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THE IMPACT OF EXTERNAL CAPITAL ON THE PERFORMANCE OF AGRICULTURAL COOPERATIVES IN INDONESIA

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ABSTRACT

Introduction/Main Objectives: Sufficient capital remains a notable challenge across various business models. This study investigates the influence of capital, mainly external capital, on cooperative productivity. **Background Problems:** Cooperatives are viewed as a potential avenue for supporting the public economy and establishing a fundamental pillar within a robust economic structure. However, in Indonesia, cooperatives have not fully realized these envisioned prospects. The issue of access to capital is believed to have an impact on the productivity of cooperatives. **Novelty:** Limited research has delved into the impact of capital on cooperative productivity. Our study utilized cooperative firm-level data, while the majority of prior studies have relied on less-detailed aggregate data. **Research Methods:** We employed recent data on agricultural cooperatives in Indonesia, covering 3,315 units. The endogenous switching regression method was applied to estimate the impact of external capital on cooperative productivity and draw comparisons between cooperatives that embraced external capital and those that did not. **Finding/Results:** The results indicated that cooperatives utilizing external capital exhibited a 2.8% higher level of productivity than those that did not. Additionally, we explored the impact of external capital based on cooperative size. The results revealed that large-category cooperatives experienced a 10% increase in productivity, medium-category cooperatives a 5.6% increase, small-category cooperatives a 0.8% increase, and micro-category cooperatives a 0.1% increase. **Conclusion:** These findings underscore the substantial influence of capital factors, mainly external capital, on cooperative productivity. The government needs to enact legislation to better regulate and support access to capital.

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INTRODUCTION

Cooperatives are associations of individuals who voluntarily join together in the economic, social, and cultural domains to fulfill common needs and aspirations through collectively owned and democratically operated businesses. Unlike corporations, which primarily seek profits, cooperatives also prioritize providing benefits to their members and the development of their surrounding communities (Launio & Sotelo, 2021; Mhembwe & Dube, 2017; Yu et al., 2023). They are committed to environmental and community improvements and cooperative members contribute equally to decision-making, regardless of their ownership shares.

Cooperatives were once considered a suitable means for developing the people's economy in Indonesia, largely based on agriculture, and empowering individuals with limited capital ownership, especially in the early days of Indonesia's independence. They were expected to elevate Indonesia's economic standards while providing social and moral education to their members (Hatta, 1957).However, this promise has yet to be completely fulfilled. Many agricultural cooperatives are currently not efficient enough to compete with other business types, both private and government-owned companies.

The agricultural sector is a crucial component of economic development, particularly for Indonesia, an agricultural nation. Supported by robust agricultural production, stable domestic food supply is vital for strengthening food security. Addressing food issues should therefore take precedence over restructuring other sectors. However, despite the agricultural sector contributing significantly to the Gross Domestic Product (GDP) of developing countries like Indonesia, there is a tendency for its share to decrease with ongoing structural transformation. To address this issue, it is vital that the Indonesian government introduce initiatives to improve the agricultural sector, including by supporting agricultural cooperatives (Martin, 2019; Timmer, 2002).

China has implemented policy initiatives to support the professional farmer cooperative movement, leading to its growth and expansion (Deng et al., 2010). Cooperatives have significantly enhanced farmers' incomes and improved their crop yields, profits, and overall earnings. A recent study in China carried out empirical analysis of survey data collected from 466 rural households. The findings indicate that membership in a cooperative has a positive impact on the subjective well-being of rural households. Additionally, income and social capital partially mediate the relationship between cooperative membership and subjective well-being. The research shows the importance of fully utilizing these benefits of cooperatives to enhance subjective well-being in rural areas(Wu et al., 2022).However, it is noteworthy that impoverished farmers may show less interest in joining as cooperative members (Ito et al., 2012; Ma et al., 2018; Ma & Abdulai, 2016).

Among the governments of developing countries in Africa, there is also active support for rural producer organizations such as cooperatives to enhance the productivity of small-scale farmers. These rural cooperatives assist farmers in obtaining inputs and marketing their produce. In Ethiopia, for example, cooperatives have been instrumental in helping farmers increase their profits from crop sales. Membership encourages the adoption of agricultural technology, boosting farmers' productivity and well-being while increasing their families' income and assets. In other examples, cooperatives in Ghana encourage members to participate in credit financing (Asante-Addo et al., 2017), while the impact of cooperatives on technology adoption, asset

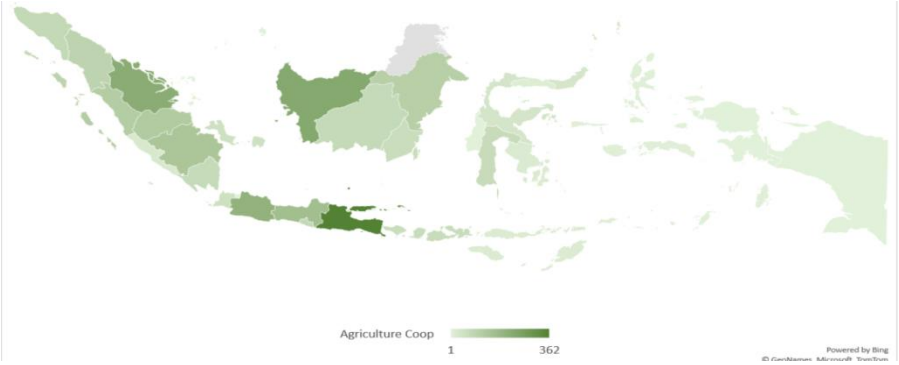
ownership, and poverty reduction has also been positive in Nigeria (Wossen et al., 2017). Another study in Nigeria indicates that membership in an agricultural cooperative, in contrast to non-membership, positively influences tomato yield for smallholder farmers in rural areas (Akinola et al., 2023). However, as found in China, other studies in African countries highlight that impoverished farmers tend to be less inclined to participate in these programs and are sometimes excluded from decision-making studies (Abebaw & Haile, 2013; Bernard & Spielman, 2009; Mojo et al., 2017).

