Measuring Financial Health of Selected Cooperatives in an ASEAN Province Using Altman Model

Melvin S. Sarsale
College of Business and Management
Southern Leyte State University
San Juan, Southern Leyte, Philippines

Abstract
The application of the Altman model concentrated mostly on investor-owned companies. Only rare studies apply this model among cooperatives, particularly in the Philippine setting. This paper attempts to address this gap by using this model in measuring the financial health of cooperatives in a Philippine province. This study employs the document analysis method as it uses the financial information from the published annual reports covering from 2011 to 2015. This study applies a two-stage sampling technique in choosing the representative cooperatives. Findings revealed that large cooperatives fell into the gray zone that poses potential risks of business failure as contributed by low liquidity, profitability, and solvency measures even though these cooperatives have relatively more assets and high membership levels than medium and small cooperatives. Medium and small cooperatives fell into a safe zone in which getting bankrupt is very unlikely to happen. Findings also showed that the size and age of cooperatives have a significant inverse relationship with their financial health. Further analysis revealed that closed-type, small cooperatives exhibited better performance compared to medium and large, open-type cooperatives, as shown in its high scores in liquidity and solvency factors. In summary, this model can be a tool for gauging the financial health of cooperatives.

Keywords: Bankruptcy model; Liquidity; Profitability; Solvency; Financial viability

Introduction
Cooperatives have been very instrumental in promoting financial inclusion in the Philippines, particularly in providing financial services to the underserved rural communities in the country. Cooperatives have become a viable option for individuals where banks are limited (Ballesteros & Llanto, 2017). The role of cooperatives as a financial intermediary in the countryside in extending varied services to underprivileged villagers is of great importance in achieving the desired economic growth (Cuevas & Buchenau, 2018).

As reported by the Cooperative Development Authority (CDA) in 2018, out of 18,065 operating cooperatives, 62% reported to be serving a million members and contributing thousands of employment and billions of assets and net surplus to the national economy. However, it is worth mentioning that 32% of the operating cooperatives are non-reporting, which may imply that these cooperatives were either delisted or not operating. It connotes that these cooperatives are struggling, especially in their financial reporting. Cooperatives must disclose financial reports regularly as it provides more information to members for their share capital decisions and also to management in identifying areas requiring improvements (Chungyas & Calara, 2018). Regulatory agencies and other stakeholders
are also interested in knowing the financial status of cooperatives (Kristanovic & Barbaca, 2016). Financial health is very critical to the life of the cooperatives. Without healthy profitability, liquidity, and solvency measures, cooperative will surely fail as they cannot meet financial obligations to their stakeholders.

Measuring the financial performance of a firm has been widely researched worldwide. Most of the companies had utilized bankruptcy models to assess their financial health. Many bankruptcy models emerged, such as recursive partitioning algorithm, logistic analysis, and artificial neural networks but not as superior as the Altman model (Altman, 1968; Altman, 1983; Altman, Hartzell, & Peck, 1995) that is prevalently applied among researchers nowadays (Saijan, 2016). However, empirical studies applying this model centered mostly on investor-owned companies, and only a few used this in cooperatives that are member-owned enterprises (Mateos-Ronco & Mas, 2011). The limited access of cooperative data to the public has led to only a few researches conducted on the financial condition of cooperatives (Shamsuddin et al., 2018).

Meanwhile, several barometers occurred in measuring the financial performance of Philippine cooperatives. In most cases, it utilized financial ratios in determining how cooperatives performed financially (Bation, 2016; Chungyas & Calara, 2018; Dizon & Elauria, 2016; Gevero & Bation, 2016; Quicoy, 2016). Contrarily, despite the effectiveness of the Altman model that also utilized ratio analysis in measuring the financial performance of firms, Mateos-Ronco & Mas (2011) found out that only a handful number of studies applied this model to cooperatives. Moreover, these researches concentrated mostly on cooperative banks and not on multipurpose cooperatives (Jesudasan & Fernandes, 2016; Lubawa & Louangrath, 2016; Muthumeena & Ahamed, 2018). The literature clearly shows a gap in the limited application of this particular model among cooperatives, especially in the Philippine setting.

