https://doi.org/10.17221/151/2019-AGRICECON

The effects of capital constraints on the growth of agricultural cooperatives

Meng-Fen Yen[1], Mario J. Miranda[2], Ani Katchova[2]*

[1]*Center for Research in Econometric Theory and Applications, National Taiwan University, Taipei, Taiwan*

[2]*Department of Agricultural, Environmental and Development Economics, The Ohio State University, Columbus, OH, USA*

**Corresponding author: mengfyen@ntu.edu.tw*

Citation: Yen M.F., Miranda M.J., Katchova A. (2020): The effects of capital constraints on the growth of agricultural cooperatives. Agric. Econ. – Czech, 66: 27–33.

Abstract: In this paper, we examine how capital constraints affect the growth of US agricultural cooperatives. Employing a panel data set obtained from CoBank on 669 US agricultural cooperatives over 5 years, we employ system-generalised method of moments to estimate models of cooperative growth that incorporate long-term debt, allocated reserves, and retained earnings as continuous measures of capital constraints. We find that long-term debt use and size have positive impacts on cooperative growth, in violation of Gibrat's law, which posits that firm size and firm growth are independent. In particular, cash flow, unallocated equity and long-term debt financing are critical contributors to asset growth for small and medium-sized cooperatives.

Keywords: firm growth; Gibrat's law; system generalised method of moments

A cooperative is a special corporation that is both owned and controlled by those who use its services, the members of the cooperative, in contrast to more conventional investor-owned-firms and corporations, which are owned and controlled by equity shareholders who do not use or otherwise have little direct interest in the services provided by the firm. In the USA, in 2014, almost 2 million farmers were members of 2 106 marketing, farm supply or service cooperatives, of which 667 had sales volume less than USD 5 million, 335 had sales volume between USD 100 million and USD 1 billion, and 30 had sales volume more than USD 1 billion (U.S. Department of Agriculture 2014). The primary business purpose of an agricultural cooperative is to provide benefits to its members by pooling resources to reduce transaction costs and by exercising collective market power to negotiate more favourable input and output prices for its members. However, effective provision of such services can conflict with the cooperative's secondary objective, to maximise cooperative profits in order to increase the value of member's equity, which is raised primarily through membership fees (Barton et al. 2011). This tension between competing objectives, unique to cooperatives, generally leads to optimal capital investment strategies and firm growth dynamics that differ from those of more conventional investor-owned-firms.

In this paper, we examine how access to capital affects the growth of agricultural cooperatives. Sources of financing, including cash flow, long-term debt, retained earnings and allocated reserves, differ in return and

Supported by the Center for Research in Econometric Theory and Applications, Grant No. 108L900202 and Grant No. MOST 108-3017-F-002-003 from The Featured Areas Research Center Program within the framework of the Higher Education Sprout Project by the Ministry of Education (MOE) and Ministry of Science and Technology (MOST) in Taiwan.

https://doi.org/10.17221/151/2019-AGRICECON

timing of redemptions. Long-term debt is usually used to finance the purchase of fixed assets such as property, plant, and equipment. The repayment of long-term debt is covered by net income and is scheduled for repayment in annual instalments over the useful life of the asset being acquired. Long-term is considered the most costly source of capital because interest must be paid on long-term debt.

Retained earnings are also a source of equity capital. Retained earnings are not assigned to specific members of the cooperative and thus do not require a return, making them the lowest-cost source of capital. Allocated reserves are equity capital obtained by retaining a portion of net income that will be accumulated until sufficient capital is available to finance facilities and operations. The amount of allocated reserves retained as equity capital must be distributed (returned) to members at the date and conditions determined by the cooperative boards.

Fulton et al. (1995) measure the growth of cooperatives as changes in total assets. They construct an unbalanced panel containing data between 1932 and 1992 for seven Canadian and US agricultural cooperatives. Fulton et al. (1995) test whether Gibrat's law holds and find that they were unable to reject the hypothesis that long-term growth is independent of firm size, arguing that equity redemption in cooperatives limits their ability to grow. Lerman and Parliament (1990) test the hypothesis that cooperatives are constrained by the lack of equity capital due to the unique ownership structure and non-marketability of cooperative equity. They find that nearly half of cooperatives finance their growth with equity and new debt raised mainly from current liabilities. Short-term debt is the most important source of financing, while long-term debt is secondary; also cooperatives prefer to use permanent equity funds rather than debt to finance their capital assets. Contrary to theoretical predictions that cooperatives may overinvest because of moral hazard, cooperatives follow a conservative strategy, financing investment in fixed assets using available equity. Wang (2016) finds that the optimal debt ratio of agricultural cooperatives increases as the personal tax rate and discount rate increase, but that the dividend rate is not affected.

