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To What Extent Does Trade Liberalisation Affect The Financial Performance of Korean Co-operatives?

An Application of the Du Pont Expansion Path

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An Application of the Du Pont Expansion Path

Abstract

This study aims at evaluating agricultural co-operative performance in Korea based on financial data vis-à-vis trade liberalisation after subsequent Free Trade Agreements. With the help of the Du Pont expansion method this paper examines the financial performance and its drivers for 1,060 agricultural primary Korean co-operatives between 2012 and 2016 within the Korean National Agricultural Cooperatives Federation. Subsequently, we estimate the effect of the producer protection ratio, agricultural export and import volumes, co-operative size and world food prices on co-operatives' net profit margins, total asset turnovers and equity multipliers. The empirical results show that trade liberalisation has an ambiguous effect on agricultural co-operatives. Increased exports have a positive effect on the co-operatives' return on equity and profitability while imports have a reducing effect. Greater import and export volumes do not result in significant effects on efficiency and solvency. This study provides valuable lessons for countries seeking to alleviate external shocks on farm income and the rural economy following trade liberalisation by emphasising strong co-operative structures, as benefits and bottlenecks of the co-operative organisational structure are displayed.

Keywords: Korea, financial performance, agricultural co-operatives, trade liberalisation, *Du Pont analysis*

JEL Codes: Q13, Q14, Q17

Introduction

Amidst Korea's spectacular GDP growth rates of almost 7% between 1970 and 2010, its primary sector has - on average - only grown by 1.7% annually. Moreover, both the share of agriculture in the national GDP and the share of agriculture in total employment have decreased rapidly from 27.4% to 2% in the former and from 50.4% to 5.2% in the latter case.

These rapid changes have revealed strategic weaknesses within the agricultural sector; such as the dominance of rice cultivation the livestock sector's dependency on imported feed grain or ageing and depopulating rural areas. Also, recent international agreements, such as the EU- South Korea or the US-Korea free trade agreement have affected Korea's agriculture ambiguously. Close to 2.3 out of 2.6 million Korean farmers organise themselves in one of the National Agricultural Co-operative Federation's (*Nonghyup*) 1,134 primary co-operatives. Hence, co-operative efficiency might be a good indicator of how the agricultural sector's performance has been affected by trade liberalisation.

Related to co-operatives, efficiency is usually either measured as economic efficiency or via financial ratios (Sexton & Iskow, 1993). Many studies assess co-operative's vis-à-vis Investor-oriented firms (Hardesty & Salgia, 2004; Porter & Scully, 1987; Sexton, Wilson, & Wann, 1989). Particularly, Porter and Scully examine dairy co-operatives and find, utilising a production function approach, that investor-owned firms (IOF) outperform their co-operatively organised counterparts (Porter & Scully, 1987). Sexton, Wilson and Wann, on the other hand, found that cotton ginning co-operatives match IOF's allocative efficiency (Sexton et al., 1989). Notably, Porter and Scully have argued that co-operatives even display an inefficient form of organisation and that supportive governments thus promote and foster inefficiencies with subsidies (Porter & Scully, 1987). More recently, Hardesty and Salgia find that while the financial performance of agricultural co-operatives and their IOF counterparts were comparable, co-operatives show lower asset turn over rates and hence efficiency. They also find co-operatives in the sectors dairy, farm supply, fruit and vegetable, and grain to be less leveraged (Hardesty & Salgia, 2004).

Besides efficiency and beyond the comparison with investor-oriented firms, profitability in the agricultural sector has become a field of interest as the sector shows two particular characteristics: First, chronic low returns to factors of production and

boom/bust cycles (Cochrane, 1993). Particularly during the 1980s, the agricultural sector endured financial stress, whereas the mid-nineties were financially more confident (Mishra et al., 2013). Second, the fact that investments in agriculture must offer returns that are both competitive vis-à-vis alternative investments and cover the financial obligations of a farm business has sparked heightened interest in finding out the drivers of farm profitability and hence an explanation for the structure of the agricultural sector (Mishra et al., 2013).