In this context, applying this model in measuring the financial health of cooperatives is very wanting. Specifically, this study aims to describe and compare the financial performance of the cooperatives in terms of liquidity, reserves, profitability, and solvency. It also aims to describe and compare the scores and zone classification among cooperative groups. It also aims to analyze the relationship between the size, age, and financial health of cooperatives. This study could give valuable information to the top-level management in gauging the financial condition of cooperatives and in crafting appropriate strategies to address potential risks. Likewise, this will provide some useful information to other stakeholders in protecting their interests towards the cooperatives, particularly its members.

Conceptual Framework

Using the information incorporated in the financial statements can examine the financial health of cooperatives and compare it with relevant industry standards (Yuvaraj & Wondem, 2013). These traditional financial performance measures include financial ratios drawn from the financial statements of cooperatives (Mathuva & Kiweu, 2016). In other words, financial statements appeared to be useful in gauging the financial condition of cooperatives based on literature (Da Silva et al., 2017; Martins & Lucato, 2018; Masuku et al., 2016).

Analyzing the financial information from the financial statements through financial ratios has expanded and continuously used among economic studies about cooperatives (Dube & Özkan, 2019; Kusmiati et al., 2019; Nwankwo et al., 2016; Ramos, 2018). It has resulted in the emergence of different models that measure the financial health of firms, such as bankruptcy prediction models. These prediction models have been used to primarily assess the financial condition of firms, particularly on its bankruptcy level (Ma’aji,
Researchers have synonymously applied and viewed these models in evaluating the financial status of private and public companies rather than as a bankruptcy event (Tung & Phung, 2019). Among these models, the Altman model surfaced to be well-accepted in analyzing the performance of several firms (Aaron et al., 2017; Almamy, Aston, & Ngwa, 2016; Bodà & Úradniček, 2016; Joshi, 2019; Ko, Fujita, & Li, 2017; Mohammed, 2016). In the Philippines, some studies also applied this to determine the financial conditions of publicly listed companies (Adriatico, 2019; Chi & Tang, 2006; Rabo, 2008).

This study adopts the liquidity, reserves, profitability, and solvency ratios of the Altman model in determining the financial health of the cooperatives (Altman et al., 1995) and investigates the correlation among these ratios (Jan & Marimuthu, 2015; Mwawughanga & Ochiri, 2017), including the age and size to the financial health of cooperatives as shown in Figure 1. This study translates some ratios fit for the cooperatives. The first ratio evaluates the cooperatives' liquidity that measures its ability to pay nearing due obligations with consideration to the size of the cooperative. Without a good liquidity assessment, a cooperative will be in question if it could maintain its creditworthiness. Failing cooperatives have low net liquid assets before becoming financially unviable. Hence, it is one of the predictors of the financial health of business organizations. The second ratio evaluates the reserves of the cooperatives. It reflects the earning power of cooperatives over time. The level of excess funds known as reserves to whatever contingencies brought by uncertainty increases the financial viability of cooperatives. A high reserve level connotes a high absorptive capacity to recover from any untoward incident that may happen to the cooperative. Thus, it is one of the predictors used in this model.

The third ratio computes the profitability of the cooperatives. This measures how firms effectively optimize their operations and manage their resources to generate more profits. The bottom line of every business entity is profit, and without it, no one will survive. This factor is the most important predictor in the viability level of cooperatives. The fourth ratio measures the solvency level of cooperatives. With high total liabilities, the financial viability of cooperatives tends to decrease as creditors will have more claims to the assets. In case of recession, creditors demand payment for their entitlements resulting in a decline in cooperative assets. Thus, this factor is likewise vital in predicting the financial viability of cooperatives. Moreover, this study analyzes the correlation between the size, age, and the financial health of cooperatives.

Methodology

This study employed the document analysis method as it used the audited financial statements incorporated in the annual reports of the cooperatives in extracting the needed financial information for this study. The researcher exercised due care and diligence in the manual gathering of data. This study used the 42 CDA registered and actively operating in a Philippine province as the target
population. This study utilized two-stage sampling in getting the required number of participating cooperatives using minimal resources without compromising the research objectives. First, the researcher applied cluster sampling and equally grouped the cooperatives into three based on their asset size and dubbed them as large, medium, and small cooperatives. Onate (2016) also used asset size in grouping cooperatives. Second, the researcher purposely chose the top two cooperatives in terms of asset size per cooperative group.

