

Associations of Membership, Debt, and Equity with Cooperative Volume in Malaysia, the Philippines, and Indonesia

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ABSTRACT

Purpose - This study examines whether cooperative membership, debt, and equity are associated with cooperative business volume in Malaysia, the Philippines, and Indonesia, and whether the pattern differs across the three national cooperative systems.

Design/methodology/approach - A quantitative comparative correlational design used secondary administrative data from 64 regional units: 14 in Malaysia, 16 in the Philippines, and 34 in Indonesia. Members, debt, equity, and volume were transformed using natural logarithms, and separate log-linear multiple regression models were estimated in SPSS version 25 at a 5% significance level.

Finding/Results - In Malaysia, only equity was significant ($B = .983$, $p = .011$). In the Philippines, debt ($B = .529$, $p = .004$) and equity ($B = .431$, $p = .009$) were significant. In Indonesia, membership ($B = .327$, $p = .013$), debt ($B = .206$, $p = .016$), and equity ($B = .508$, $p < .001$) were significant.

Originality/Value - The comparison shows that equity is the most consistent correlate of cooperative volume, while the relevance of membership and debt varies by country. The study provides a country-sensitive application of a log-linear production-oriented framework to cooperative performance and cautions against assuming one development model across ASEAN settings.

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1. Introduction

Cooperatives combine member ownership, democratic governance, and market activity in a form that differs from investor-owned firms. Their economic scale depends on financial resources, but members are also users, contributors, and decision makers, making organizational inputs difficult to separate from financial inputs. Recent studies therefore describe cooperative performance as a multidimensional outcome shaped by organizational design, governance, capital, and institutional conditions (Chollet et al., 2026; Löffel & Gmür, 2024; Wang & Wang, 2024). Comparative evidence also shows substantial performance variation among cooperatives operating within the same sector or country (D'Amato et al., 2021; Sebhathu et al., 2021). These findings make the relationships among membership, debt, equity, and business volume empirical questions rather than relationships that can be assumed in advance.

The issue is particularly relevant in Southeast Asia, where cooperative organizations operate under different regulatory histories and institutional arrangements despite geographic proximity. Evidence from Indonesia and Malaysia shows that cooperative resilience may depend on the interaction between internal solidarity and public or institutional support (Yuhertiana et al., 2022). Indonesian evidence further associates cooperative success with participation, governance, collective action, and vertical integration rather than membership numbers alone (Kusmiati et al., 2023), while studies from other institutional settings show that cooperative outcomes can also be constrained by organizational design and market conditions (Hu et al., 2023; Bernardi et al., 2022; Özgül et al., 2020). These differences suggest that the same financial or organizational variable may have different statistical relevance across national systems. A country-specific comparison can therefore reveal patterns that would be obscured by a pooled regional estimate.

Previous cooperative research has commonly examined either member-level outcomes or the financial performance of particular cooperative types. Membership has been associated with access to information, services, markets, productivity, and welfare in agricultural settings (Ahado et al., 2021; Cai et al., 2022; Lin et al., 2022; Ma et al., 2022; Neupane et al., 2022; Toiba et al., 2024), whereas financial studies have examined leverage, working capital, reserves, internal controls, and growth strategies (Nayak, 2022; Ndung'u & Mutinda, 2020; Otache et al., 2022; Segovia-Vargas et al., 2023; Towo, 2023). These streams are informative but often isolate membership or finance rather than considering them jointly in a comparative model. The resulting gap concerns whether membership, debt, and equity retain similar relationships with cooperative business volume when estimated simultaneously across different national cooperative systems.

This study addresses that gap by examining the associations of membership, debt, and equity with cooperative business volume in Malaysia, the Philippines, and Indonesia. Separate log-linear regression models are estimated for each country using regional secondary data, allowing the direction and statistical significance of the three predictors to be compared without assuming identical national structures. The study contributes theoretically by adapting a production-oriented empirical specification to a cooperative setting while distinguishing member-based and financial resources. Empirically, it identifies whether the same variables remain relevant across three neighboring ASEAN cooperative systems. Because the design is observational and based on secondary regional aggregates, the results are interpreted as associations rather than causal effects.