A number of papers examine liquidity constraints on Investor-Owned-Firm (IOF) growth. Oliveira and Fortunato (2006), applying the Generalised Method of Moments (GMM), finds that liquidity constraints had a negative effect on the growth of Portuguese manufacturing firms over the period 1990–2001. They also find that capital constraints are more likely to limit the growth of smaller and younger firms, which may be more capital constrained due to illiquidity of financial markets. Fagiolo and Luzzi (2006) find that controlling for size, liquidity constraints had a negative effect on the growth of Italian manufacturing firms from 1995 to 2000.

Other studies of IOFs identify factors affecting the optimal capital structure and capital constraints. Chang et al. (2014) find that both over-levered and under-levered firms with weak corporate governance adjust slowly toward target debt ratios. Faulkender and Petersen (2012) find that repatriating firms increased domestic investment if they are capital constrained, but not otherwise, using the implementation of the American Jobs Creation Act as a natural experiment.

Chaddad et al. (2005) rigorously examine the role of capital constraints on agricultural cooperative growth. They investigate the relationship between investment growth and financial constraints among US agricultural cooperatives between 1991 and 2000 employing a model based on Tobin's q theory. Tobin's q is constructed using vector auto-regression forecasting equations based on firm fundamentals such as profits and sales. Chaddad et al. (2005) find that cash flow and marginal q are both positively related to the investment opportunities facing US agricultural cooperatives. However, they do not address whether external sources of capital would relieve capital constraints.

Li et al. (2015) also explore the financial constraint problem of agricultural cooperatives and IOFs, arguing that agricultural cooperatives, due to conflicting business purposes in providing members benefits as well as maximizing profits, will have different capital needs than IOF firms, of which the only business objective is profit maximisation. Using a panel dataset containing both US agricultural supply and grain cooperatives and IOFs, Li et al. (2015) regress firm/cooperatives capital structure (i.e. Debt-to-Asset ratio) on various financial constructs such as liquidity, operating profit margins, asset turnover rate and debt structure. They find that cooperatives rely less on debt financing than IOFs in the short run. However, they do find that cooperatives use more equity to finance investments relatives to IOFs, this result postulate as evidence supporting the existence of capital constraint in the long-term investments.

This paper attempts to fill a gap in the literature on cooperative growth and capital constraints. We examine the role of capital constraints on the growth of agricultural cooperatives employing firm-level unbalanced

https://doi.org/10.17221/151/2019-AGRICECON

panel data from 2011 to 2015. Our work examines whether capital constraints impede the growth of small cooperatives, something that has been suspected in the literature but has not been formally studied. Our work also attempts to identify which external sources of capital will best relieve the capital constraints faced by small and large cooperatives. We employ System Generalised Methods of Moments Estimation (system-GMM) to test whether extra sources of capital (allocated reserves, retained earnings and long-term debt, long-term accounts receivables) promote cooperative growth. We find that allocated reserves, retained earnings and long-term debt promote cooperative growth.

DATA

The data used for this study was provided by CoBank (2015), a member of the US Farm Credit System that provides loans and financial services to cooperatives, agribusinesses, and other farm credit associations. The unbalanced panel financial dataset covers the period 2011–2015 and includes data from 669 cooperatives. The dataset includes observations for farm supply and grain marketing cooperatives, processing cooperatives, agricultural production and service cooperatives. About 80% of the cooperatives are in the farm supply and grain marketing sector.