This study used financial reports for a period of five years as applied in the studies of Da Silva et al. (2017), Panigrahi (2019), and Saijan (2016), covering the years 2011 up to 2015 as these were commonly available among the representative cooperatives. The researcher sought written permission from the general manager to extract financial information from the published annual reports. Moreover, this study strictly observed the anonymity of the participating cooperatives. The data were analyzed using the Altman formula written as follows in measuring the financial health of cooperatives:

\[ Z = 6.56X_1 + 3.26X_2 + 6.72X_3 + 1.05X_4 \]

The first factor computes the ratio of working capital over total assets, of which working capital is the difference between current assets and current liabilities. The second factor reflects the retained earnings over total assets. In this study, the statutory reserve is the equivalent term in the cooperatives chart of accounts for retained earnings. The third factor is the percentage of earnings exclusive of interest and taxes over total assets. However, the net surplus is more fitting than earnings before interest and taxes to the cooperative sector. The fourth factor is the quotient between the book value of equity divided by total debt.

The Z*-score is the sum of the weighted factors which determine the zone classification of cooperatives. If the Z*-score is above 2.6, the cooperative is safe from bankruptcy. In other words, cooperatives that fall into this zone is considered to be financially viable and expected to stay operational. Similarly speaking, the cooperatives in this zone are performing well. If the Z*-score fell on this range, 1.1 to 2.6, the cooperative is under the gray classification, wherein the cooperative may encounter possible risks of bankruptcy. In this situation, cooperatives have a low financial viability level and call for an investigation to immediately address its causes. If the cooperative has a Z*-score of lower than 1.1, it is under the distress zone in which the cooperative financial status is very questionable. This zone calls for an extensive recovery plan to remain financially viable. Management and staff are alerted of the low performance of the cooperative that demands an urgent solution. Meanwhile, Pearson Correlation determined the relationship between the size, age, and financial health of cooperatives.

**Results and Discussion**

**Financial Ratio Analysis**

Table 1 shows the financial ratio analysis by cooperative groups from 2011 to 2015. The working capital to total assets ratio of large cooperatives for the last five years poses a declining trend due to its increasing liabilities. This situation corroborates Paudel & Khanal (2016), suggesting that large cooperatives remained confronted with liquidity issues. The book value of equity to debt ratios for large cooperatives dwelled below 100%, which means that these cooperatives relied more on liabilities rather than from the contributions of members. Alcantara & Piadozo (2016) emphasized that this condition may have an impact on the solvency of cooperatives. On the other hand, the percentage average of statutory reserves to total assets ranged from 3.63% to 4.35% for the last five years.

Medium cooperatives showed a notable decreasing percentage of working capital
Table 1. Financial ratio analysis by cooperative groups from years 2011-2015

<table>
<thead>
<tr>
<th>Cooperative Groups</th>
<th>Working Capital to Total Assets</th>
<th>Statutory Reserves to Total Assets</th>
<th>Net Surplus to Total Assets</th>
<th>Book Value of Equity to Total Debt</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Large Cooperatives</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2015</td>
<td>15.18%</td>
<td>4.35%</td>
<td>4.36%</td>
<td>39.64%</td>
</tr>
<tr>
<td>2014</td>
<td>21.31%</td>
<td>3.91%</td>
<td>3.94%</td>
<td>42.14%</td>
</tr>
<tr>
<td>2013</td>
<td>17.66%</td>
<td>3.99%</td>
<td>3.73%</td>
<td>41.28%</td>
</tr>
<tr>
<td>2012</td>
<td>25.25%</td>
<td>4.32%</td>
<td>3.97%</td>
<td>45.78%</td>
</tr>
<tr>
<td>2011</td>
<td>23.29%</td>
<td>3.63%</td>
<td>3.29%</td>
<td>41.70%</td>
</tr>
<tr>
<td><strong>Medium Cooperatives</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2015</td>
<td>54.16%</td>
<td>3.43%</td>
<td>2.44%</td>
<td>117.40%</td>
</tr>
<tr>
<td>2014</td>
<td>54.78%</td>
<td>3.79%</td>
<td>4.10%</td>
<td>122.17%</td>
</tr>
<tr>
<td>2013</td>
<td>51.06%</td>
<td>3.59%</td>
<td>4.83%</td>
<td>115.28%</td>
</tr>
<tr>
<td>2012</td>
<td>63.71%</td>
<td>3.45%</td>
<td>5.39%</td>
<td>125.13%</td>
</tr>
<tr>
<td>2011</td>
<td>67.74%</td>
<td>3.20%</td>
<td>-3.10%</td>
<td>134.67%</td>
</tr>
<tr>
<td><strong>Small Cooperatives</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2015</td>
<td>57.29%</td>
<td>19.00%</td>
<td>6.66%</td>
<td>216.57%</td>
</tr>
<tr>
<td>2014</td>
<td>60.52%</td>
<td>21.05%</td>
<td>8.98%</td>
<td>356.69%</td>
</tr>
<tr>
<td>2013</td>
<td>57.93%</td>
<td>21.39%</td>
<td>10.05%</td>
<td>353.29%</td>
</tr>
<tr>
<td>2012</td>
<td>61.25%</td>
<td>22.91%</td>
<td>8.27%</td>
<td>395.41%</td>
</tr>
<tr>
<td>2011</td>
<td>66.44%</td>
<td>22.67%</td>
<td>7.10%</td>
<td>362.45%</td>
</tr>
</tbody>
</table>

