in the agriculture sector for the time span of 18 years.

Meanwhile, the leading liquidity indicators or CR, QR, and C&CER however, they all reflect a similar path with the CR. Thus, we rather prefer to concentrate on CR which is the framework for liquidity indicators (Figure II). Table I ensures the robustness and convenience for the selected variables of the study as in the explicit equation given above. Thus, we focus on the first testing regression where CR is the dependent variable and others (STL/TL, LTA/E, STBC/STL, and LTBC/TA) are independent estimators.



Source: Calculations on CBRT data.

Figure I. Three years' averages of CR and LTA/SE ratio with some relevant potential determinants of liquidity in the agriculture sector of Turkey (1998-2016)



Source: Calculations on CBRT data.

Figure II. Three years' averages of main liquidity indicators in the agriculture sector of Turkey (1998-2016)

Table I. Summaries of the tested regressions with all variables

Dependent	Independents	Adj. R Square	DW	Sign.
CR	**STL/TL, STBC/STL, LTBC/TA, and LTA/E**	**0.90**	**1.85**	**0.000****
STL/TL	CR, STBC/STL, LTBC/TA, and LTA/E	0.87	1.59	0.000**
STBC/STL	CR, STL/TL, LTBC/TA, and LTA/E	0.74	1.01	0.000**
LTBC/TA	CR, STL/TL, STBC/STL, and LTA/E	0.91	1.32	0.000**
LTA/E	CR, STL/TL, STBC/STL, and LTBC/TA	0.91	2.02	0.000**

**. 0.01 significance and at least with coefficients of 0.05 significance including constants. LS: Least Squares (NLS and ARMA), dependent variable and the regressors (independent variables) including ARMA and PDL terms, or ANOVA results.

Table II. Summaries of the selected results for the model

Regression	R Square	Adjusted R Square	Durbin-Watson	Significance
CR (Dependent)	0.92	0.90	1.85	0.000**
Independents	**Coefficients**	**Prob.**	**Collinearity Tolerances**	**Centered VIFs**
C	271.500	0.000		
STL/TL	- 1.839	0.000	0.942	1.061
STBC/STL	- 0.894	0.046	0.273	3.668
LTBC/TA	1.874	0.006	0.125	8.001
LTA/E	- 0.733	0.000	0.275	3.630

[a]. ANOVA, LS Results, Predictors: (Constant), STL/TL, STBC/STL, LTBC/TA, LTA/E. CR is the dependent variable.
**. 0.01 significance. All VIFs are within the interval 0 to 10.

Table III. Tests confirming the fundamental assumptions of the regression

Test	Prob. *
Breusch and Godfrey Serial Correlation LM with Obs*R-squared Prob.Chi-Square (2)	0.2799
Breusch, Pagan and Godfrey Heteroscedasticity with Obs*R-squared Prob.Chi-Square (4)	0.0734
Jarque Bera Test: Prob.	0.3942

All tests confirm the assumptions for serial correlation, heteroscedasticity, and normality as p values > 0.05 (Breusch, 1978; Godfrey, 1978a; Breusch and Pagan, 1979; Godfrey, 1978b; Jarque and Bera, 1980; Jarque and Bera, 1987).

Table II summarizes the significant results of the model and collinearity metrics. Along with STL/TL, the predictor LTA/E has one of the most significant coefficients in which only LTBC/TA has a positive one. Table III additionally confirms the fundamental assumptions of the regression in terms of serial correlation, heteroscedasticity, and normality.

Individual unit root check for the series are conducted with the ADF tests both at the level and at the first differences of the variables (Table IV). The results confirm that all the variables are stationary at their first difference levels. Table V demonstrates the findings of unit root tests so as to ensure that the variables do not contain a common unit root either.