Table 1. Model variables

Symbol	Variable	Mean	Std. dev.
I_{it}	investment (million USD)	13.2	22
A_{it}	total assets (million USD)	39.8	1.14
LTD_{it}	long term debt (million USD)	3.6	9.8
AR_{it}	allocated reserves (million USD)	6.53	12.1
RE_{it}	retained earnings (million USD)	10.8	18.2
CF_{it}	cash flow (million USD)	1.73	4.04
CR_{it}	current ratio	1.88	2.77
DE_{it}	debt to equity ratio	5.8	124.7

i – cooperatives; t – year

Source: CoBank (2015)

Table 1 lists the key variables used in our empirical analysis, their sample means and standard deviations, and the symbols used to refer to them. Following Lerman and Parliament (1993), we then define "investment" as the sum of capital expenditure and short-term investment listed under current assets. "Total assets" is the value of assets owned by the cooperative, including cash and cash equivalents, inventories, account receivables, and fixed assets. "Long term debt" is financial obligations maturing in over one year. "Allocated reserves" is net income allocated to members based on their patronage, but retained by the cooperative for operating purposes. "Retained earnings" is net income retained by the cooperative to provide equity capital. "Cash flow" is net income plus depreciation and amortisation, excluding non-cash patronage income, patronage dividends paid in cash, net retirements of allocated equity and net gains on asset sales, in dollars.[1] "Current ratio" is liquid assets convertible to cash in less than one year divided by financial obligations due within one year. "Debt to equity ratio" is the sum of short- and long-term debt divided by the value of shares owned by cooperative members.

To ascertain whether the CoBank sample is representative of agricultural cooperatives in the U.S., we compare its summary statistics to the broader population of agricultural cooperatives reported by the U.S. Department of Agriculture (2014). Table 2

Table 2. Means of financial variables for cooperatives in CoBank and USDA datasets (million USD)

	2014		2013		2012	
	USDA	CoBank	USDA	CoBank	USDA	CoBank
Total assets	41.35	42.1	37.77	38.7	37.28	40.5
Short-term debt	16.87	15.8	15.83	16.6	11.01	20.3
Long-term debt	6.63	3.93	6.09	3.46	12.78	3.64
Equity	17.85	19.5	15.84	17.6	13.48	15.5
Allocated equity	10.67	7.76	9.86	6.48	3.12	6.03
Retained earnings	7.18	13.2	5.99	10.8	1.74	9.52

Source: USDA (2014) and CoBank (2015)

[1]There are sources of cash flow unique to cooperatives, compared to investor-owned-firms, including cash patronage income, per-unit capital retains and retained patronage refunds. We construct our "cash flow" as recommended by Chaddad et al. (2005).

https://doi.org/10.17221/151/2019-AGRICECON

reports the average value of total assets, short-term debt, long-term debt, retained earnings and allocated earnings for agricultural cooperatives in the CoBank dataset and USDA dataset in 2012, 2013, and 2014. We use a simple *t*-test to compare means of short-term debt from USDA and CoBank data and find that the data of the years 2013 and 2014 are similar but significantly different for year 2012. The average equity values of CoBank data are different from those of USDA in all years. These results indicate that CoBank data are generally representative of USDA data in total assets.

MODEL AND ESTIMATION METHODS

We hypothesise that raising capital through borrowing and equity will induce higher growth rates of cooperatives. To test our hypotheses, we employ the system-GMM methods to evaluate the relationship between capital and cooperative growth rates. One of the benefits of using system-GMM for our data is that it is applicable to panel datasets that span a limited number of periods, but which contains a large number of observations on non-exogenous independent variables. Problems of panel data such as autocorrelation, heteroscedasticity and endogeneity, can be handled by system-GMM, as it allows us to control for the presence of unobserved firm-specific effects and for the endogeneity of lagged capital constraints variables.

Cooperatives, unlike IOFs, cannot separate management decisions aimed at directly benefiting its members from those that maximise profits. Finding an affordable source of capital while maintaining the services it provides to its members is vital for cooperatives. Candidates for the capital constraint variables are internal financing, external financing and liquid assets. Sources of internal financing are allocated reserves, retained earnings, and cash flow. Sources of external financing are debt financing, which can be separated into short-term debt and long-term debt.