Based on the Du Pont Analysis, Mishra et al. utilise financial ratio analysis to examine the drivers of profitability, efficiency and solvency of the US American farming sector with the help of the Du Pont expansion method (Mishra, Harris, Erickson, Hallahan, & Detre, 2013; Mishra, Moss, & Erickson, 2009). They find that critical drivers of the net profit margin are factors as farm typology, crop specialisation, and the level of government payments received. The asset-turnover component (i.e. efficiency) of the Du Pont model, however, is mainly affected by factors as farm specialisation, vertical coordination and government payments, where the results for vertical coordination are consistent with transaction cost theory (Williamson, 1979).

Finally Mishra et al. find that farm size, farm typology, contracting, and specialisation affect the asset-to-equity ratio component (i.e. the equity multiplier or solvency) of the Du Pont model (Mishra et al., 2013). In their study, they also confirm Moss and Schmitz' notion that the agricultural sector is subject to significant boom and bust cycles as several temporal variables show significance (Mishra et al., 2013; Moss & Schmitz, 2006). Hence, in booming periods, farm households somewhat expand their economic activity inducing sectorial overcapacities, as the augmented wealth lowers the relative interest rate paid. In bust times, however, the access to reasonable credit markets may be reduced, or the relative interest rate increased due to inferior levels of solvency (Mishra et al., 2013).

Applying Mishra et al.'s model to co-operatives in the Korean agricultural sector, we will be able to provide insights on the effects of trade liberalisation. With the help of the Du Pont expansion method this paper examines the financial performance and the drivers of financial performance of 1,060 agricultural primary Korean co-operatives between 2012 and 2016 within the Korean National Agricultural Cooperatives Federation. For this aim, a Seemingly Unrelated Regression (SUR) analysis is conducted, estimating the effect of producer protection ratio, agricultural import and export

volumes, co-operative size and world food prices on co-operatives' net profit margins, total asset turnovers and equity multipliers. From our results, we hope to find which factors are critical for profitable and efficient co-operatives amid trade liberalisation and thus might serve policymakers as a tool to create public policies that mitigate liberalisation's most adverse effects. Finally, this paper is divided into three sections. First, Korean co-operatives financial performance is analysed with the help of key financial figures. Second, the Du Pont expansion path and the SUR Model are introduced. Lastly, the results are examined, and several conclusions are drawn.

Financial Performance Analysis and DuPont Analysis

Data

The data we use stems from the Korean Financial Statistics Information System (FISIS) and comprises a set of 1,060 agricultural co-operatives organised within the National Agricultural Cooperative Federation (NACF) founded in 1961. Of these co-operatives 89 are specialised in livestock, 33 in horticulture 11 in ginseng, 11 in fruit and vegetables, 9 in meat and 11 in dairy and milk production. In total, 169 speciality co-operatives oppose 891 general co-operatives. The period analysed is 2012 to 2016, comprising of 5,300 analysed observations. All trade related variables (import and export values, as well as producer protection figures, stem from the OECD).

Results Financial Analysis

As it can be seen from the graphs below, the overall financial situation of the Korean co-operatives has been subject to several ambiguous changes over the last five years. Admit declining operating revenues, net income has been rather constant as the first graph shows. Moreover, while total assets and total liabilities have increased symmetrically, co-operative equity has remained stable over the entire period and increased slightly in 2016. Solvency, as measured by the equity multiplier in the third graph, has decreased from 14.41 to 12.85, indicating that total assets have decreased relative to the equity. However, these figures remain at very high levels which can be explained by elevated levels of indebtedness.

At the same time, Korean co-operatives have lost in efficiency, as the total asset turnover shows a negative trend. A drop in operating revenues and the significant increase in assets explains the strong decline in total asset turnover.

Financial Indicators on Korean Co-operatives

Figure 1

Operating Revenue and Net income for Korean Cooperatives in ten thousand KRW, 2012 - 2016

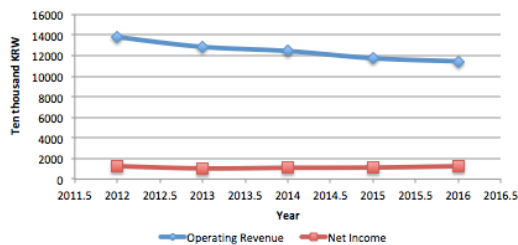


Figure 2

Equity, Total Assets and Total Liabilities for Korean Cooperatives in ten thousand KRW, 2012 - 2016