Table IV. ADF test for series at the level and at the first differences

		At the level		At the first difference	
Series		**t-Statistic**	**Prob. ***	**t-Statistic**	**Prob. ***
CR	**ADF test statistics**	-1.595195	0.7539	-4.258044	0.0204
	1% level	-4.571559		-4.667883	
	5% level	-3.690814		-3.733200	
	10% level	-3.286909		-3.310349	
STL/TL	**ADF test statistics**	-1.002326	0.9181	-3.920069	0.0347
	1% level	-4.571559		-4.616209	
	5% level	-3.690814		-3.710482	
	10% level	-3.286909		-3.297799	
LTA/E	**ADF test statistics**	-3.623795	0.0563	-4.378524	0.0196
	1% level	-4.571559		-4.800080	
	5% level	-3.690814		-3.791172	
	10% level	-3.286909		-3.342253	
STBC/STL	**ADF test statistics**	-4.176783	0.0234	-4.840507	0.0083
	1% level	-4.667883		-4.728363	
	5% level	-3.733200		-3.759743	
	10% level	-3.310349		-3.324976	
LTBC/TA	**ADF test statistics**	-2.880018	0.1907	-4.814821	0.0070
	1% level	-4.571559		-4.616209	
	5% level	-3.690814		-3.710482	
	10% level	-3.286909		-3.297799	

Augmented Dickey Fuller Test (ADF) results and critical values at level and first differences for trend and intercept. Null Hypothesis: Series has a unit root. Exogenous: Constant, Linear Trend. Lag Length: 0-3 (Automatic - based on SIC, max. lag=3). *MacKinnon (1996) one-sided p-values. Warning: Probabilities and critical values calculated for 20 observations and may not be accurate for a sample size of 18-14 (Dickey and Fuller 1979).

Table V. Group unit root tests for first differences

Group	Method	Statistic	Prob.**	Cross-sections	Obs
CR, STL/TL, STBC/STL, LTBC/TA, and LTA/E	Null: Unit root (common)				
	Levin, Lin and Chu t	- 6.90882	0.0000	5	83
	Null: Unit root (individual)				
	Im, Pesaran and Shin W-stat	- 7.71356	0.0000	5	83
	ADF - Fisher Chi-square	63.7888	0.0000	5	83
	PP - Fisher Chi-square	65.3865	0.0000	5	85

** Fisher tests use an asymptotic Chi-square distribution, other tests assume asymptotic normality (Levin et al., 2002; Im et al., 2003; Dickey and Fuller, 1979; Fisher, 1932; Phillips and Perron, 1988). Sample: 1998-2016.: Individual effects for exogenous variables. Maximum lag. Automatic selection of lag length based on SIC: 0 to 2 with the selection of Newey-West automatic bandwidth and with kernel at Bartlett (Andrews, 1991; Newey and West, 1987; Newey and West, 1994).

However, we skeptically conducted single-equation cointegration tests (Engle-Granger with Schwarz information criterion) for the group of the series at their first differences (Table VI). Table VI therefore reports single-equation cointegration tests results with the variables at their first differences level with Engle Granger test and Schwarz information criterion. The significant results are only given for CR and LTA/E as dependents in Table VI.

Table VI. Single equation cointegration tests for group of series at first differences

Equation and Trend Specification	Lag	Dependent	tau-statistic	Prob.*	z-statistic	Prob.*
None	1	D(CR)	-4.799488	0.0504	-50.62531	0.0000
None	0	D(LTA/E)	-5.799663	0.0099	-22.98380	0.0066
Constant	1	D(CR)	-5.058681	0.0730	-54.90590	0.0001
Constant	0	D(LTA/E)	-5.832166	0.0229	-23.05950	0.0169
Linear Trend	0	D(LTA/E)	-5.873195	0.0452	-23.28899	0.0338
Quadratic Trend	0	D(LTA/E)	-5.873195	0.0452	-23.28899	0.0338

*MacKinnon (1996) p-values. Engle Granger with Schwarz info criterion max lag. Sample (adjusted): 1999 2016. Included observations: 18 after adjustments. Null hypothesis: Series are not cointegrated. Automatic lags specification based on Schwarz criterion (max. lag=3). Number of observations 17 for no lag, and 16 for 1 lag. All results have 5 stochastic trends in asymptotic distribution.