2. Literature Review & Hypothesis Development

2.1. Membership and Cooperative Volume

Membership is central to cooperative identity, but the number of registered members is not equivalent to the intensity or quality of member participation. Studies of smallholder cooperatives show that membership decisions are influenced by assets, information, training, commercial orientation, and access to services (Hando et al., 2022; Miroro et al., 2023; Molla et al., 2024). Participation and innovation have also been linked with cooperative performance in the Indonesian context (Muryani et al., 2022). At the outcome level, membership can be associated with productivity, efficiency, profit, or welfare when cooperatives improve members' access to markets and productive resources (Ahado et al., 2021; Cai et al., 2022; Lin et al., 2022; Ma et al., 2022; Neupane et al., 2022; Toiba et al., 2024). However, meta-analytic evidence indicates that estimated membership effects are heterogeneous and can become smaller after accounting for study design and publication bias (Ayouba, 2025; Ma, 2023). The relationship between membership scale and cooperative business volume therefore requires direct empirical testing.

Social-capital research further explains why membership counts alone may not capture the economic role of members. Trust, reciprocity, information exchange, shared norms, and network structures shape cooperative formation and member interaction (Belay & Wondimu, 2024; Bianchi & Vieta, 2020; Jia & Xu, 2021; Saz-Gil et al., 2021). An inclusive cooperative may also face a trade-off between broad membership and performance if participation becomes less intensive or coordination becomes more difficult (Miller & Mullally, 2022). The present study therefore treats the number of members as an organizational scale measure rather than a complete indicator of social capital or participation quality. This distinction supports country-specific hypotheses rather than a universal prediction about the strength of the membership coefficient.

H1: Membership is significantly associated with cooperative volume in Malaysia.

H2: Membership is significantly associated with cooperative volume in the Philippines.

H3: Membership is significantly associated with cooperative volume in Indonesia.

2.2. Debt and Cooperative Volume

Debt provides external financing that may support working capital, investment, and business expansion, but leverage also introduces repayment costs and liquidity risk. Evidence from savings and credit cooperatives shows that greater leverage does not necessarily improve performance when financing costs or governance constraints offset the benefits of additional funds (Towo, 2023). Cooperative banking studies similarly show that borrowing, working capital, share capital, deposits, and reserves can have different short-run and long-run relationships with performance (Nayak, 2022). Research on cooperative financial management also emphasizes internal controls and growth strategy as relevant to organizational outcomes (Ndung'u & Mutinda, 2020; Otache et al., 2022). Debt is therefore expected to have an empirical relationship with volume, but the direction and significance may vary with national financing arrangements and cooperative structures.

H4: Debt is significantly associated with cooperative volume in Malaysia.

H5: Debt is significantly associated with cooperative volume in the Philippines.

H6: Debt is significantly associated with cooperative volume in Indonesia.

2.3. Equity and Cooperative Volume

Equity differs from debt because it represents internally anchored capital and does not carry the same contractual repayment obligation. In cooperatives, equity can reflect member contributions, accumulated reserves, and other forms of internal capital that support operational autonomy. Studies of cooperative resilience and finance indicate that internal financial capacity, member economic participation, and institutional capital can support organizational continuity and performance (Bernardi et al., 2022; Segovia-Vargas et al., 2023; Yuhertiana et al., 2022). Comparative performance research also shows that cooperative financial outcomes must be interpreted in light of ownership objectives and governance structures rather than through investor-owned assumptions alone (D'Amato et al., 2021). Because equity may provide a more stable financing base for cooperative activity, the present study tests its association with business volume separately in each country.

H7: Equity is significantly associated with cooperative volume in Malaysia.

H8: Equity is significantly associated with cooperative volume in the Philippines.

H9: Equity is significantly associated with cooperative volume in Indonesia.