Our estimation Equation (1) explains the rate of growth in cooperative investment in terms of financial constraint effects and effects other than those related to financial constraints.

$$\begin{aligned}\Delta \ln I_{it} = {} & \alpha_i + \delta_t + \rho^* \Delta \ln I_{it-1} \\ & + \beta_1 \times \ln A_{it-1} + \\ & + \beta_2 \times \Delta \ln LTD_{it} + \\ & + \beta_3 \times \Delta \ln AR_{it} + \\ & + \beta_4 \times \Delta \ln RE_{it} + \\ & + \beta_5 \times \ln CF_{it-1} + \\ & + \beta_6 \times \ln CF_{it-1} \times \ln LTD_{it-1} + \\ & + \beta_7 \times \ln CF_{it-1} \times \ln AR_{it-1} + \\ & + \beta_8 \times \ln CF_{it-1} \times CR_{it-1} + \\ & + \beta_9 \times \ln CF_{it-1} \times DE_{it-1} + \\ & + \varepsilon_{it}\end{aligned} \quad (1)$$

Here, $\Delta \ln I_{it}$, rate of growth in investment is log investment in year t less log investment in the preceding year; $\ln A_{it}$ is the log of cooperative assets at the beginning of year $t - 1$; $\Delta \ln LTD_{it}$ rate of growth in long term debt, is log long term debt in year t less log long term debt in the preceding year; $\Delta \ln AR_{it}$, rate of growth in allocated reserves, is log allocated reserves in year t less log allocated reserves in the preceding year; $\Delta \ln RE_{it}$, rate of growth in retained earnings, is log retained earnings in year t less log retained earnings in the preceding year; and $\Delta \ln CF_{it-1}$ is the log cash flow over year $t - 1$. Equation (1) also includes terms capturing interactions between lagged cash flow and other variables: $\Delta \ln LTD_{it-1}$, log of long-term debt in year $t - 1$; $\Delta \ln AR_{it-1}$ log of allocated reserves in year $t - 1$; CR_{it-1}, the current ratio in year $t - 1$; and DE_{it-1}, the debt to equity ratio in year $t - 1$.

Cash flow has two roles in our study: one serving as liquidity constraint, the other serving a source of internal financing (Chaddad et al. 2005; Oliveira and Fortunato 2006). We also include interaction terms between lagged cash flow and rates of growth in long-term debt, retained earnings and allocated reserves because borrowing and equity (retained earnings and allocated reserves) are used to address insufficiencies in the preceding period's cash flow.

RESULTS

We hypothesise that cash flow and extra sources of capital (allocated reserves, retained earnings and long-term debt) have positive effects on cooperative growth. To test this hypothesis, we estimate Equation (1) using the full sample employing three different specifications, designated Models 1–3. The results are reported in Table 3.

In order to test whether capital constraints affect small cooperatives differently from large cooperatives, we divide our data into two subsamples, one containing small to medium-sized cooperatives and the other containing medium to large cooperatives, using USD 40.4 million in assets as the dividing point. We then estimate Equation (1) for the subsample

https://doi.org/10.17221/151/2019-AGRICECON

of small to medium size cooperatives, again employing three different specifications, designated Models 4–6, with results reported in Table 4. And we then estimate Equation (1) for the subsample of medium to large size cooperatives, again employing three different specifications, designated Models 7–9, with results reported in Table 5.

Table 3. Parameter estimates – full sample

Independent variables	Model 1	Model 2	Model 3
$\Delta\ln I_{it-1}$	0.539*** (0.0950)	0.780*** (0.0712)	0.727*** (0.0518)
$\Delta\ln A_{it-1}$	0.483*** (0.124)	0.276*** (0.0939)	0.389*** (0.0961)
$\Delta\ln LTD_{it}$	0.0569*** (0.0111)	0.0469*** (0.0122)	0.0518*** (0.0118)
$\Delta\ln AR_{it}$	0.0980 (0.109)	0.319*** (0.108)	–0.0357 (0.127)
$\Delta\ln RE_{it-1}$	0.128 (0.0910)	0.267*** (0.0998)	0.0692 (0.102)
$\ln CF_{it-1}$	0.0260 (0.0180)	–	–0.0152 (0.0336)
$\ln CF_{it-1} \times \ln LTD_{it-1}$	0.00105** (0.000483)	–	–
$\ln CF_{it-1} \times \ln AR_{it-1}$	0.000797 (0.000616)	–	–
$\ln CF_{it-1} \times CR_{it-1}$	–0.00234** (0.00118)	–	–
$\ln CF_{it-1} \times DE_{it-1}$	–0.00915*** (0.00328)	–	–
2013 year dummy	0.0288 (0.0217)	0.0565** (0.0228)	0.0183 (0.0238)
2014 year dummy	0.0221 (0.0272)	0.0643** (0.0256)	0.00849 (0.0299)
2015 year dummy	0.0260 (0.0269)	0.0566** (0.0261)	0.00947 (0.0288)
Constant	–1.290* (0.770)	–1.185* (0.691)	–1.993*** (0.767)
Wald test	2 323.21	1 765.33	1 637.95
Arellano-Bond test for AR(1) (*P*-value)	–5.55 (0.000)	–5.71 (0.000)	–4.63 –
Arellano-Bond test for AR(2) (*P*-value)	0.43 (0.666)	–0.16 (0.876)	0.10 (0.921)
Sargan's test (*P*-value)	(32) 61.14 (0.001)	(23) 39.22 (0.019)	(22) 45.68 (0.002)