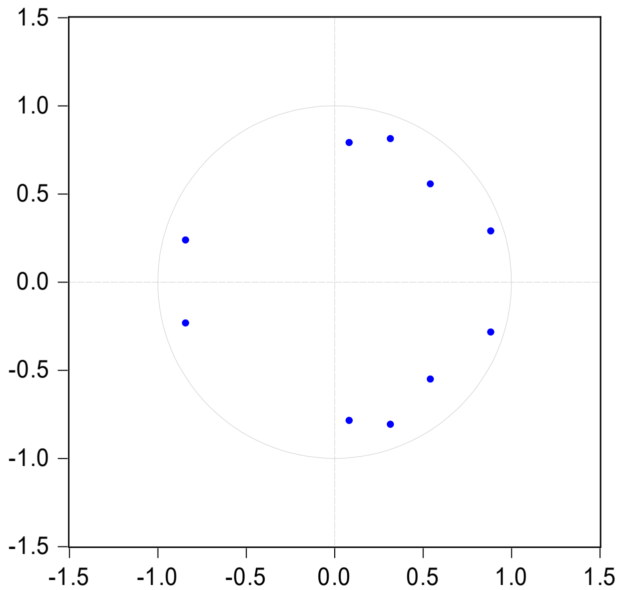


Figure III. Inverse roots of AR characteristic polynomial

Table VII. Lag order selection

Lag	LogL	AIC	SC	HQ
0	- 260.3021	33.16276	33.40419	33.17512
1	- 225.9331	31.99164	33.44024	32.06582
2	- 153.5511	26.06889	28.72466	26.20488
3	1933.931	- 231.7413*	- 227.8784*	- 231.5435*

* Lag order selected at VAR (Akaike, 1973; Akaike, 1974; Akaike 1979; Schwarz, 1978; Lutkepohl, 1991; Lutkepohl, 2004). Exogenous variables: C. Sample: 1998-2016. Included observations: 16. Abbreviations are as follows; AIC: Akaike information criterion; SC: Schwarz information criterion; and HQ: Hannan-Quinn information criterion.

Table VIII. Most significant results of unrestricted cointegration rank tests at VAR

Linear deterministic trend (restricted)	Hyp. No. of CE(s)[1]	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
	None	0.904853	87.51090	88.80380	0.0618
	Hyp. No. of CE(s)[2]	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
	None *	0.904853	42.34197	38.33101	0.0164
Quadratic deterministic trend	Hyp. No. of CE(s)[1]	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
	None *	0.903107	86.07473	79.34145	0.0141
	Hyp. No. of CE(s)[2]	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
	None *	0.903107	42.01471	37.16359	0.0129

VAR: CR, STL/TL, STBC/STL, LTBC/TA, and LTA/E. Unrestricted Cointegration Rank Test for Var and Johansen Test for group of the series. No lags, 0 to 1, and 0 to 3: Trace[1] and Maximum Eigenvalue[2] (Johansen, 1988; Johansen, 1995; Pesaran and Shin, 1998). Sample (adjusted): 2000 2016. 18 observations after adjustments with the assumption of a linear deterministic trend and quadratic deterministic trend. Lags (in first differences): 0 to 3. *. Rejection at 0.05 level. **. MacKinnon-Haug-Michelis (1999) p-values. Trace test or Max-eigenvalue test both indicate 1 cointegrating equations at 0.05 level.

Thus, we followed VAR analysis by the order of AR inverse roots, lag length and structure, cointegration, and variance decomposition on CR (Figure III; Table VII, VIII, IX, X). Figure III reflects the inverse roots for the model at AR Characteristic Polynomial to ensure VAR version of the model is stationary. We further checked the first differences of the variables in the equation and they eventually give significant regression results at 0.01 as 0.000 significance.

Table IX. Summaries for unrestricted cointegration tests at VAR at level variables

Data trend	None	None	Linear	Linear	Quadratic
Test type	No Intercept No Trend	Intercept No Trend	Intercept No Trend	Intercept Trend	Intercept Trend
Trace	0	0	0	0	1
Max-Eig	0	0	0	1	1

Critical values based on MacKinnon-Haug-Michelis (1999). Selected (0.05 level) Number of Cointegrating Relations by Model. Lags: No lags. 18 observations are included. Only Max-Eigenvalue test ensures 1 cointegrating equation for linear intercept and trend. Trace test or Max-eigenvalue test both indicate 1 cointegrating equations at 0.05 level. for group of the series gives the same results.