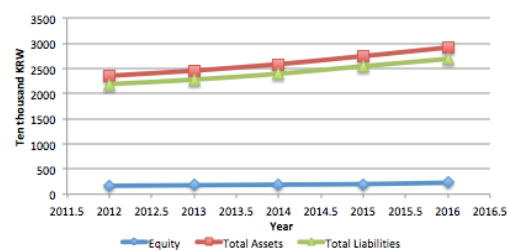


Figure 3

Total Asset Turnover and Equity Multiplier for Korean Cooperatives, ratio, 2012-2016

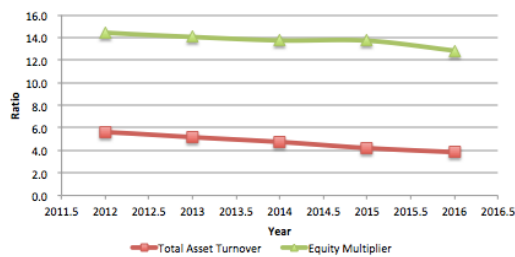


Figure 4

Net Profit Margin and Return on Assets for Korean Cooperatives, per cent, 2012-2016

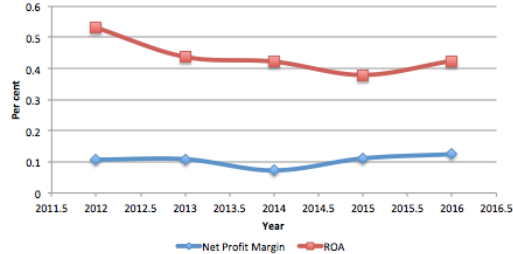
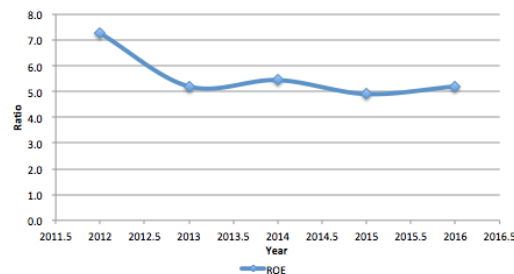


Figure 5

Return on Equity for Korean Cooperatives, ratio, 2012-2016



Analysing the Korean agricultural co-operatives' profitability (figures 4 and 5), we can observe how - despite a downward trend from 2012 on - the return on assets has increased mildly in 2016. In general, the Korean co-operative sector is highly leveraged shown by extraordinary high equity multiplier values (over 12 throughout the period analysed) and shows very strong profitability (oscillating around 10 per cent between 2012 and 2016).

Also, co-operatives' low equity leads to a high *ROE* oscillating around five over the last four years. During the period analysed the *ROA* dropped from 0.53 in 2012 to 0.42 in 2016. To sum it up, Korean co-operatives show remarkably strong returns on

asset and equity, with strong values for efficiency and solvency measured as total asset turnover and equity multiplier respectively.

Financial Analysis by Province and Specialty

Analysing profitability, efficiency and solvency separately for the Korean provinces and special cities, three patterns dissolve from figures 6 to 8. First, figure 6 displays - admit outlaying Gyeongsangnam and Jeollanam province - the proximity of net profit margins across provinces. However, absolute mean deviations increase from 12.3 to 16.4 percentage points between 2012 and 2016.

Second, analysing mean deviations regarding cross-provincial efficiency, we can see how the spread in deviations has decreased, as the *TAT* has converged (see figure 7). While in 2012 the efficiency between Gyeonggi and Jeollabuk province differed 120.2 percentage points, the mean deviation has been halved in 2016 (57.6 percentage points difference between Ulsan and Jeollabuk province). Remarkably, Gyeonggi province and the special city of Ulsan have remained with the highest positive and Jeollabuk province with the highest negative mean deviation throughout the period.

Third, regarding solvency average mean deviation has even increased between 2012 and 2016 (316.3 to 379%). Also, our analysis shows that while Gyeonggi and Chungcheongnam province have remained less solvent than the mean throughout the period analysed, the cities Busan, Daejeon and Seoul have emerged as comparatively solvent (see figure 8).