Similar positive effects of cooperatives have been observed in the dairy sector in India, where cooperative members achieve profitability levels comparable to those of farmers working for multinational companies. Although the efficiency level of cooperative members is lower than that of global companies, it is higher than that of traditional farmers (Vandeplas et al., 2013). Cooperative membership increases milk yields, net profits, and compliance with local food safety standards (Kumar et al., 2018).

A study in Bosnia and Herzegovina revealed the beneficial effects of cooperative membership on berry farmers' working conditions and gaining access to markets. The findings suggest that fostering collective action among berry farmers can serve as an effective intervention for rural development, contributing to poverty alleviation and mitigating its adverse consequences (Gava et al., 2021).

A recent investigation in Indonesia further confirms that being a cooperative member can have a favorable and substantial effect on household income within the capture fisheries sector, consequently enhancing overall living standards (Taniu et al., 2024). However, as at 2020, Indonesian cooperative members comprised only 10% of the total population, with cooperatives contributing only 1.1% to the GDP(Ministry of Cooperatives and SMEs of The Republic of Indonesia, 2022). This figure had remained about the same over the previous ten years. Since many Indonesian households, particularly among the poor, still engage in agriculture (for example, 9.46% of the labor force is dependent on the agricultural sector for their livelihoods), cooperatives should thrive in this sector (BPS-Statistics Indonesia, 2022). However, previous research by Hasan et al. (2018) indicates that cooperatives in Indonesia are highly inefficient, which may explain their failure to become a cornerstone of the Indonesian economy. Figure 1 illustrates the distribution of agricultural cooperatives across Indonesia, highlighting Java as the dominant region with the highest number of agricultural cooperatives, particularly East Java.

Figure 1. Distribution Map of Agricultural Cooperatives in Indonesia



Notes: The data depicted in this map image is summarized from the distribution data of cooperatives in Indonesia by province

Source: Ministry of Cooperatives and SMEs of the Republic of Indonesia (2022)

Despite increased growth in cooperatives over the past decade in Indonesia, approximately 30% are inactive. Starting in 2015, the Indonesian government began evaluating and certifying existing cooperatives. As of 2022, there were 127,846 active cooperatives, 41,231 of which had received certification, indicating that they were business-active, legally active, and had conducted member meetings within the past three years (Ministry of Cooperatives and SMEs of The Republic of Indonesia, 2022). Table 1 illustrates the turnover of Indonesian cooperatives and their business surplus relative to GDP. The business volume ratio to GDP has remained below 2%, and the business surplus ratio to GDP has stayed below 0.1% for the past twenty years. This lack of productivity raises the question of whether cooperatives can compete equally with corporations and become foundational pillars of the Indonesian economy.

Capital-related challenges are a perennial issue for all business entities, affecting cooperatives, corporations, and investor-owned firms. Alongside capital adequacy problems (Budirahayu, 2018; Majid et al., 2022; Mohd et al., 2017; Purmiyati et al., 2022; Riswan et al., 2017), the cooperative sector in Indonesia faces multifaceted issues, including concerns about low efficiency (Hasan et al., 2018) and the professionalism of its administrators (Mohd et al., 2017; Riswan et al., 2017).

Insufficient capital, however, poses significant challenges, hampering cooperatives and their members from financing their production activities and needs. Consequently, individuals often seek more costly alternatives or face difficulties sustaining their production. The fact that most farmers in rural Indonesia still live below the poverty line underscores the crucial role of cooperatives in assisting them with production. However, since cooperatives rely on funding from their members, poverty is a barrier to their advancement. Many impoverished farmers ultimately do not join cooperatives due to the savings requirements for membership (Ito et al., 2012; Ma et al., 2018; Ma & Abdulai, 2016). As a result, cooperatives cannot raise sufficient funds, which hinders their effective operations and leaves farmers' productivity issues unresolved.

Table 1. Cooperative Statistics in Indonesia, 2000–2020

Criteria	2000	2005	2010	2020
Number of cooperatives (unit)	103,077	134,963	177,482	188,181
Active cooperatives	88,930	94,818	124,855	127,124
Members (million people)	27.3	27.3	30.5	25.1
Annual member meeting (unit)	36,283	45,508	55,818	47,115
Business volume (billion Rupiah)	23,122.2	40,831.7	76,822.1	174,033
Business surplus (billion Rupiah)	694.5	2,198.3	5,622.2	7,225.1
Ratio				
Members/Active cooperatives	307.0	287.9	244.3	197.4
Annual member meeting/Active cooperatives	40.8	48.0	44.7	37.1
Business volume/Active cooperatives (million Rupiah)	260.0	430.6	615.3	1,369.0
Business surplus/Active cooperatives (million Rupiah)	7.80951	23.1844	45.0298	56.8351
Business volume/GDP (percent)	1.66	1.47	1.12	1.13
Business surplus/GDP (percent)	0.05	0.08	0.08	0.05
GDP (trillion Rupiah)	1,389.8	2,785	6,864.1	15,434.2