to total assets. Nonetheless, the working capital comprised more than 50% of the total assets implying that these cooperatives under this group were very liquid. There were enough current assets to pay present obligations if they become due. Table 1 also reveals the constant ratio between statutory reserves over total assets remained at a range of 3.20% to 3.79% for the last five years. These cooperatives only maintained up to this level as this was purely mandatory from the existing rules and regulations for cooperatives, which were 10% from the yearly net surplus. On the contrary, Galor & Sofer (2019) found that providing reserves lead to deterioration of service quality to members as these cooperatives remained successful even without relying on reserve funds. In 2011, small cooperatives experienced losses resulting in a negative 3.10% ratio of net surplus to total assets due to the recognition of losses from uncollectible accounts above from the gross income generated during that year. However, they regained their profitability level in the next four years, ranging from 2.44% up to 5.39% of the total assets, although positive but still too low from the 20% assets efficiency standard ratio (Capiña, 2016). Their equity is higher than their total debt, as reflected in the percentage ranging from 115.28% to 134.67% from 2011 to 2015. However, it is notable the decreasing value of equity over liabilities that may connote increasing debt or decreasing equity.

In 2011, small cooperatives exhibited a high percentage of working capital over total assets (66.44%), which means that for every peso of total assets, 66.44 cents of it was working capital. However, from 2012 towards 2015, there was a decreasing trend of liquidity ratio. This trend of continual decline poses a default risk to small cooperatives (Ripas, Ripas, & Madamba, 2016). The same happened to the percentage of statutory reserves to total assets from 22.67% in 2011 to 19% in 2015. It is noteworthy that small cooperatives produced the highest ratio of statutory reserve level over total assets. In terms of net surplus to total assets, they yielded as high as 10.05% in 2013 and as low as 6.66% in 2015. Again, they exhibited the highest percentage of net surplus as to total assets.
Figure 2. Comparative financial ratios by cooperative groups from years 2011-2015

among the cooperatives. Table 1 also reveals the consistently high value of equity more than the total debt. Compared to the rest of the cooperatives, small cooperatives showed the best financial results.

Small and medium cooperatives exhibited higher percentages in working capital to total assets than large cooperatives, as shown in Figure 2. The net liquid assets of small and medium cooperatives were relatively higher than large cooperatives. In other words, these cooperatives have enough current assets to pay obligations when due. It indicates that these cooperatives have better working capital management (Alcantara & Piadozo, 2016). However, this may also mean that these cooperatives have more idle assets than large cooperatives. The opportunity losses or forgone profit opportunities were high for both small and medium cooperatives. It is worthy to note that large cooperatives are more effective in terms of asset utilization than the rest of the cooperatives because of their large membership base. Sensini (2020) observed that working capital has a negative association with profitability, which means that excessive working capital may hamper the capability of cooperatives to earn more profit.

Small cooperatives showed the highest percentage of statutory reserves to total
assets among the cooperatives but in a decreasing manner. These cooperatives have the necessary reserve funds to back up on any contingencies that may happen. Moreover, Cook (2018) described putting more reserves provides strong justification among cooperatives to limit dividend pay-out to members. Conversely, this may also mean that these funds remained unutilized, thereby creating opportunity losses for the cooperative. It is remarkable that the rest of the cooperatives relatively maintain statutory reserves up to 4% of the total assets, which implied the active approach of the cooperatives to maximize profits from generated surplus and reserve only what was necessary. In terms of profitability, small cooperatives garnered the highest percentage of net surplus to total assets, which implies that the earning power of these cooperatives was relatively higher than the rest of the cooperatives. Moreover, this would have increased if it fully maximized the profit potential of all its resources to remain relevant and competitive (Xaba, Marwa, & Mathur-Helm, 2018).