Analysing the mean deviations of the return on asset and the return on equity (figures 9 and 10), volatility is more apparent than in the other graphs. However, here too we can see that specific provinces remain clearly above or below the mean. Both regarding *ROA* and *ROE*, Jeju province and Ulsan city have been solidly above the average while Busan and Incheon have shown the most significant negative deviation from the mean over most years. Regarding the absolute mean deviation, it has decreased from 26.7 to 23 percentage points in the case of the *ROA* and 4.1 to 2.5 percentage points in the case of the *ROE*.

Financial Indicators of Korean Co-operatives by province

Figure 6

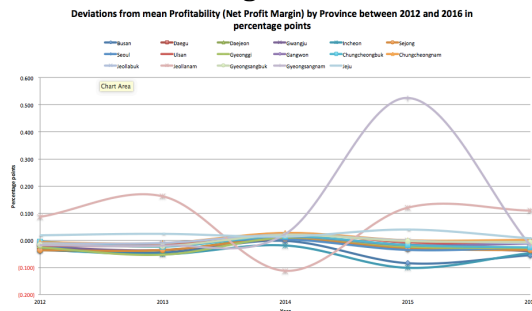


Figure 7

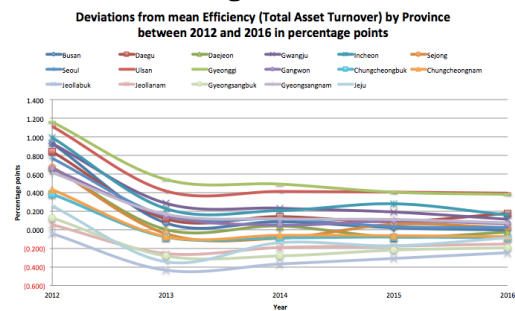


Figure 8

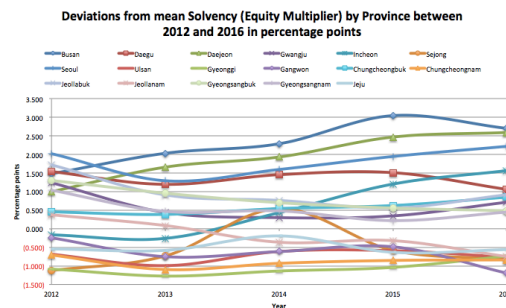


Figure 9

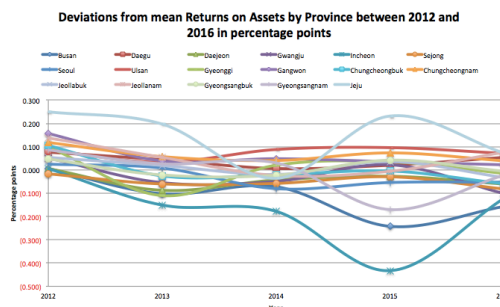
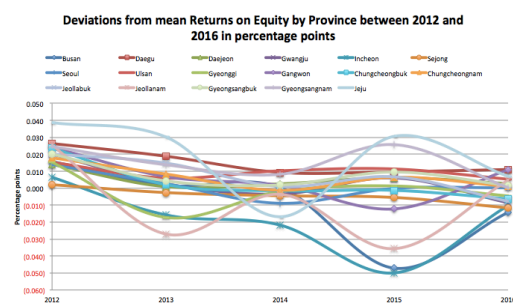


Figure 10



When analysing the financial indicators regarding the co-operatives' speciality several findings emerge. First, analogously to the cross-province comparison, the absolute mean deviation changes regarding profitability, efficiency and solvency. Admit the highly volatile Fruit and Vegetable co-operatives' profitability, the *NPM*, in general, is similar across specialities (figure 11). Excluding the figures for the fruit and vegetable co-operatives, absolute mean deviations have decreased from 11.9 percentage points to 6.9 percentage points between 2012 and 2016. Across all indicators analysed in the paper, this is the smallest absolute mean deviation.

Second, regarding efficiency absolute mean deviations have decreased significantly between 2012 (291.9 percentage points between other specialities and

Ginseng co-operatives) and 2016 (130.9 percentage points between the same two speciality groups). Also, horticulture and other speciality co-operatives (consisting of one raw sugar, one honey and three flower co-operatives) have been most efficient throughout the five-year-period while fruit and vegetable, as well as ginseng co-operatives, have underperformed mean efficiency continuously (figure 12).