Source: Ministry of Cooperatives and SMEs of the Republic of Indonesia (2022)

Building upon the Modigliani–Miller theory as their foundation, various theorizations regarding corporate finance have emerged, including the trade-off and the pecking order theories. The trade-off theory posits that companies determine their debt levels by weighing the benefits gained against the costs of using debt. The optimal capital structure represents a debt/equity ratio that maximizes firm value. In turn, the ability of a company to access financial resources and its financial flexibility impacts the investment decisions made by the company (Cherkasova & Kuzmin, 2018). Conversely, the pecking order theory suggests that costs stemming from asymmetric information determine the optimal leverage ratio. Companies typically follow a sequential approach in financing their operations, utilizing retained earnings, debt, and then equity (Myers, 1984). Companies with substantial profits rely on internal capital, while smaller companies lean towards increased debt usage.

The size of cooperative assets or firm size influence production, enhancing profitability (Memili et al., 2015; Zhong et al., 2023). However, cooperatives face numerous challenges in obtaining sufficient capital, particularly when they rely solely on member deposits for capital accumulation. Introducing external capital into cooperatives can expedite and improve their performance.

Table 2 below compares cooperative statistics in Indonesia with several other countries selected based on their population size. The number of cooperatives in Indonesia relative to population is higher compared to China, the US, or Pakistan. India has the highest number of cooperatives, totaling 854,355 units. However, when compared in terms of business volume, Indonesia ranks far below China and the US.

To date, limited research has delved into the impact of capital on cooperative productivity. Majid et al. (2020) attempt to elucidate the effects of both internal and external capital on cooperative productivity using provincial-level aggregate data estimated through panel data methods. Nonetheless, endogeneity and selection bias may have affected the estimation. Kang et al. (2022) suggest an inverse correlation between asset levels and cooperative performance, indicating that smaller cooperatives are associated with higher financial risks. In other words, cooperatives with lower capitalization are exposed to greater financial risks. Thus, those able to access external funding experience reduced financial risk. However, the study does not differentiate between cooperatives with internal capital and those obtaining external capital.

Table 2. Cooperative Statistics in Indonesia and Other Countries

Criteria	Indonesia	China	India	US	Pakistan
Survey year	2020	2017	2018	2008	2016
Number of cooperatives (unit)	188,181	55,189	854,355	29,285	43,533
Members (million people)	25.1	200	290.1	350.9	440.3
Business volume (million USD)	12,338	790,000	Not available	514,600	Not available

Notes: This table displays cooperative statistics in Indonesia and other countries based on population.

Source: Indonesia (Ministry of Cooperatives and SMEs of The Republic of Indonesia, 2022), China (International Cooperative Alliance, 2017), India (International Cooperative Alliance, 2018), US (International Cooperative Alliance, 2008), Pakistan (International Cooperative Alliance, 2016)

A novel aspect of our study and primary research objective is to shed light on the role of external capital in supporting cooperative productivity. Our approach incorporates the following three aspects. First, utilizing cooperative firm-level data from the Ministry of Cooperatives and SMEs of the Republic of Indonesia, our study aims to elucidate the influence of external capital on cooperative productivity, explicitly focusing on cooperative profits or variations in operating results. Second, since cooperatives voluntarily adopt their capital policy, we need to address both the observed and unobserved endogeneity and selection bias that will likely arise. We will apply the endogenous switching regression (ESR) method to address these issues. Finally, we contribute to the literature by investigating whether the estimated treatment effects of cooperative capital policy are heterogeneous among cooperatives endowed with different characteristics.

The remainder of the article is organized as follows. The second section reviews the literature and develops hypotheses, followed by an outline of the research methodology and data sources in the third section. The fourth section presents and discusses the research findings, and the concluding section explores the implications of our results, considers the study's limitations and offers suggestions for future research.

LITERATURE REVIEW

A number of studies on cooperatives have been carried out in Indonesia. In their research, Budirahayu (2018)explore the development of cooperatives in East Java, identifying capital difficulties that drove members to seek alternative, albeit higher-cost loans. In a wider study, Majid et al. (2022) undertake a comprehensive examination of cooperatives across 34 Indonesian provinces. They conclude that limited liquidity and high debt levels hamper the performance of cooperatives. According to Mohd et al. (2017), cooperatives in Indonesia make a modest contribution to employment, employing only 0.5% of the total population. This is attributed, in part, to their limited access to financing, which hinders their ability to scale up operations. Purmiyati et al. (2022) emphasize capital issues as the primary challenge faced by cooperatives in East Java, resulting in low overall efficiency. In a SWOT analysis of village unit cooperatives (VUCs) in Banyumas by Riswan et al. (2017), capital adequacy is again identified as one of the significant problems faced by VUCs.

Cooperatives have failed to become the predominant form of agricultural enterprise in the United States despite holding a significant market share in agricultural products (Cook, 1995). As Cook (1995) explains, challenges related to capital and ownership clarity have hindered cooperative development. These challenges encompass two key aspects. First, is the horizon problem, with members viewing their long-term financial contributions as unprofitable and difficult to market. Second, portfolio issues arose, as investments in cooperatives were interconnected and often suboptimal in terms of members' risk preferences.