*, **, and *** indicate statistically significant at the 10, 5, and 1% levels, respectively; I_{it} – investment; A_{it} – total assets; LTD_{it} – long term debt; AR_{it} – allocated reserves; RE_{it} – retained earnings; CF_{it} – cash flow; CR_{it} – current ratio; i – cooperatives; t – year

Source: Authors' calculations

The parameter estimates of lagged log total assets are positive and significant in Models 1–6 and 9, but not in Models 7–8. The parameter estimates are all significant at the 1% level. The results of estimates of Models 1–6 reject Gibrat's law, which maintains that the growth rate of a cooperative is independent of its size. The positive relationship may be the result of better management practices for small cooperatives, and therefore the investment growth tends to persist for those cooperatives.

The parameter estimates of the rate of growth in long-term debt for all Models are positive and significant; estimates for Models 1–4 and 6 are significant at 1% level; for Models 5 and 9 are significant at 5% level; and for Models 7 and 9 are significant at 10% level. The significantly positive parameter estimates of rates of growth of long-term debt indicate that there is a direct relationship between long-term debt and investment growth, suggesting that the availability of external financing through long-term borrowing relieves capital constraints.

The parameter estimates of the rate of growth in allocated reserves of Models 7–9 are also positive and significant at either the 5% or 10% level, but not significant in the other Models. The significance of the rate of growth in allocated reserves in medium to large size cooperatives (Models 7–9 in Table 5) indicates medium to large size cooperatives use allocated reserves to raise risky capital. Differences in the estimates presented in Tables 4–5 confirm our predictions that large and small cooperatives employ different strategies for raising risky capital. Our results support our hypothesis that increases in retained earnings and allocated reserves promote cooperative growth, regardless of cooperative size.

The parameter estimates of the rate of growth in retained earnings of Models 2 and 4–6 are positive and significant at either the 1% or 5% level, but not in Models 7–9. This indicates that retained earnings are important sources of internal capital for small to medium size cooperatives but not for large cooperatives. This may be the result that small to medium cooperatives are more capital constrained and internal capital such as retained earnings are less costly than external capital and thus retained earnings become a vital source of risky capital.

The parameter estimates of lagged log cash flow of Models 4 and 6 are positive and significant at 1% lev-

https://doi.org/10.17221/151/2019-AGRICECON

el (Table 4). This suggests that cash flow is critical to small/medium-sized cooperatives, confirming our hypothesis that small cooperatives are more capital constrained than large ones. The positive estimate