Small cooperatives generated more returns from their assets than medium and large cooperatives. Large cooperatives maintained their earning rate at a certain low level, considering it has enough necessary resources. In short, the increase in net surplus did not complement the increase in total assets. It was due to having more members that led to rising operating costs, thus, lower net surplus margin ratio. Although large cooperatives may exploit economies of scale having a large membership base, it does not automatically convert into higher profitability (Singh et al., 2019). At the very least, returns must be equal to the rate should have these assets invested in the market. Oppositely, the net surplus of medium cooperatives decreased, signaling a challenge to their profitability. This situation puts cooperative sustainability in difficulty (Ripas et al., 2016). Small cooperatives have the highest percentage of equity over liabilities among the cooperatives understudied. It has as triple as what the large cooperatives had. It means that the cooperatives have more contributions from the members and statutory reserves than its liabilities. This further means that small cooperatives were very solvent. On the contrary, large cooperatives showed insolvency challenges as it maintained an equity ratio below 50%, implying that there were more liabilities than equity. These cooperatives have more exposure to losses since payment for interests cut a significant share from the net surplus (Capiña, 2016). When bankruptcy comes, members lose their priority from the creditors. On the other hand, medium cooperatives showed a tolerable result.

**Z''-scores and Zone Classification**

As shown in Table 2, the zone classification of large cooperatives was gray due to its scores ranging from 1.846 to 2.544, suggesting that they were in a situation that may or may not experience bankruptcy soon. This result occurred because of low profitability assessment as shown in the past five years, the average percentage of net surplus to total assets ranged from 3.29% to 4.36%, which was very much lower to the prevailing current market interest rate. Alcantara & Piadozo (2016) described low profitability might indicate inefficiency in the actual operations. Another contributory factor that led them into the gray zone was the low liquidity result. Bation (2016) suggested that declining liquidity assessment might be the effect of increasing members’ deposit and share capital.

The zone classification of medium cooperatives is safe, as evidenced by its scores that ranged from 5.001 to 5.968, denoting that they were in a situation that bankruptcy is unlikely to happen. The high score on working capital to total assets ratio contributes to their safe classification. Business failure is very much unlikely to happen because of the high net liquid assets
Table 2. Z*-scores and zone classification by cooperative groups from years 2011-2015

<table>
<thead>
<tr>
<th>Cooperative Groups</th>
<th>Liquidity (X₁)</th>
<th>Reserves (X₂)</th>
<th>Profitability (X₃)</th>
<th>Solvency (X₄)</th>
<th>Z*-score</th>
<th>Zone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large Cooperatives</td>
<td></td>
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</tr>
<tr>
<td>2015</td>
<td>0.996</td>
<td>0.142</td>
<td>0.293</td>
<td>0.416</td>
<td>1.846</td>
<td>Gray</td>
</tr>
<tr>
<td>2014</td>
<td>1.398</td>
<td>0.127</td>
<td>0.265</td>
<td>0.443</td>
<td>2.233</td>
<td>Gray</td>
</tr>
<tr>
<td>2013</td>
<td>1.159</td>
<td>0.13</td>
<td>0.25</td>
<td>0.433</td>
<td>1.973</td>
<td>Gray</td>
</tr>
<tr>
<td>2012</td>
<td>1.656</td>
<td>0.141</td>
<td>0.266</td>
<td>0.481</td>
<td>2.544</td>
<td>Gray</td>
</tr>
<tr>
<td>2011</td>
<td>1.528</td>
<td>0.118</td>
<td>0.221</td>
<td>0.438</td>
<td>2.305</td>
<td>Gray</td>
</tr>
<tr>
<td>Medium Cooperatives</td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2015</td>
<td>3.553</td>
<td>0.112</td>
<td>0.164</td>
<td>1.233</td>
<td>5.061</td>
<td>Safe</td>
</tr>
<tr>
<td>2014</td>
<td>3.593</td>
<td>0.124</td>
<td>0.275</td>
<td>1.283</td>
<td>5.275</td>
<td>Safe</td>
</tr>
<tr>
<td>2013</td>
<td>3.349</td>
<td>0.117</td>
<td>0.324</td>
<td>1.21</td>
<td>5.001</td>
<td>Safe</td>
</tr>
<tr>
<td>2012</td>
<td>4.18</td>
<td>0.113</td>
<td>0.362</td>
<td>1.314</td>
<td>5.968</td>
<td>Safe</td>
</tr>
<tr>
<td>2011</td>
<td>4.444</td>
<td>0.104</td>
<td>-0.209</td>
<td>1.414</td>
<td>5.754</td>
<td>Safe</td>
</tr>
<tr>
<td>Small Cooperatives</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2015</td>
<td>3.758</td>
<td>0.619</td>
<td>0.447</td>
<td>2.274</td>
<td>7.099</td>
<td>Safe</td>
</tr>
<tr>
<td>2014</td>
<td>3.97</td>
<td>0.686</td>
<td>0.603</td>
<td>3.745</td>
<td>9.005</td>
<td>Safe</td>
</tr>
<tr>
<td>2013</td>
<td>3.8</td>
<td>0.697</td>
<td>0.675</td>
<td>3.71</td>
<td>8.882</td>
<td>Safe</td>
</tr>
<tr>
<td>2012</td>
<td>4.018</td>
<td>0.747</td>
<td>0.555</td>
<td>4.152</td>
<td>9.472</td>
<td>Safe</td>
</tr>
<tr>
<td>2011</td>
<td>4.359</td>
<td>0.739</td>
<td>0.477</td>
<td>3.806</td>
<td>9.381</td>
<td>Safe</td>
</tr>
</tbody>
</table>