2.4. Comparative Framework

The empirical model uses the Cobb-Douglas tradition as an organizing framework for relating an output measure to several inputs (Cobb & Douglas, 1928). Log-based and productivity-oriented approaches have also been used to study cooperative output and efficiency in contemporary settings (Lin et al., 2022; Neupane et al., 2022; Zhang et al., 2021). In this application, membership is not treated as conventional labor, and debt and equity are not treated as interchangeable forms of capital. Instead, the functional form provides a consistent way to compare conditional associations across countries while preserving the institutional meaning of each cooperative variable. Figure 1 summarizes the theoretical relationships tested in the nine hypotheses.

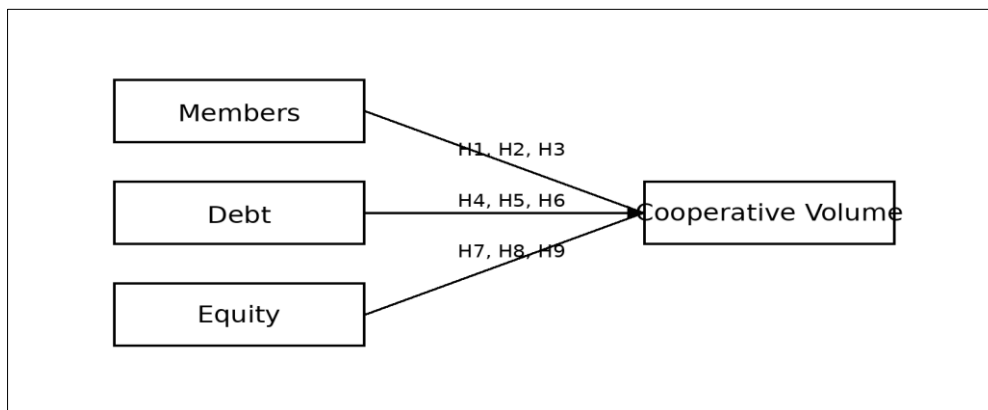


Figure 1. Theoretical framework

3. Methodology

3.1. Research Design and Data Sources

This study used a quantitative comparative correlational design based on secondary administrative data. The analytical units were regional cooperative aggregates rather than individual cooperative members or survey respondents. The dataset used in the submitted study contained 64 regional units: 14 from Malaysia, 16 from the Philippines, and 34 from Indonesia. National cooperative statistics were identified as the sources: cooperative statistics for Malaysia, annual cooperative reporting from the Cooperative Development Authority in

the Philippines, and cooperative data from the Ministry of Cooperatives and SMEs in Indonesia. The source manuscript describes the observation period as spanning 2021-2023, but the reporting structure is not fully synchronized across the three countries. Separate country models were therefore retained to reduce direct comparability problems arising from different administrative structures and monetary scales. No participant-level sampling or questionnaire administration was involved.

3.2. Variables and Measurement

Cooperative business volume was the dependent variable, while members, debt, and equity were the explanatory variables. Each variable was transformed using the natural logarithm. Country suffixes identify the corresponding national series: M for Malaysia, P for the Philippines, and I for Indonesia. Table 1 presents the operational measures used in the three country models.

Table 1. Variable measurement

Variable	Indicator	Supporting literature
Members	LnMM: logged members of Malaysian cooperatives LnMP: logged members of Philippine cooperatives LnMI: logged members of Indonesian cooperatives	Miroro et al. (2023); Molla et al. (2024); Kusmiati et al. (2023)
Debt	LnDM: logged debt of Malaysian cooperatives LnDP: logged debt of Philippine cooperatives LnDI: logged debt of Indonesian cooperatives	Towo (2023); Nayak (2022); Segovia-Vargas et al. (2023)
Equity	LnEM: logged equity of Malaysian cooperatives LnEP: logged equity of Philippine cooperatives LnEI: logged equity of Indonesian cooperatives	Otache et al. (2022); D'Amato et al. (2021); Yuhertiana et al. (2022)
Volume	LnVM: logged volume of Malaysian cooperatives LnVP: logged volume of Philippine cooperatives LnVI: logged volume of Indonesian cooperatives	Sebhatu et al. (2021); Cai et al. (2022); Zhang et al. (2021)

Source: Operational definitions adapted from the submitted manuscript and supporting literature.