However, research in Slovenia shows how these challenges can potentially be addressed through adjustments to relevant capitalization laws (Avsec, 2023). Compensating departing members with investment fees or creating specialized investment savings for members have also been proposed as ways to mitigate the horizon problem (Tortia, 2021). Additionally, strategies like product diversification (Grashuis & Elliott, 2018) and enabling members to trade their investments with others (Chaddad et al., 2004; Mikami, 2015, 2018) have been suggested to address the portfolio problem.

Adaptations to legislation have been made to allow outside investment in cooperatives, notably by European governments in 2003 when they introduced the Statute for the European Cooperative Society. This Statute enables cooperatives to accept investor memberships, where individuals provide financial capital without engaging in the day-to-day operations of the cooperative, but expecting dividends in return. Moreover, these investor memberships take the form of transferable shares that are tradable on the secondary market. Unlike redeemable shares, these shares can change ownership through buying and selling, akin to shares in conventional companies (Mikami, 2013, 2015, 2016). This regulatory framework offers cooperatives increased access to external capital sources, thereby complementing internal sources, such as long-term debt and external investments.

Like corporate businesses, cooperatives require adequate capital to support operations, foster growth, and ensure sustainability(Li et al., 2015; Mhembwe & Dube, 2017; Yen et al., 2020).To attain profitability, cooperatives must consider the trade-off between increasing their level of debt to achieve enhanced profits. The pecking order theory highlights the funding sources accessible to cooperatives while accounting for potential risks. In this regard, cooperatives may acquire additional capital through retained earnings; however, for some cooperatives, this does not fully resolve capital shortages (Budirahayu, 2018; Majid et al., 2022; Purmiyati et al., 2022). Subsequently, they solicit additional capital from their members through deposits or investments, which can easily be redeemed and transferred, contingent upon supporting regulations (Mikami, 2015). Alternatively, cooperatives may secure loans from external parties that do not entail ownership stakes, such as bank loans (Alexandra et al., 2013).

The operation of Indonesian cooperatives is closely intertwined with applicable laws and regulations. In alignment with the evolving business landscape, the Indonesian government, akin to its European counterparts, has a vested interest in fostering cooperatives. The prevailing law governing cooperatives is Law No. 25/1992, which has existed for over 30 years. Given the changing needs of cooperatives, an update to this legislation was deemed imperative, with the government introducing Law No. 17/2012 as a replacement for Law No. 25/1992 in 2012. One notable change was facilitating access to external capital for cooperatives. However, this law generated both support and opposition concerning capital-related matters, prompting a judicial review by the Constitutional Court. Subsequently, the Constitutional Court revoked the law, which had been in effect for less than a year. Law No. 25/1992 was reinstated to address the legislative gap and remains in effect today.

The primary issue with Law No. 17/2012 is that it was perceived to prioritize capital or profit over the well-being of members and the wider community, which is fundamental to cooperatives. Cooperatives are not solely focused on profits; they aim to empower members and provide social and socio-psychological benefits through shared prosperity. However, capital adequacy remains a critical determinant of cooperative productivity, and research has demonstrated a positive correlation between cooperative capital and productivity (Majid et al., 2020). As with corporate business entities, capital plays a crucial role in the operation of cooperatives. However, capital does not confer ownership in cooperatives as it does in corporations. Capital adequacy challenges make it difficult for cooperatives to compete with corporations, leading to inefficiencies in cooperative performance (Grashuis & Elliott, 2018; Hasan et al., 2018). This deficiency in capital adequacy

also contributes to the development of unprofessional management and a lack of member participation, further hindering the healthy growth of cooperatives (Riswan et al., 2017).

METHOD, DATA, AND ANALYSIS

Our variable of interest, which pertains to the decision to utilize external capital, is contingent on the choices and policies of individual cooperatives. It may also correlate with unobservable characteristics, such as the cooperative's capacity or motivation, which can influence productivity. Consequently, we anticipate an endogeneity problem in the outcome variable—a direct comparison between cooperatives that adopt external capital and those that do not could yield biased results.

To address both selection bias and endogeneity, we employ an ESR framework to estimate the parameters of the outcome variable (Lokhsin & Sajaia, 2004; Ma et al., 2022; Ma & Abdulai, 2016; Narayanan, 2014). Specifically, we estimate a simultaneous equation model with endogenous switching using the full information maximum likelihood (FIML) method.

1. The decision to Adopt External Capital

This study focuses on the variable of external capital investment in cooperatives and the subsequent effect on performance. The decision to adopt external capital is voluntary and based on the choice of each cooperative. This decision could be based on capacity or expected benefits. Therefore, the choice of each cooperative regarding external capital can be modeled using dummy variables. We defined the selection equation for the decision to adopt external capital as follows:

$$D_i^* = Z_i\beta + \mu_i \text{ with } D_i = \begin{cases} 1 \; if \; D_i^* > 0 \\ 0 \; otherwise \end{cases} \quad (1)$$

A cooperative decides to adopt external capital ($D_i = 1$) if $D_i^* > 0$, where $D^*$is the expected return from adopting external capital versus not using external capital, and Z is the vector of variables associated with the decision to adopt external capital. These variables are cooperative assets, business volume, internal capital, and the number of administrators, supervisors, and cooperative members.