Legend: Below 1.1 – Distress Zone; 1.1-2.60 – Gray Zone; Above 2.60 – Safe Zone

available. Ripas et al. (2016) sought the importance of sufficiency of cash as it reflects the flexibility of the cooperatives in meeting the needs of members. However, this also indicates low asset efficiency levels or profitability levels among these cooperatives as these resources are supposed to generate returns. In other words, cooperatives lacked business undertakings to maximize the profit potential of its resources. Another contributory factor to this safe classification was the positive score on the book value of equity over total liabilities ranged from 1.414 in 2011 to 1.233 in 2015. It implies that the members contributed more resources than external creditors. It happened when members continued to contribute to their cooperative equity (Quilloy & Luis, 2016). In this situation, members-owners tend to protect the cooperative’s interest as a whole because their investments were relatively higher. In another way around, if there were more liabilities than equity, the likelihood of bankruptcy is high because any default on these obligations may affect its profitability and survival.

As reflected in Table 2, the zone classification of small cooperatives was safe, as supported by its scores ranged from 7.099 to 9.472, signifying that bankruptcy was unlikely to happen. The main contributors to this safe classification were the high scores on the book value of equity over total liabilities and working capital over total assets. Its high equity over total liabilities was evident in 2012, yielding the highest score of 4.152 among the cooperatives. It is also notable for its high net surplus and statutory reserves ratio over total assets and high net liquid assets. In summary, small cooperatives showed remarkable financial results, which was the safest among the groups. The fear of credit risks among small cooperatives relying upon loans and incurring so many financial obligations might contribute to their safe classification (Salvosa, 2016).

Only large cooperatives fell on the gray zone, which unveiled a challenge to the management and staff to reinvent their cooperatives to address this warning. Low liquidity, profitability, and solvency measures were the attributes of their gray classification.
even though they have relatively more assets and high membership levels than the rest of the cooperatives. Meanwhile, small and medium cooperatives were in the safe region. In summary, being a large cooperative does not guarantee remarkable results, and being a small cooperative does not mean they cannot perform well. Figure 3 further supported these findings, which showed the comparative scores among cooperative groups. Moreover, a closed-type cooperative showed better financial performance than open-type cooperatives. This finding corroborates the study made by Gevero and Bation (2016) that closed-type cooperatives got higher net earnings and were more efficient in asset management compare to open-type cooperatives.

Correlation Matrix among Variables

Reserves and solvency show a very high significant relationship, as shown in Table 3, which emphasized the importance of having reserve funds for keeping the cooperatives solvent. Having low reserves and insufficient provisions for future losses will weaken the institutional capacity of the cooperatives (Capiña, 2016). Furthermore, the increased allocation of reserve funds will lead to becoming a trusted financial institution in the community (Bation, 2016). On the other hand, profitability and reserves showed a moderate relationship with high significance, suggesting that when cooperatives become more profitable, the reserve funds increase. Conversely, liquidity is not significantly related to profitability, which confirms the study made by Mohanty and Mehrrota (2018) that found no significant correlation between liquidity ratios and the performance of SMEs.