3.3. Model Specification and Data Analysis

The analytical specification follows a Cobb-Douglas form in which cooperative volume (V) is related to members (M), debt (D), and equity (E). The multiplicative form is expressed as follows:

$$V = A M^{\alpha} D^{\beta} E^{\gamma} \quad (1)$$

After natural-log transformation, the model becomes linear in parameters:

$$\ln(V) = \ln(A) + \alpha \ln(M) + \beta \ln(D) + \gamma \ln(E) + \varepsilon \quad (2)$$

The variables were transformed in Microsoft Excel and analyzed in SPSS version 25. Separate multiple linear regressions were estimated for Malaysia, the Philippines, and Indonesia, with statistical decisions evaluated at $p < .05$. The submitted analysis reported Kolmogorov-Smirnov significance values of .936 for members, .430 for debt, .092 for equity, and .436 for volume, all above .05, and an absolute-residual heteroscedasticity test of $p = .900$. The original output also reported a minimum eigenvalue of .003 and a condition index of 34.041. Because a condition index above 30 can indicate multicollinearity, the individual coefficients are interpreted cautiously, particularly in view of the high model R-squared values. Correlation-based validity statistics and Cronbach's alpha reported in the earlier draft were not used as construct-validity evidence in this revision because the variables are administrative measures rather than multi-item psychometric scales.

The analysis proceeded from source-data assembly to variable harmonization, natural-log transformation, diagnostic assessment, separate country regressions, hypothesis decisions, and comparative interpretation. Figure 2 summarizes this sequence. The design supports comparative association testing but does not establish causal effects.

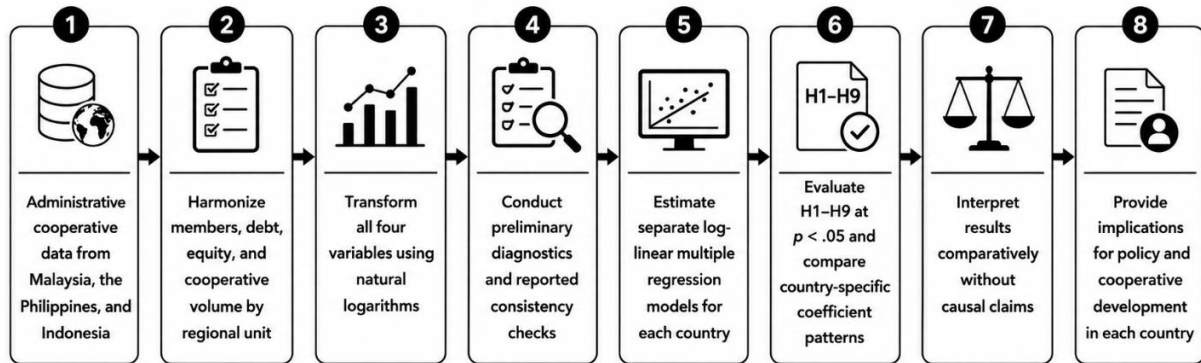


Figure 2. Research procedure

4. Result and Discussion

4.1. Regression Results

The country-specific models produced distinct coefficient patterns. In Malaysia, equity was the only statistically significant predictor of cooperative volume. In the Philippines, debt and equity were significant, while membership was not. In Indonesia, all three predictors were statistically significant. Table 2 reports the coefficients from the submitted SPSS outputs and expresses the reported SPSS value of .000 as $p < .001$.