Table 4. Parameter estimates – small to medium size cooperatives subsample

Independent variables	Model 4	Model 5	Model 6
$\Delta\ln I_{it-1}$	0.7034*** (0.0674)	0.893*** (0.0799)	0.811*** (0.0368)
$\Delta\ln A_{it-1}$	0.385*** (0.109)	0.257** (0.126)	0.209*** (0.0801)
$\Delta\ln LTD_{it}$	0.0380*** (0.0102)	0.0499** (0.0226)	0.0392*** (0.0111)
$\Delta\ln AR_{it}$	–0.0946 (0.101)	0.596*** (0.151)	–0.119 (0.109)
$\Delta\ln RE_{it-1}$	0.152** (0.0761)	0.302** (0.153)	0.242*** (0.0808)
$\ln CF_{it-1}$	0.0559*** (0.0179)	–	0.0900*** (0.0339)
$\ln CF_{it-1} \times \ln LTD_{it-1}$	0.000524 (0.000480)	–	–
$\ln CF_{it-1} \times \ln AR_{it-1}$	–0.000474 (0.000659)	–	–
$\ln CF_{it-1} \times CR_{it-1}$	–0.00283*** (0.00102)	–	–
$\ln CF_{it-1} \times DE_{it-1}$	–0.00867** (0.00375)	–	–
2013 year dummy	–0.0236 (0.0228)	0.0622 (0.0412)	–0.0168 (0.0248)
2014 year dummy	–0.0469* (0.0279)	0.0710 (0.0446)	–0.0250 (0.0299)
2015 year dummy	–0.0366 (0.0286)	0.0617 (0.0458)	–0.0183 (0.0301)
Constant	–2.167** (1.030)	–2.561* (1.504)	–1.612* (0.913)
Wald test	1 463.79	432.14	1 241.92
Arellano-Bond test for AR(1) (*P*-value)	–5.10 (0.000)	–3.68 (0.000)	–5.07 –
Arellano-Bond test for AR(2) (*P*-value)	–0.02 (0.983)	–0.34 (0.731)	0.06 (0.953)
Sargan's test (*P*-value)	(32) 165.50 (0.000)	(28) 19.58 (0.879)	(27) 136.46 (0.000)

*,**, and *** statistically significant at 10, 5, and 1% levels, respectively; dependent variable is rate of growth in investment; I_{it} – investment; A_{it} – total assets; LTD_{it} – long term debt; AR_{it} – allocated reserves; RE_{it} – retained earnings; CF_{it} – cash flow; CR_{it} – current ratio; i – cooperatives; t – year

Source: Authors' calculations

Table 5. Parameter estimates – large size cooperative subsample

Independent variables	Model 7	Model 8	Model 9
$\Delta\ln I_{it-1}$	0.971*** (0.0964)	1.071*** (0.0560)	1.068*** (0.0439)
$\Delta\ln A_{it-1}$	–0.118 (0.144)	–0.146 (0.0921)	–0.179** (0.0842)
$\Delta\ln LTD_{it}$	0.0236* (0.0141)	0.0251** (0.0110)	0.0197* (0.0102)
$\Delta\ln AR_{it}$	0.142** (0.0648)	0.136** (0.0668)	0.0983* (0.0536)
$\Delta\ln RE_{it-1}$	0.102 (0.237)	–0.0218 (0.221)	0.0190 (0.191)
$\ln CF_{it-1}$	0.0306 (0.0273)	– –	0.0207 (0.0250)
$\ln CF_{it-1} \times \ln LTD_{it-1}$	0.000699 (0.000534)	– –	– –
$\ln CF_{it-1} \times \ln AR_{it-1}$	0.000477 (0.000442)	– –	– –
$\ln CF_{it-1} \times CR_{it-1}$	–0.000975 (0.00716)	– –	– –
$\ln CF_{it-1} \times DE_{it-1}$	–0.00203 (0.00221)	– –	– –
2013 year dummy	0.00749 (0.0258)	–0.00988 (0.0211)	–0.00582 (0.0219)
2014 year dummy	0.0166 (0.0300)	–0.0220 (0.0309)	–0.00858 (0.0246)
2015 year dummy	–0.0101 (0.0393)	–0.0527 (0.0374)	–0.0444 (0.0313)
Constant	2.119 (1.531)	1.582 (1.300)	1.931 (1.223)
Wald test	975.05	799.85	1 020.54
Arellano-Bond test for AR(1) (*P*-value)	–3.57 (0.000)	–3.73 (0.000)	–3.86 (0.000)
Arellano-Bond test for AR(2) (*P*-value)	–0.89 (0.374)	–0.98 (0.325)	–1.11 (0.267)
Sargan's test (*P*-value)	(23) 24.82 (0.360)	(23) 19.05 (0.698)	(27) 29.86 (0.320)

*, **, and *** statistically significant at 10, 5, and 1% levels, respectively; dependent variable is rate of growth in investment; I_{it} – investment; A_{it} – total assets; LTD_{it} – long term debt; AR_{it} – allocated reserves; RE_{it} – retained earnings; CF_{it} – cash flow; CR_{it} – current ratio; i – cooperatives; t – year

Source: Authors' calculations

https://doi.org/10.17221/151/2019-AGRICECON

of cash flow-long-term debt interaction term provides evidence that cooperative current external financing through long-term debt reduces future borrowing, making cooperatives more reliant on internal financing. The borrowing of long-term debt is critical to the growth of both large and small cooperatives.