Meanwhile, liquidity, reserves, profitability, and solvency have a significant relationship with scores, which implies that these factors contributed to the financial condition of the cooperatives. This finding confirms the validity of these predictors of financial health (Altman, 1968; Altman, 1983; Bođa & Ūradniček, 2016; Ko et al., 2017). In this manner, the management must always look into these factors to curtail bankruptcy risks. However, reserves and profitability were not significantly related to the zone classification of cooperatives. Liquidity and profitability also show no significant relationship, which supports the finding of Andarsari, Winarno, & Istanti (2016).

On the contrary, asset size and age posed a significant negative relationship with scores, which support Aleksanyan & Huiban (2016), who observed that size and age affect the bankruptcy level of a firm. When cooperatives manifested an increase in asset holdings, the financial condition will be affected. This finding holds when these new assets will not generate more returns to the cooperative when not managed optimally. In other words, acquiring new assets will pose additional bankruptcy risks to the cooperatives. This result reminds the cooperatives to evaluate each investment carefully. Similarly, the age of cooperatives has a significant inverse relationship with scores, implying that the cooperatives will face more bankruptcy risks as they continue to operate. As cooperatives age, the business conditions change in which competitions become stiff and the market saturates. The increasing number of members will eventually affect the profitability and reserves of the cooperatives. These realities will continue to challenge the existence of cooperatives over the years.
### Table 3. Correlation matrix among variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liquidity</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reserves</td>
<td>.509**</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Profitability</td>
<td>.200ns</td>
<td>.773**</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solvency</td>
<td>.718**</td>
<td>.939**</td>
<td>.687**</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asset Size</td>
<td>-.955**</td>
<td>-.467ns</td>
<td>-.234ns</td>
<td>-.668**</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>-.796**</td>
<td>-.317ns</td>
<td>-.110ns</td>
<td>-.342ns</td>
<td>.909**</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Z*-scores</td>
<td>.873**</td>
<td>.852**</td>
<td>.582*</td>
<td>.964**</td>
<td>-.826**</td>
<td>-.534**</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Zone</td>
<td>.968**</td>
<td>.474ns</td>
<td>.249ns</td>
<td>.684**</td>
<td>-.956**</td>
<td>-.905**</td>
<td>.709**</td>
<td>-</td>
</tr>
</tbody>
</table>

Notes: *p < 0.05; **p < 0.01; ns not significant

Cooperatives envisioning growth must strike a balance between the welfare of members and profitability to strengthen their continued existence.

**Conclusion and Recommendations**

This study aimed to measure the financial health of selected cooperatives in a Philippine province using the Altman model. This study extended the application of this bankruptcy model in classifying the well-being of cooperatives. The empirical application of this model to cooperatives improves the existing literature, which centered mostly on public and private companies. This study provides how the model is equally utilized in the cooperative industry, although there are financial terms that are only commonly used among cooperatives.

The findings revealed that large cooperatives fell into the gray zone due to their low liquidity, profitability, and solvency assessment. Small and medium cooperatives fell on the safe range as they exhibited better financial results in all variables. The findings further revealed that the size and age of cooperatives have a significant inverse relationship with their financial health.

The financial health of small and medium cooperatives shows better performance than large cooperatives. The management of large cooperatives need to reexamine their liquidity, profitability, and solvency strategies to improve their financial condition. The finding implies that as cooperatives grow and its membership expands, it changes their capital structure and business operations to address the increasing demands of members. This situation puts the financial health of large cooperatives at risk as there will be a trade-off between profitability and growing membership base; more so when new members do not support the owner-user principle of cooperatives. In this context, cooperatives must ensure that their vision for growth in membership and their overall financial health is balanced.

This study translated the ratios in the model to amplify its applicability in the cooperative context. This study also provided the measurement capability of the model in determining the financial health of cooperatives. In this light, the Cooperative Development Authority may consider institutionalizing this model’s application among registered cooperatives to identify those needing their assistance and intervention as early as possible.

Lastly, further replication of this study is highly recommended to a larger number of cooperatives since this study considered only a limited number of participating cooperatives. This study also encourages other researchers to investigate further that small and medium cooperatives are financially healthier than large cooperatives, and closed-type cooperatives showed better financial performance than open-type cooperatives.
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