Table X. Summaries for Johansen cointegration tests for group at first differences

Data trend	None	None	Linear	Linear	Quadratic
Test type	No Intercept No Trend	Intercept No Trend	Intercept No Trend	Intercept Trend	Intercept Trend
Trace	5	2	5	2	5
Max-Eig	2	1	2	1	2

Critical values based on MacKinnon-Haug-Michelis (1999). Selected (0.05 level). Number of Cointegrating Relations by Model. Lags: No lags. 17 observations are included. All tests ensure cointegrating equation(s).

Table XI. The significant results of pairwise Granger causality tests for the group of series

Lag	Null Hypothesis	Obs.	F-Statistic	Prob.
1	LTBC/TA does not Granger Cause STL/TL	18	4.77488	0.0452
2	LTBC/TA does not Granger Cause STL/TL	17	6.11763	0.0147
3	STBC/STL does not Granger Cause STL/TL	16	8.36705	0.0057
4	STBC/STL does not Granger Cause STL/TL	15	11.1021	0.0061
5	STBC/STL does not Granger Cause STL/TL	14	37.9498	0.0065

Reports the only significant result at 0.05 level for Pairwise Granger Causality Tests on the group of the series for Lag 1to 5. Sample 1998–2016.

Table XII. The significant results of pairwise Granger causality tests for the group of series at first differences

Lag	Null Hypothesis	Obs.	F-Statistic	Prob.*
2	D(LTBC/TA) does not Granger Cause D(STL/TL)	16	4.64819	0.0344
1	D(STBC/STL) does not Granger Cause D(STL/TL)	17	6.90956	0.0198
1	D(LTBC/TA) does not Granger Cause D(STL/TL)	17	13.2743	0.0027
1	D(STBC/STL) does not Granger Cause D(LTBC/TA)	17	5.01723	0.0418
2	D(LTBC/TA) does not Granger Cause D(STL/TL)	16	4.64819	0.0344
3	D(STBC/STL) does not Granger Cause D(STL/TL)	15	5.34071	0.0259
4	D(STBC/STL) does not Granger Cause D(STL/TL)	14	15.7569	0.0049
5	D(STBC/STL) does not Granger Cause D(STL/TL)	13	22.0180	0.0440
5	D(LTA/E) does not Granger Cause D(LTBC/TA)	13	304.411	0.0033

* Reports the only significant result at 0.05 level for Pairwise Granger Causality Tests on the group of the series for Lag 1 to 5. Sample 1998–2016.

Tables XI and XII give the significant results of Granger causality tests for the group of the series both at level and at the first differences.

Table XI summaries the significant results of Granger causality tests in which both short and long-term bank credit do cause the crucial indicator of liquidity i.e. STL/TL.

Table XII gives the similar causalities at the first differences of the variables for STL/TL, however the causality in between bank credit across time from short to long term reveals herein adding the LTA/E causality on long-term bank credits only by the fifth lag. The causality tests confirm that STL/TL is the chief variable in terms of liquidity in the shorter time periods. However, single cointegration equations and cointegration tests all ensure that LTA/E significantly affects the liquidity assessed with CR in the long-run as well.

Table XIII. Variance decomposition for CR

Period	S.E.	CR	STL/TL	STBC/STL	LTBC/TA	LTA/E
1	10.19276	100.0000	0.000000	0.000000	0.000000	0.000000
2	14.52209	58.40438	11.48031	26.11906	2.900898	1.095356
3	26.05334	26.94628	6.635527	30.75512	16.51703	19.14603
4	28.04518	24.16839	10.50715	27.67481	18.25407	19.39558
5	31.17868	19.98735	14.67742	23.71127	22.39467	19.22928
6	32.63679	18.24756	16.42885	22.79828	21.78931	20.73600
7	33.64712	17.34884	16.76668	21.46267	24.90759	19.51422
8	34.15439	17.25474	16.27487	22.55423	24.43698	19.47919
9	35.18796	17.13603	15.40031	23.60623	23.18154	20.67589
10	35.75005	17.07586	14.95859	24.15184	22.66658	21.14712

Unrestricted Var. Lag 1 2. Variance Decomposition. Cholesky ordering: Only for the dependent CR, Exogenous C, 10 periods.