2. The ESR Model

The ESR model comprises two stages. The first stage is a selection equation based on a dichotomous criterion function to select the use of external capital, as shown in Equation (1). Based on the results of the selection function, in the second stage two equations are determined to describe the outcome of interest, namely the cooperative's profit as a proxy for productivity. The relationship between the vector of explanatory variables Z and the outcome variable Y can be shown by $Y = f(X)$as follows:

$$\text{Regime 1: } Y_{iM} = X'_i\beta_{iM} + \varepsilon_{iM} \text{ if } D_i = 1 \quad (2a)$$

$$\text{Regime 2: } Y_{iN} = X'_i\beta_{iN} + \varepsilon_{iN} \text{ if } D_i = 0, \quad (2b)$$

where Y_{iM} and $Y_{iN}$are the outcomes in regimes 1 and 2, and $X'_i$is a vector of the explanatory variables listed above. Finally, the error term is assumed to have a trivariate normal distribution, with zero mean and a covariance matrix. Using this method, we were able to prove that endogenous switching held and that there was no sample selectivity bias (Ma et al., 2022; Yu et al., 2023).

The ESR model requires at least one additional variable as an instrument that directly affects the selection variable but not the outcome variable. According to the peer effects theory, individuals are more likely to participate if their peers do the same (Sampson & Perry, 2019; Yu et al., 2023). We used the variable‘ percentage of cooperatives adopting external capital in the same 'municipalities' as an instrument variable.

Cooperatives were shown to be more likely to adopt external capital if their neighboring cooperatives in the same municipalities did so. In this case, the percentage of cooperatives using external capital did not affect the productivity of a cooperative. We employed the chi-square statistic test to determine whether the independent variable was endogenous.

The variables X'_iin Equations (2a) and (2b) include observable factors to handle selection bias. However, unobservable factors can still create a correlation between the error term and the outcome equation. The ESR model considers the selection bias caused by unobserved factors a missing variable. After estimating the selection-related equations, we calculated the inverse Mills ratios, λ_{iM} and λ_{iN}, as well as the covariance terms, $\sigma_{\mu M} = cov\,(\mu_i, \varepsilon_{iM})$ and $\sigma_{\mu N} = cov\,(\mu_i, \varepsilon_{iN})$ and plugged them into Equations (2a) and (2b) as follows:

$$Y_{iM} = X'_i\beta_{iM} + \sigma_{\mu M}\lambda_{iM} + \gamma_{iM} \text{ if } D_i = 1 \quad (3a)$$

$$Y_{iN} = X'_i\beta_{iN} + \sigma_{\mu N}\lambda_{iN} + \gamma_{iN} \text{ if } D_i = 0, \quad (3b)$$

where λ_{iM} and λ_{iN} control for selection bias due to unobservable factors and error terms γ_{iM} and γ_{iN} have zero conditional mean.

The ESR method provides estimates for $\rho_{\mu M}$and $\rho_{\mu N}$, representing the covariance terms between the error terms in selection, Equation (1), and outcome, Equations (2a) and (2b). The correlation coefficients $\rho_{\mu M}$ and $\rho_{\mu N}$have an econometric interpretation (Lokhsin & Sajaia, 2004). Thus, if $\rho_{\mu M}$ and $\rho_{\mu N}$ were statistically significant, it implied that participants had higher than average productivity, regardless of their participation; however, they would be better off if they participated. If $\rho_{\mu M}$ and $\rho_{\mu N}$ were both statistically insignificant, this indicated the presence of unobserved variables determining their choice. If $\rho_{\mu M}$ was significant and $\rho_{\mu N}$ was not, participating would be an absolute advantage. Otherwise, it would be an advantage for non-participants.

The estimation results from the ESR model could be used to calculate the average treatment effect of the treated (ATT), where ATT indicated the expected change in the average outcome of adopters if the characteristics of adopters had the same outcome values as non-adopters, or if their characteristics were similar. We calculated the conditional expectation for cooperative productivity based on the use of external capital as follows:

$$E[Y_{iM}|D = 1] = X_i\beta_{iM} + \sigma_{\mu M}\lambda_{iM} \quad (4a)$$

$$E[Y_{iN}|D = 1] = X_i\beta_{iN} + \sigma_{\mu N}\lambda_{iN}. \quad (4b)$$

Equations (4a) and (4b) were used to derive the unbiased ATT as follows:

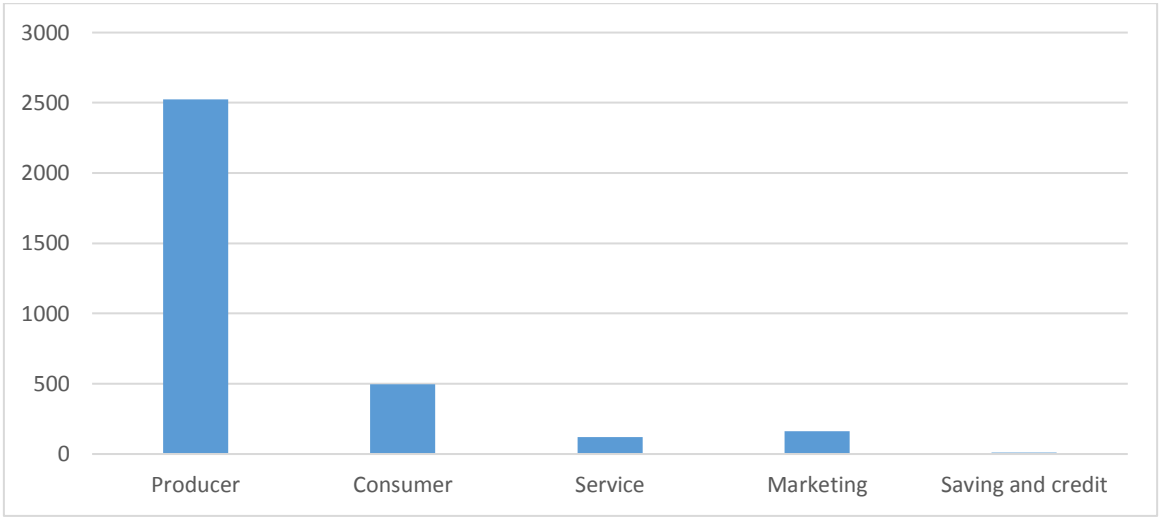
$$ATT = E[Y_{iM}|D = 1] - E[Y_{iN}|D = 1]. \quad (5)$$