Table 2. Country-specific regression coefficients and hypothesis decisions

Country	Term	B	Std. Error	Beta	t	p	Decision
Malaysia	LnMM	.109	.247	.107	.439	.670	H1 not supported
Malaysia	LnDM	-.189	.397	-.181	-.475	.645	H4 not supported
Malaysia	LnEM	.983	.313	1.038	3.140	.011	H7 supported
Philippines	LnMP	-.035	.031	-.079	-1.121	.284	H2 not supported
Philippines	LnDP	.529	.150	.530	3.530	.004	H5 supported
Philippines	LnEP	.431	.138	.488	3.125	.009	H8 supported
Indonesia	LnMI	.327	.123	.312	2.651	.013	H3 supported
Indonesia	LnDI	.206	.081	.235	2.555	.016	H6 supported
Indonesia	LnEI	.508	.116	.458	4.366	<.001	H9 supported

Table 3. Model summaries

Country	R	R Square	Adjusted R Square	Std. Error of Estimate
Malaysia	.962	.926	.904	.20893
Philippines	.976	.952	.940	.18430
Indonesia	.987	.974	.972	.29904

The Malaysia model had $R = .962$ and $R\text{ Square} = .926$, indicating that the three logged predictors jointly accounted for 92.6% of the observed variation in logged cooperative volume within the Malaysian regional dataset. The corresponding $R\text{ Square}$ values were .952 for the Philippines and .974 for Indonesia. These percentages follow the $R\text{ Square}$ values displayed in the original SPSS tables, correcting the earlier narrative that had interpreted R as $R\text{ Square}$. The high model fit should not be interpreted as causal evidence, and the reported collinearity diagnostic requires caution when comparing individual coefficient magnitudes.

4.2. Discussion

The Malaysian result places equity, rather than membership scale or debt, at the center of the observed relationship with cooperative volume. The positive equity coefficient indicates that regions with larger logged cooperative equity also tended to report larger logged business volume after the other variables were held constant. This pattern is consistent with research emphasizing internal financial capacity and cooperative resilience (Bernardi et al., 2022; Yuhertiana et al., 2022) and with evidence that cooperative performance should not be evaluated solely through financing assumptions developed for investor-owned firms (D'Amato et al., 2021). The non-significant debt coefficient is also compatible with findings that leverage may fail to improve cooperative performance when financing costs and repayment obligations outweigh the benefit of additional funds (Towo, 2023). Within the limits of the aggregate data, the Malaysian model therefore points to internal capital formation as a stronger correlate of volume than simple expansion in membership or borrowing.

The Philippine model produced a different configuration because debt and equity were both positively and significantly associated with cooperative volume, while membership was not. This suggests that the scale of cooperative activity in the Philippine regional data was more closely related to financial capacity than to the number of registered members. The pattern is consistent with studies showing that cooperative financial outcomes depend on the configuration of borrowing, working capital, reserves, internal controls, and other financial resources (Nayak, 2022; Otache et al., 2022; Segovia-Vargas et al., 2023). However, the non-significant membership coefficient does not imply that members are economically irrelevant. Research distinguishes broad membership from intensive participation, patronage, and governance involvement, which can have different relationships with performance (Hando et al., 2022; Miller & Mullally, 2022). The present membership variable captures scale, not participation quality, which may help explain why financial variables were more directly associated with aggregate volume.

Indonesia was the only country in which membership, debt, and equity were all significantly associated with cooperative volume. This broader pattern is consistent with Indonesian evidence linking cooperative performance to member participation, governance, collective action, innovation, and organizational integration (Kusmiati et al., 2023; Muryani et al., 2022). It also aligns with international studies showing that cooperative participation can be associated with higher output, efficiency, profit, or welfare when members gain access to services and coordinated markets (Ahado et al., 2021; Cai et al., 2022; Lin et al., 2022; Ma et al., 2022; Neupane et al., 2022; Toiba et al., 2024). The result does not mean that adding members mechanically increases volume; it indicates that membership scale retained a positive conditional association after debt and equity were included. For Indonesian cooperative development, the evidence supports an integrated interpretation in which member scale and financial capacity are considered together.

Across the three countries, the central empirical finding is heterogeneity. Equity was significant in all three models, debt was significant in the Philippines and Indonesia, and membership was significant only in Indonesia. This is consistent with literature showing that cooperative performance varies with institutional design, social capital, entrepreneurial orientation, sector, and governance conditions (Belay & Wondimu, 2024; Bianchi & Vieta, 2020; Jia & Xu, 2021; Löffel & Gmür, 2024; Saz-Gil et al., 2021; Sebhatu et al., 2021; Wang & Wang, 2024). Recent review evidence similarly argues for context-sensitive approaches to cooperative sustainability and performance (Chollet et al., 2026). The results therefore do not support a single development formula that can be transferred unchanged across ASEAN cooperative systems.