Nonetheless, we have evaluated the variance the decomposition for CR where LTA/E is as much contributive as the bank credit usage in both short and the long run starting from the third period by which the ratio's decomposition values remains almost steady (Table XIII). Granger causality can also be check by the help of VAR Granger causality and/or block exogeneity Wald tests. The selected significant results here confirm the multi-dimensional importance of STL/TL and LTA/E remains at the critical level comparing with other variables (Table XIV). We have hereby checked the importance of two leading regressors of the model equation STL/TL which is rather effective in the short-run, and LTA/E which deserves considerations as much as the level of short-term liabilities and more than bank credit used in the agriculture sector.

Table XIV. The significant results of VAR Granger causality/Block exogeneity Wald tests

Dependent	Excluded	Chi-sq	df	Prob.
CR	STL/TL	11.04602	2	0.0040
	STBC/STL	0.654999	2	0.7207
	LTBC/TA	0.788395	2	0.6742
	LTA/E	5.115765	2	0.0775
	All	26.45866	8	0.0009
STL/TL	**Excluded**	**Chi-sq**	**df**	**Prob.**
	CR	40.40948	2	0.0000
	STBC/STL	11.23210	2	0.0036
	LTBC/TA	35.07049	2	0.0000
	LTA/E	31.43551	2	0.0000
	All	92.28940	8	0.0000

Unrestricted VAR, Lag 1 2, Granger Causality/Block Exogeneity Wald Tests Sample: 1998 2016. Included observations: 17.

Figure IV represents the robustness of LTA/E on the regression run for the study. STL/TL is the most explanatory independent variable of the model and LTA/E displays a likely outfit

(Figure IV). We then followed the procedure with the stability of the equation by CUSUM Square test in order to evaluate stability and structural change in the model. The appearance of CUSUM Square test confirms the stability of the model as well (Figure V).

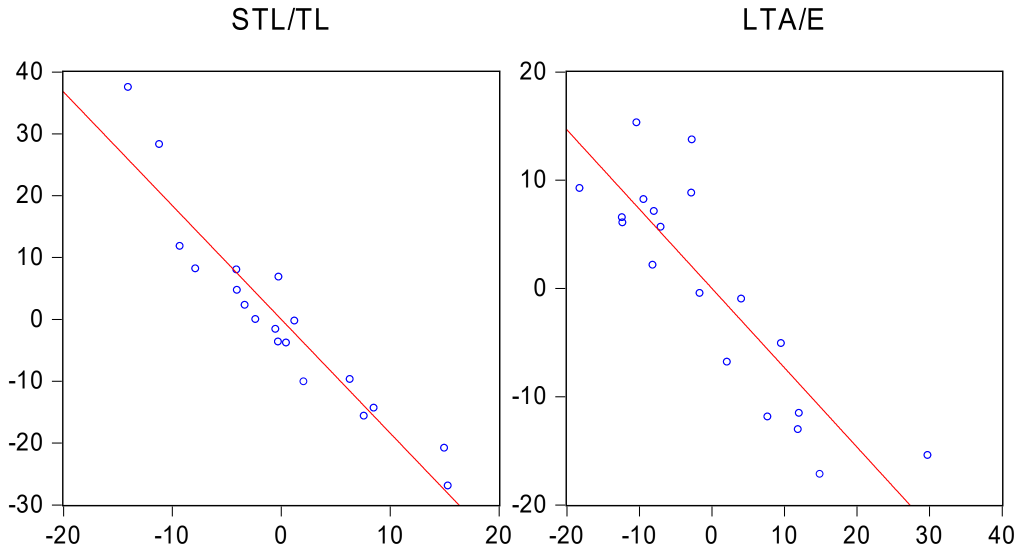


Figure IV. STL/TL and LTA/E (partialled on regressors)