3. Data

The data for analysis were sourced from the Ministry of Cooperatives and Small and Medium Enterprises of the Republic of Indonesia for 2022, the latest government-certified, firm-level information on cooperatives across Indonesia. The study aims to elucidate the impact of capital utilization on each cooperative unit necessitated firm-level analysis units to address the inquiry. Individual analytical units provide an advantage in terms of scrutinizing facts in greater depth compared to the group or aggregate data that serves as the basis of previous research.

This data could be categorized by cooperatives utilizing external capital and those that did not. Furthermore, cooperatives could be grouped by province and municipality. Additional available data included information on the number of management personnel, supervisors, and cooperative members and details on total assets, business volume, internal capital, and cooperative profits.

Figure 2. Distribution of Cooperatives by Type



Notes: This figure displays the number of agriculture and forestry cooperatives based on their types.
Source: Ministry of Cooperatives and SMEs of The Republic of Indonesia (2022)

Figure 2 breaks down our sample of3,315 cooperative units in the agriculture and forestry sector by type. The sample comprised 2,526 producer cooperatives, 496 consumer cooperatives, 120 service cooperatives, 162 marketing cooperatives, and 11 savings and credit cooperatives. Thus producer cooperatives made up the majority. A producer cooperative is one where individuals or businesses, typically producers of a specific product or service, come together to own and operate the cooperative collectively. The members of a producer cooperative work together to produce, market, and sell their products or services, sharing their profits and benefits based on their contribution and participation. A producer cooperative's primary goal is to enhance its members' economic and social well-being.

RESULTS AND DISCUSSION

1. Descriptive Statistics

We employed a multistage purposive sampling approach to select the observation sample. First, we focused on cooperatives involved in agriculture and plantations. Second, we only included primary cooperatives for observation and excluded secondary cooperatives. Secondary cooperatives are characterized by a membership composed of primary cooperative legal entities, thus essentially representing conglomerates of multiple primary cooperatives. Since primary cooperatives were already accounted for in the dataset, utilizing secondary cooperatives would result in redundant data duplication. Finally, our observations were limited to cooperatives without government affiliations. This selection process yielded a sample size of 3,315 agricultural cooperatives for our study.

Table 3 presents the definitions and summary statistics of the variables analyzed in this study. Approximately 69.5% of the cooperatives in our sample chose to adopt external capital. In comparison, nearly 69.6% of the nearby cooperatives followed the same capital policy. The average annual profit was Rp 132 million, with a business volume of Rp 3.13 billion, resulting in a net profit margin of approximately 4.2%. The return on assets stood at approximately 3.3%, based on an average asset value of Rp 4.05 billion.

Table 3. Variable Definitions and Summary Statistics

Variables	Description	Mean	*SD*
Capital policy	1 If the cooperative uses external capital, 0 otherwise	0.695	0.460
Profit	Cooperative profit (rupiah)	132,000,000	1,150,000,000
Volume	Cooperative business volume (rupiah)	3,130,000,000	22,800,000,000
Asset	Total cooperative assets (rupiah)	4,050,000,000	16,700,000,000
Internal capital	Cooperative internal capital (rupiah)	1,160,000,000	6,450,000,000
Administrator	Number of cooperative administrators	3.210	0.561
Supervisor	Number of cooperative supervisors	2.457	0.927
Member	Number of cooperative members	560.822	1,442.575
Peer effect	Percentage of cooperatives using External capital in the same municipality	0.696	0.276

Note: This table provides definitions and summaries of the variables used in the study.

Table 4 displays the mean differences in characteristics between cooperatives adopting external capital and those without it. Among the 3,515 cooperatives in the sample, 2,305 utilized external capital, whereas 1,010 cooperatives did not. Cooperatives opting for external capital tended to exhibit more significant profits, business volumes, asset holdings, and internal capital. Additionally, they managed to have a more extensive membership base, at nearly three times the size of cooperatives without external capital on average. Four of the observed variables indicated significant differences between cooperatives with and without external capital. These descriptive comparisons suggest that external capital utilization is vital in profit generation compared to cooperatives relying solely on internal capital. Nevertheless, it is essential to note that the findings reported in Table 3 lack robustness due to the omission of confounding factors, such as cooperative characteristics and unobserved variables, e.g., the skills of cooperative managers and employees, member motivation, and risk perception.

2. Determinants of Cooperative Capital Policy

Table 5 presents the estimation results for factors influencing a cooperative's decision to adopt external capital and the impact of this external capital policy on cooperative profits. We employed the FIML approach to estimate the selection and outcome equations simultaneously.