The membership results require the greatest conceptual caution. Membership decisions are shaped by household resources, information, training, market orientation, and institutional access (Miroro et al., 2023; Molla et al., 2024), while social capital depends on relational features that are not captured by a headcount. Meta-analytic evidence further shows substantial heterogeneity in the measured productive effects of cooperative membership (Ayoub, 2025; Ma, 2023). In addition, organizational and market conditions can constrain cooperative outcomes even where formal structures are present (Hu et al., 2023; Özgül et al., 2020). For this reason, the non-significant coefficients for Malaysia and the Philippines should be interpreted narrowly as results for regional membership counts in these models. They do not contradict the institutional importance of members as owners, users, and governance participants.

The production-oriented framework provides a common empirical structure, but its coefficients should not be treated as structural causal parameters. The log-linear specification places membership, debt, equity, and volume on proportional scales and allows the same functional form to be estimated separately in each country, consistent with productivity-oriented approaches used in cooperative research (Lin et al., 2022; Neupane et al., 2022; Zhang et al., 2021). Nevertheless, the condition index of 34.041 suggests possible multicollinearity, and the very high R Square values may partly reflect common scale among the predictors. Unobserved differences in cooperative type, sector composition, governance, technology, and regional economic structure may also be related to both the predictors and volume. The empirical contribution is therefore comparative association rather than causal identification.

5. Conclusion and Suggestion

The study identifies three country-specific patterns. In Malaysia, equity was significantly associated with cooperative volume, while membership and debt were not. In the Philippines, debt and equity were significant, but membership was not. In Indonesia, membership, debt, and equity were all significant. Equity was therefore the only predictor that remained significant in every national model, although the size of the coefficient and its institutional meaning differed across datasets.

The findings suggest that cooperative development should not be reduced to membership growth or external borrowing alone. Malaysia may warrant greater attention to internal capital formation, the Philippines to the management of both external and internal finance, and Indonesia to coordinated member and financial development. These suggestions are grounded in observed associations and should be treated as priorities for further testing rather than causal policy prescriptions. Managers and policymakers should also distinguish membership scale from active participation because the present data cannot measure patronage intensity, governance involvement, or social-capital quality.

Theoretically, the study shows that a log-linear production-oriented specification can be used as a comparative empirical framework for cooperative data when the variables retain their institutional meaning. Membership represents organizational scale rather than conventional labor, debt represents externally financed capacity together with repayment obligations, and equity represents internally anchored capital. The cross-country differences extend the existing cooperative-performance literature by showing that identical variables do not necessarily retain identical statistical roles across neighboring national systems.

6. Limitations and Future Research

Several limitations should be considered. First, the data are secondary regional aggregates, so relationships observed at the regional level cannot be assumed to hold for individual cooperatives or members. Second, the 2021-2023 reporting period is not fully synchronized across the three national sources, which limits strict cross-country comparability. Third, the submitted file did not contain complete reproducible raw-data tables for Malaysia and the Philippines. Fourth, the reported condition index suggests possible multicollinearity, and the high R Square values may partly reflect shared scale among membership and financial variables. Fifth, the models do not control for cooperative sector, governance quality, technology, market access, or regional economic structure. Future research should use harmonized panel data, cooperative-level observations, additional governance and participation measures, VIF and tolerance diagnostics, confidence intervals, and robustness strategies addressing endogeneity and cross-country comparability.

Declaration of AI and AI-assisted technologies in the writing process

During the preparation of this manuscript, the authors used OpenAI's ChatGPT to support academic language editing, structural organization, and formatting in accordance with the journal template. The authors are responsible for reviewing the revised content, verifying all data and references, and approving the final manuscript for submission.

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