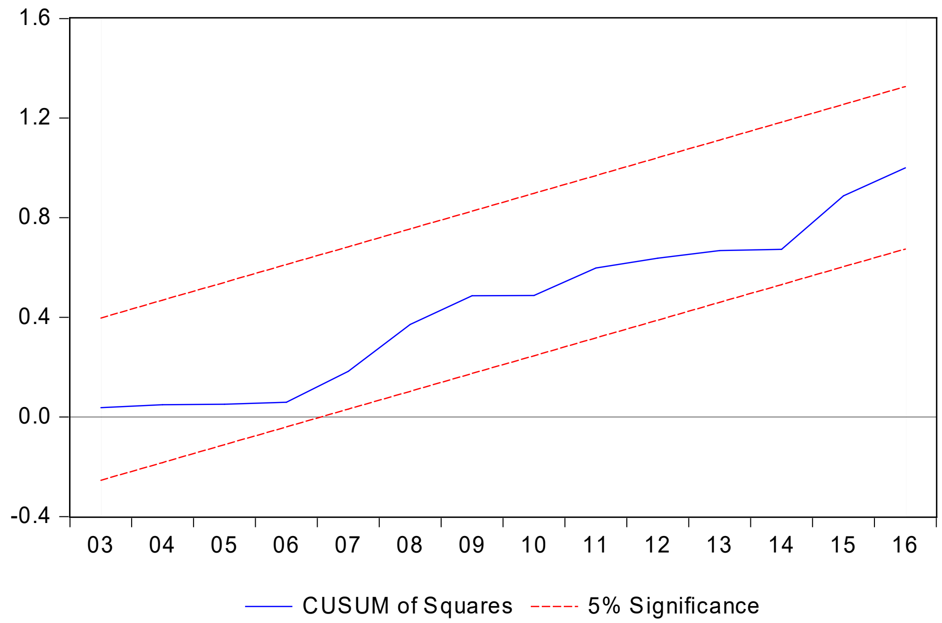


Figure V. CUSUM of squares test result for recursive estimates (OLS only)

IV. CONCLUSION

As liquidity is the first step indicator of financial health, we hereby evaluate the long-term data of the businesses in the agriculture sector of Turkey to reveal the effects of a set of selected variables on CR. The core novelty of the study is the statistical evidence that the core liquidity criterion or current ratio depends not only on the short-term liabilities but also on bank credits and on equities to the degree to which they better finance the long-term assets.

The results depict that enriching the level of equities will favor liquidity in general on the condition of financing the long-term assets. We have presented that the independent variable of long-term assets to equities ratio apparently follows, in a negative manner, the long-term movement of current ratio. The other variables of the model, however, have also profound effects on the level of better liquidity as the control variables of the study. The level of short-term liabilities, which is the crucial measure of liquidity, stays in the scene as the main denominator among all liquidity indicators.

As a result of variance decomposition, LTA/E is found as much contributive as the bank credit usage in both short and long run starting by the third period. We detected linear and quadratic relations in terms of cointegration.

The model design also suggests that each variable of the independent group is required, and they are all significantly effective on CR in different dimensions. The selected significant results on causality confirm the multi-dimensional importance of STL/TL and LTA/E as regressors. The two leading regressors of the model equation are STL/TL and LTA/E. The first is rather effective in the short-run, and the latter or LTA/E is found vital in time along with the level of bank credit used in the agriculture sector. Long-term bank credit usage is more significant among the alternatives as well.

Nonetheless, STL/TL is the most explanatory independent variable of the model and LTA/E displays a likely outfit. The cointegration and stability tests of the model empower the robustness of the findings. Expectedly, the level of short-term liabilities does affect the liquidity in terms of CR. The most important conclusion of this study, we believe, is the variance decomposition of CR which depicts that LTA/E ratio has lagging but significant contribution to attain a better liquidity as much as do the bank credits short-term liabilities.

Though the findings give long-term evidence for the businesses in the agriculture sector of Turkey, the model deserves to be run for the other sectors or country data as well in the future studies. We eventually agree the limitations of ratio analysis, sectoral circumstances, and the usage of local secondary data as well. However, we believe that the discussion of this study will be a favorable advantage in the future studies on the same topic. Afterall the decisions, incentives, credit worthiness, and any policies would better take into consideration the effect of equities in the agriculture sector accompanied by the other significant findings represented in this study.

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