Third, solvency related mean deviations have absolutely decreased from 620.6 percentage points in 2012 to 455.5 percentage points in 2016 between meat and fruit and vegetable co-operatives. While other speciality and meat co-operatives have remained at higher solvency levels, fruit and vegetable co-operatives have underperformed the Korean mean. Livestock, ginseng, dairy and horticulture co-operatives' solvency has converged over the period, while the last three showed closer proximity (see figure 13).

Comparing returns on assets and returns on equity across specialities (figures 14 and 15), the similar pattern between fruit and vegetable and ginseng co-operatives becomes apparent. Moreover, as the meat, livestock and horticulture co-operatives' ROAs evolve parallel, and their ROE's only do so recently, the meat co-operatives equity level has converged compared to the mean. Regarding both variables, ginseng co-operatives perform well below the mean, as indicated by their strong negative deviations. Absolute mean deviations have decreased from 44.3 to 26.2 percentage points (ROA) and from 7 to 3.6 percentage points (2016) between 2012 and 2016.

Financial Indicators of Korean Co-operatives by speciality

Figure 11

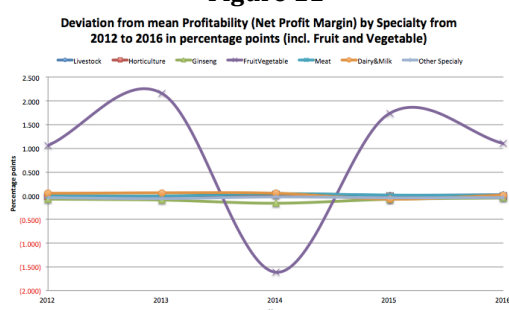


Figure 12

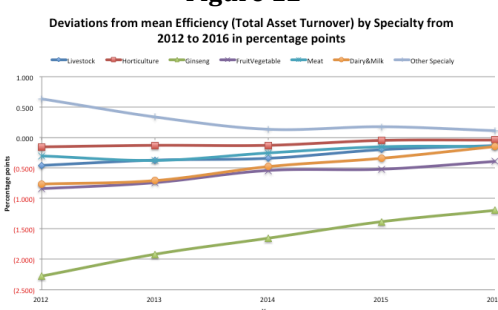


Figure 13

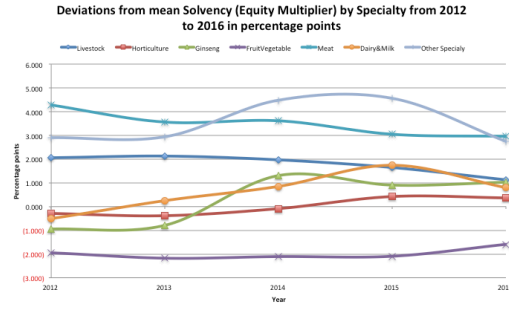


Figure 14

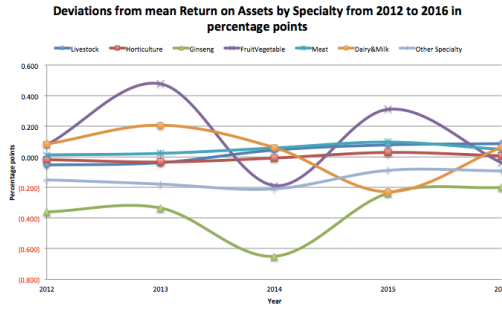
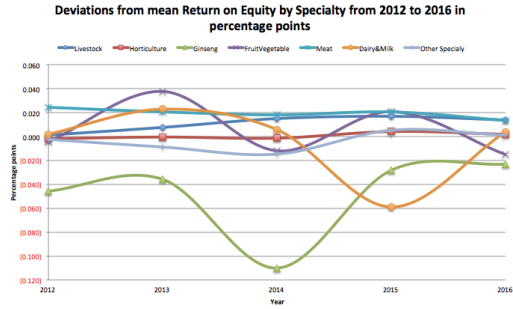


Figure 15



The DuPont Analysis

The DuPont Model measures and indicates through the *ROE* how efficiently a farm is managed, taking profitability, efficiency and solvency into account. It calculates the rate of return that the farm earns on farm business equity (Sheela & Karthikeyan, 2012).

$$ROE = \frac{\text{Net income}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Assets}} \times \frac{\text{Assets}}{\text{Equity}} = \frac{\text{Net income}}{\text{Equity}} \quad (1)$$