The parameter estimates of the interaction terms of lagged log cash flow with current ratio and debt-to-equity ratio are negative and significant in Models 1 and 4. The negative relationship with the current ratio is expected because a large current ratio enhances the cooperative's ability to cover short-term debt obligations through external financing, making them less reliant on internal financing. These results are more pronounced in small cooperatives than in large cooperatives, since small cooperatives are more capital constrained. The negative sign on the lagged log cash flow and debt-to-equity ratio interaction term indicate that high cash flow and solvency ratios impede cooperative growth. This suggests that cooperatives seeking to grow should reduce excess cash flow. This result also suggests that both capital and liquidity constraints affect cooperatives growth.

CONCLUSION

Our empirical results based on system-GMM estimates indicate that long-term debt and retained earnings are critical to the growth of small to medium-sized cooperatives, while long-term debt and allocated reserves are critical to the growth of medium to large-sized cooperatives. In addition, our estimation results support our hypothesis that small cooperatives face more restrictive capital constraints than large ones, and thus are more sensitive to the availability of internal financing such as cash flow. Large cooperatives are less capital constrained and unaffected by cash flow.

The major problem facing cooperatives in raising capital is the residual claim on cooperative equity. There is no way to get around the problems caused by the presence of residual claims on cooperative growth without unless the cooperative structure is significantly reorganised (Chaddad et al. 2005). In recent years, cooperatives have begun to address this issue by increasing the use of retained earnings, supported by our findings that the use of retained earnings relieve capital constraints. Thus, our findings suggest that cooperatives should continue to increase the use of retained earnings as a way to access low-cost capital. In addition, cooperatives need to increase efficiency in order to increase profits and to employ financial expertise internally or externally to keep up with competition and to handle changes in the structure of the Farm Credit System.

REFERENCES

Barton D., Boland M., Chaddad F., Eversull E. (2011): Current challenges in financing agricultural cooperatives. Choices, 26.

Chaddad F., Cook M., Heckelei T. (2005): Testing for the presence of financial constraints in US agricultural cooperatives: An investment behavior approach. Journal of Agricultural Economics, 56: 385–397.

Chang Y., Chou R.K., Huang T. (2014): Corporate governance and the dynamics of capital structure: New evidence. Journal of Banking & Finance, 48: 374–385.

CoBank (2015): Member Cooperative Financial Data, 2011–2015. [Unpublished proprietary dataset]. CoBank, Greenwood Village, CO, USA.

Fagiolo G., Luzzi A. (2006): Do liquidity constraints matter in explaining firm size and growth? Some evidence from the Italian manufacturing industry. Industrial and Corporate Change, 15: 1–39.

Faulkender M., Petersen M. (2012): Investment and capital constraints: Repatriations under the American Jobs Creation Act. The Review of Financial Studies, 25: 3351–3388.

Fulton M.E., Fulton J.R., Clark J.S., Parliament C. (1995): Cooperative growth: Is it constrained? Agribusiness, 11: 245–261.

Lerman Z., Parliament C. (1990): Comparative performance of cooperatives and investor-owned firms in US food industries. Agribusiness, 6: 527–540.

Lerman Z., Parliament C. (1993): Financing growth in agricultural cooperatives. Review of Agricultural Economics, 15: 431–441.

Li Z., Jacobs K.L., Georgeanne M.A. (2015): The cooperative capital constraint revisited. Agricultural Finance Review, 75: 253–266.

Oliveira B., Fortunato A. (2006): Firm growth and liquidity constraints: A dynamic analysis. Small Business Economics, 27: 139–156.

U.S. Department of Agriculture (2014): Agricultural Cooperative Statistics 2012–2014. [Dataset]. U.S. Department of Agriculture, Washington, D.C.

Wang Y. (2016): The optimal capital structure in agricultural cooperatives under the revolving fund cycles. Agricultural Economics – Czech, 62: 45–50.

Received: May 24, 2019
Accepted: August 31, 2019