Table 4. The Mean Difference Between Cooperatives with and without External Capital

Variables	With external capital (N = 2,305)	Without external capital (N = 1,010)	Mean differences
Profit	138,000,000	120,000,000	18,200,000
Volume	3,390,000,000	2,530,000,000	854,000,000
Asset	4,870,000,000	2,170,000,000	2,690,000,000***
Internal capital	1,300,000,000	837,000,000	463,000,000*
Administrator	3.220	3.188	0.032
Supervisor	2.413	2.557	0.146***
Member	688,235	270,043	418,192***

Notes: This table shows the mean difference between cooperatives using external capital and those without external capital.
**** p < 0.001, ** p < 0.05, * p < 0.01*

Table 5. Determinants of Cooperative Capital Policy and Its Impact on Profit

Variables	Selection	Profit	
		With external capital	Without external capital
Constant	–4.585 (0.431)***	21.933 (0.060)***	21.832 (0.095)***
Volume (log)	0.007 (0.024)	0.012 (0.003)***	0.012 (0.003)***
Asset (log)	0.520 (0.080)***	0.001 (0.003)	0.005 (0.005)
Internal capital (log)	–0.388 (0.070)***	–0.001 (0.006)	0.001 (0.006)
Administrator	–0.061 (0.063)	0.006 (0.005)	0.010 (0.012)
Supervisor	–0.052 (0.038)	0.002 (0.003)	0.004 (0.002)**
Member	0.00002 (0.00003)	3.21e-06 (3.45e-06)	–9.03e-07 (3.80e-06)
Peer effect	3.759 (0.126)***		
$\text{Ln}\sigma_{\mu M}$		–1.790 (0.387)***	
$\rho_{\mu M}$		0.103 (0.022)***	
$\text{Ln}\sigma_{\mu N}$			–2.603 (0.199)***
$\rho_{\mu N}$			–0.043 (0.046)
Wald chi2(6)	61.99		
Log pseudolikelihood	965.24		
LR test of Indep. Eq.	22.12***		
Observations	3,315	2,305	1,010

Notes: The dependent variable is cooperative profit in logs. Standard errors are in parentheses.
**** p < 0.001, ** p < 0.05, * p < 0.01*

The second column of the table represents the selection equation, highlighting the determinants of cooperatives electing to adopt external capital. The third and fourth columns represent the outcome equation, illustrating the impact of utilizing external capital on cooperative profits.

The selection column in Table 5 elucidates the impact of capital policy choices. In particular, the asset variable displays a positive significance, implying that cooperatives with larger assets were more inclined to adopt external capital. Conversely, the internal capital variable shows a negative significance, indicating that higher levels of internal capital decreased the likelihood of external capital adoption. These findings are consistent with prior research identifying a positive correlation between assets and external debt financing (Gweyi & Karanja, 2014; Kang et al., 2022). Furthermore, the presence of alternative capital sources where internal capital is available significantly reduced the likelihood of external capital use in our sample. This aligns with the Modigliani–Miller theory and related theories, such as the trade-off and pecking order theories. The results demonstrate that cooperatives meet their financial needs similarly to investor-owned firms.

The peer effect was positively statistically significant, signifying that the policies of cooperatives in neighboring areas influenced decision-making. This indicates a close relationship between cooperatives and their peers, where the policies adopted by peers serve as considerations for implementing similar actions (Sampson & Perry, 2019; Yu et al., 2023). This study thus further highlights peer effect theory as applying to cooperatives.

3. ESR Estimation Results

We interpreted the results for the variables in Table 5 as follows. Business volume positively and significantly influenced the profit of cooperatives employing external capital

compared to those not utilizing it, underscoring its impact on cooperative earnings. Asset size exhibited a positive relationship with profit for cooperatives without external capital, indicating that larger asset bases are associated with higher profits. The supervisor variable showed a positive and significant association with cooperatives utilizing external capital, implying that more supervisors correlates with increased profits. These findings align with prior research highlighting the diverse impact of cooperatives on economic and social aspects of the lives of their members and communities (Bhukuth et al., 2018; Riswan et al., 2017; Yu et al., 2023).

Table 5 also presents the estimated correlation coefficients. $\rho_{\mu M}$ and $\rho_{\mu N}$, which carry important econometric implications (Lokhsin & Sajaia, 2004). First, the results indicated that $\rho_{\mu M}$ was statistically significant while $\rho_{\mu N}$ was not, suggesting that cooperatives opting for external capital had a distinct advantage over those that did not. This finding confirmed the presence of selection bias, implying the influence of observable and unobservable factors on the choice of capital policy and cooperative profits. Second, the positive value of $\rho_{\mu M}$ signified a negative selection bias, aligning with the intended objective of using external capital to enhance cooperative productivity and profitability.

Table 6 presents the estimated average treatment effect in both the treated and untreated groups, illustrating the impact of external capital usage on cooperative profits. These estimations accounted for selection bias arising from observable and unobservable characteristics. The ATT results demonstrated a significant 2.8% increase in profits associated with utilizing external capital. These findings contrast with research conducted by Majid et al. (2020), which found no significant effect of external capital on cooperative profits. Their research utilized a panel data regression method based on aggregate cooperative data at the provincial level. This method is susceptible to selectivity bias and unobservable variables, which may result in less reliable outcomes. However, considering the limitations of the data, such shortcomings are understandable.

The results demonstrate that external capital has a significantly positive impact on cooperative performance, aligning with previous research by Budirahayu (2018)and indicating that cooperatives struggle to develop due to difficulties in finding alternative funding sources. If cooperatives rely solely on member savings, they will face challenges because members, especially in agricultural cooperatives, are often farmers with weak economic means, making it difficult to raise sufficient capital to finance cooperative activities. Adequate capital is thus confirmed one of the obstacles to cooperative development (Purmiyati et al., 2022; Riswan et al., 2017).