To simplify the above equation:

$$\frac{R}{E} = \left[\frac{S-C}{S} \right] * \left[\frac{S}{A} \right] * \left[\frac{A}{E} \right] \quad (2)$$

Where R is the profit defined as gross receipts minus the cost of production, E is the KRW value of equity; A is the total KRW value of assets, S is the level of sales and C is the cost of production. As Mishra et al. show, the DuPont model is linear in logs (Mishra et al., 2013):

$$\ln(ROE) = \ln\left(\frac{\text{Net income}}{\text{Sales}}\right) + \ln\left(\frac{\text{Sales}}{\text{Assets}}\right) + \ln\left(\frac{\text{Assets}}{\text{Equity}}\right) \quad (3)$$

where $\ln(x)$ is the natural log operator. Since equation (3) also is a strict identity, we can decompose the *ROE* into each component.

Empirical Model

As our model consists of several equations across which we can not rule out a correlation between the error terms (i.e. non-zero covariance), we utilise a generalisation of the linear regression model, the seemingly unrelated regression (SUR) model (Greene, 2003).

Model Set Up

1. $LN(ROE) = \alpha_{10} + \alpha_{11}LNProdProt + \alpha_{12}LNIMP + \alpha_{13}LNEXP + \alpha_{14}LNFAO + \alpha_{15}ORSize + \alpha_{16}LIVESTOCK + \alpha_{17}HORTICULTURE + \varepsilon_1$
2. $LN(NPM) = \alpha_{20} + \alpha_{21}LNProdProt + \alpha_{22}LNIMP + \alpha_{23}LNEXP + \alpha_{24}LNFAO + \alpha_{25}ORSize + \alpha_{26}LIVESTOCK + \alpha_{27}HORTICULTURE + \varepsilon_1$
3. $LN(TAT) = \alpha_{30} + \alpha_{31}LNProdProt + \alpha_{32}LNIMP + \alpha_{33}LNEXP + \alpha_{34}LNFAO + \alpha_{35}ORSize + \alpha_{36}LIVESTOCK + \alpha_{37}HORTICULTURE + \varepsilon_2$
4. $LN(EM) = \alpha_{40} + \alpha_{41}LNProdProt + \alpha_{42}LNIMP + \alpha_{43}LNEXP + \alpha_{44}LNFAO + \alpha_{45}ORSize + \alpha_{46}LIVESTOCK + \alpha_{47}HORTICULTURE + \varepsilon_3$

Variable Description

Variables Description (all variables are used in a logarithmic form)	
ROE	Return on Equity*
NPM	Net Profit Margin*
TAT	Total Asset Turnover*
EM	Equity Multiplier*
ProdProtRat	Ratio of Producer Protection**
IMP	Annual agricultural imports in thousand USD**
EXP	Annual agricultural exports in thousand USD**
FAO	World nominal food price index (base year 2010)***
ORSize	Size dummy dividing co-operative size by Revenue in three categories*
LIVESTOCK	Co-operative specialised in Livestock (Dummy variable)*
Horticulture	Co-operative specialised in Horticulture (Dummy variable)*

Legend: *= data from Korean Financial Statistics Information System (2017); **=data from OECD (2017); ***=data from FAOSTAT (2017)

Empirical Results

We have analysed 1,060 Korean agricultural co-operatives using the statistical programme Stata. The results from our Seemingly Unrelated Regressions model can be obtained from table 1.

First, considering the rate of return on equity (*ROE*), we find several interesting results. The producer protection ratio (*PPR*) - defined as the ratio between the average

price received by producers and the border price - has a significant negative effect on the *ROE* (-1.151; *Std. Err.*: 0.149). This could be explained by the negative effect on demand resulting in lower profits following a rise in consumer prices. A rise in agricultural imports reduces the return on equity significantly (-0.607; 0.172). We assume that increased competition from foreign products reduces profits and hence *ROE*. Symmetrically, rising exports increase the *ROE* as farmers might find a chance to export their goods to foreign countries (0.792; *Std. Err.*: 0.125).

Rising world food prices increase the *ROE* significantly (0.208; 0.07). Two different effects may explain this phenomenon. First, rising world food prices increase the revenues for exported agricultural goods. Second, higher world food prices increase the border price and thus reduce the producer production ratio, which relatively reduces domestic prices, as imported goods are more expensive.

Increased co-operative size has a negative effect on the *ROE* (-0.1; *Std. Err.*: 0.002). This - somewhat counterintuitive - finding might be an indicator for that as co-operatives grow, their equity grows at a larger pace as their profits resulting in a smaller return on equity. At last, livestock and horticulture co-operatives have a slightly lower *ROE* (-0.002 and -0.191, respectively). An explanation might be that - as competition is higher for specialised livestock and horticulture co-operatives - the pressure on income is greater than for general agricultural co-operatives.

Regarding the net profit margin (*NPM*), a rising *PPR* equally has a reducing effect. Here, similar argumentation applies as above, a higher ratio difference between the domestic and the border price may reduce net income at a higher pace than sales.

A rise in imports has a negative effect on the *NPM* which may be an indicator of that increased competition from abroad reduces co-operatives' profitability significantly (-0.64; *Std. Err.*: 0.36). However, a rise in exports has a significant and positive effect on the net profit margin (1.058; 0.26), indicating that a greater value in exports increases co-operatives' profitability. Higher world food market prices reduce the *NPM* (-1.11; 0.14). Here, higher operating revenue increases relative to net income might be the reason. Analogously to the *ROE*, livestock and horticulture co-operatives are less profitable (-0.103 and -0.364, respectively) than the mean co-operative.

Regarding co-operatives' efficiency, we find that both a rise in the *PPR* and the world food market price index have significant positive effects (1.606; 0.408 and 0.908; 0.162, respectively). Both seem to affect revenue positively despite more constant

developments in the value of the total assets of co-operatives. Rising imports and exports do not have a statistically significant effect on Korean co-operatives' efficiency. Here, the high PPR but also an elevated PSE might be an explanation. Finally, livestock co-operatives are slightly less efficient than their counterparts (-0.086) while horticulture co-operatives have a positive effect on efficiency (0.125).

Finally, neither the producer protection ratio, the agricultural imports nor exports affect co-operative solvency - as measured by the equity multiplier - significantly. This may indicate that the relationship between assets and equity is not affected unambiguously by changes in imports, exports, *PPR* and world food prices.

However, both world food prices and the co-operative size have a positive effect on solvency (0.15; *Std. Err.*: 0.09 and 0.092; *Std. Err.*: 0.011, respectively). The former effect might be caused by the fact that required leverage is reduced if world food prices are high, while the latter can be explained by the fact that larger co-operatives have more possibilities to manage financial risk resulting in higher solvency. Both livestock and horticulture co-operatives are more solvent than the average indicating that the two types of speciality co-operatives are more leveraged than the average Korean co-operative.

Table 1 - Results Seemingly Unrelated Regression

Effect on	Variable Name	Coefficient	Standard Error
Return on Equity (ROE)	LNProdProtRat	-1.151	0.149***
	LNFAO	0.208	0.07***
	LNimp	-0.607	0.172***
	LNexp	0.792	0.125***
	ORSize	-0.102	0.002***
	Livestock (d)	-0.002	/
	Horticulture (d)	-0.191	/
Net Profit Margin (NPM)	LNProdProtRat	-1.655	0.304***
	LNFAO	-1.112	0.143***
	LNimp	-0.644	0.357*
	LNexp	1.058	0.257***
	ORSize	-0.176	0.02***
	Livestock (d)	-0.103	/
	Horticulture (d)	-0.364	/
Total Asset Turnover (TAT)	LNProdProtRat	1.606	0.408***
	LNFAO	0.908	0.162***
	LNimp	-0.308	0.36
	LNexp	0.067	0.281
	ORSize	0.03	0.011***
	Livestock (d)	-0.086	/
	Horticulture (d)	0.125	/
Equity Multiplier (EM)	LNProdProtRat	-0.005	0.317
	LNFAO	0.15	0.09*
	LNimp	-0.114	0.105
	LNexp	0.228	0.141
	ORSize	0.092	0.011***
	Livestock (d)	0.153	/
	Horticulture (d)	0.052	/

***: 1% significance level, **: 5% significance level, *: 10% significance level

Conclusion

The analyses of this study allow us to draw several conclusions. First, across provinces and specialities we see an ever-closing gap between the most positive and negative mean deviations for the indicators of profitability, efficiency, return on assets and return on equity. Second, the effects of both profitability and solvency are ambiguous. While the profitability spread for provinces has widened, absolute mean deviations have decreased for speciality co-operatives. Equally ambiguous, deviations from the mean equity multiplier for solvency decreased across specialities and increased across provinces. In both cases, we believe it is critical for the National Agricultural Co-operative Federation and policy makers to carefully follow these

developments. More profitable provinces like Jeju, Jeollanam or Chungcheongnam province could serve as examples to adapt while the special cities, as Busan, Incheon, Seoul but also Chungcheongbuk province may not fall behind further. Gangwong, Chuncheongnam, Geonggi but also Jeju province has considerably lower levels of solvency, while most special cities (namely, Busan, Daejeon and Seoul) but also Gyeongsanbuk province are very solvent. Here, more research is needed to pinpoint the differences between the provinces and hence for the diverging solvency ratios.

From our econometric analysis, we can conclude that increased integration in the global economy as measured by agricultural imports and exports has significant effects on co-operative *ROE* and profitability. While imports reduce both indicators, increased exports improve the *NPM* and the *ROE* equally. Also, we can say that co-operative size has a positive effect on efficiency and solvency while it has a negative effect on the *ROE* and the *NPM*. Furthermore, the producer protection ratio has a significant effect on all but solvency. Hence, the *PPR* remains an important policy tool with a strong negative effect on the *ROE* and the profitability but a strongly positive effect on co-operative efficiency. Finally, as efficiency is not affected in a statistically significant way, more research is needed to analyse the link between imports, exports and the relationship between sales and assets.

References

- Cochrane, W. W. (1993). *The development of American agriculture : a historical analysis*. University of Minnesota Press.
- Greene, W. H. (2003). *Econometric analysis* (5th ed.). Upper Saddle River N.J.: Prentice Hall.
- Hardesty, S. D., & Salgia, V. D. (2004). Comparative Financial Performance of Agricultural Cooperatives and Investor-Owned Firms. *NCR-194 Research on Cooperatives Annual Meeting*, (JANUARY 2004), 29.
- Mishra, A., El-Osta, H., & Gillespie, J. M. (2009). Effect of agricultural policy on regional income inequality among farm households. *Journal of Policy Modeling*, 31(3), 325–340.
- Mishra, A. K., Harris, J. M., Erickson, K. W., Hallahan, C., & Detre, J. D. (2013). Agricultural Finance Review Drivers of agricultural profitability in the USA: An application of the Du Pont expansion method "Drivers of agricultural profitability in the USA: An application of the Du Pont expansion method" *Agricultural Finance Review Agricultural Finance Review Agricultural Finance Review*, 72(1), 325–340.
- Mishra, A. K., Moss, C. B., & Erickson, K. W. (2009). Agricultural Finance Review Regional differences in agricultural profitability, government payments, and farmland values: Implications of DuPont expansion. *Agricultural Finance Review Agricultural Finance Review Agricultural Finance Review*, 69(3), 49–66.
- Moss, C. B., & Schmitz, A. (2006). Farmland Markets, Boom/Bust Cycles, And Farm Size. In J. Curtiss, A. Balmann, K. Dautzenberg, & K. Happe (Eds.), *Agriculture in the Face of Changing Markets, Institutions and Policies: Challenges and Strategies* (33rd ed., pp. 80–103). Halle (Saale): IAMO.
- Porter, P. K., & Scully, G. W. (1987). Economic Efficiency in Cooperatives. *The Journal of Law & Economics*, 30(2), 489–512.
- Sexton, R. J., & Iskow, J. (1993). What Do We Know About the Economic Efficiency of Cooperatives: An Evaluative Survey. *Journal of Agricultural Cooperation*, 8, 15–27.
- Sexton, R. J., Wilson, B. M., & Wann, J. J. (1989). Some Tests of the Economic Theory of Cooperatives: Methodology and Application to Cotton Ginning. *Western Journal of Agricultural Economics*, 14(1), 56–66.
- Sheela, S. C., & Karthikeyan, K. (2012). Financial Performance of Pharmaceutical Industry in India using DuPont Analysis. *European Journal of Business and Management*, 4(14), 84–91.
- Williamson, O. E. (1979). Transaction-Cost Economics: The Governance of Contractual Relations. *Journal of Law and Economics*, 22(2), 233–261.