The idea of facilitating access to capital through transferable shares that are tradable on secondary markets (Mikami, 2015, 2016) is one solution for funding besides external loans that do not require ownership (Alexandra et al., 2013). Our findings strengthen the rationale for the government to establish regulations that facilitate cooperatives in obtaining external funding (Avsec, 2023).

Table 6. Impact of External Capital Adoption Policy on Cooperative Profit

Outcome variables	Mean outcome		ATT	t-value
	With external capital	Without external capital		
Profit	22.211 (0.001)	22.183 (0.001)	0.028***	27.440

Notes: The table shows the ATT of capital policy on cooperative profits. Standard errors are in parentheses.
**** p < 0.001, ** p < 0.05, * p < 0.01*

Table 7. Categorisation of Cooperatives Based on Size

Category	Number of cooperatives		Total
	With external capital	Without external capital	
Micro	182	287	469
Small	835	426	1,261
Medium	1,083	250	1,333
Large	205	47	252

Notes: The table shows the categorization of cooperatives based on Law No. 20/2008 on micro, small, and medium enterprises.

To further explore the impact of external capital on cooperative profits, we conducted tests based on the size categories outlined in Law No. 20/2008 for micro, small, and medium enterprises. Micro-sized enterprises are defined as those with assets of up to Rp 50 million or annual business volumes of up to Rp 300 million. Small-sized businesses fall within the range of Rp 50 million to Rp 500 million in assets or annual sales ranging from Rp 300 million to Rp 2.5 billion. The medium-sized category encompasses those with assets ranging from Rp 500 million to Rp 10 billion in value or annual business volumes between Rp 2.5 billion to Rp 50 billion. A large business possesses assets and an annual business volume exceeding that of a medium-sized business.

According to the above classification, Table 7 illustrates that the cooperatives were distributed across the categories as follows: 469 units were categorized as micro, 1,261 as small, 1,333 as medium, and 252 as large cooperatives. Concerning the criteria for micro-sized cooperatives, it was evident that among the 469 units, only 182 units used external capital, while the majority did not employ it. This indicated that micro-sized cooperatives encountered limitations when attempting to access external funding, a point emphasized in research on cooperatives conducted across various locations in Indonesia (Budirahayu, 2018; Majid et al., 2022; Mohd et al., 2017; Purmiyati et al., 2022; Riswan et al., 2017). Conversely, other cooperatives faced less difficulty accessing external capital, as evidenced by more cooperatives utilizing external capital than not among the medium and large-sized cooperatives.

As shown in Table 8, the findings consistently demonstrated a positive and significant impact of external capital usage across the different size categories of cooperatives. Notably, external capital had the most substantial effect on the large category, increasing profits by 10% and representing the highest impact among all the categories. Medium-sized cooperatives experienced the second highest impact, with a profit increase of 5.6%, while small-sized and micro-sized cooperatives experienced a respective increase in profits of 0.8% and 0.1% from utilizing external capital.

Table 8. Impact of External Capital Policy on Cooperative Profit by Cooperative Size Category

Category	Mean outcome		ATT	t-value
	With external capital	Without external capital		
Micro	22.192 (0.000)	22.191 (0.000)	0.001***	8.345
Small	22.196 (0.000)	22.188 (0.001)	0.008***	31.667
Medium	22.217 (0.001)	22.161 (0.002)	0.056***	35.482
Large	22.275 (0.007)	22.175 (0.016)	0.100***	6.145

Notes: The table shows the ATT of capital policy on cooperative profits by cooperative size category. Standard errors are in parentheses. Cooperative categories are based on Law No. 20/2008 on micro, small, and medium enterprises.

**** $p < 0.001$, ** $p < 0.05$, * $p < 0.01$*

Table 8also reveals a correlation between increasing cooperative size and the profit difference between cooperatives utilizing external capital and those not using it. Notably, the profit disparity for micro-sized cooperatives employing external capital was marginal compared to those that did not (Note: the results of the prior regression analysis examining the determinants of cooperative capital policy by size category are presented in the appendices).

Research findings from companies listed on the Indonesian Stock Exchange from 2000 to 2008 indicate that company size positively influences investment decisions (Utama & Sulistika, 2015). These findings also corroborate research outcomes in Kenya, indicating that size exerts an influence on cooperative productivity (Othuon et al., 2021) and that agricultural cooperatives share similar characteristics with small and medium-sized enterprises (Memili et al., 2015; Zhong et al., 2023). The greater the scale of the cooperative, the more streamlined its production processes, consequently enhancing profitability.

Conversely, insufficient capital poses operational challenges for cooperatives. Due to difficulties securing financial support, cooperatives can often resort to higher-cost borrowing to meet their capital requirements, subsequently impacting operational efficiency. This study reaffirms previous research findings emphasizing the financial challenges faced by many Indonesian cooperatives (Budirahayu, 2018; Purmiyati et al., 2022).

The findings also support trade-off theory, which asserts that companies are willing to use debt after considering whether the profits generated will be greater than the costs of using the debt, thereby benefiting the company. Similarly, it supports pecking order theory, which posits that companies have a hierarchy for meeting their financial needs, as follows: utilizing retained earnings, debt, and then equity (Myers, 1984).

CONCLUSION

1. Conclusion

This study has investigated the factors influencing agricultural cooperatives' adoption of external capital in Indonesia and the subsequent impact on their profits. We analyzed cross-sectional, firm-level data from the Ministry of Cooperatives and Small and Medium Enterprises of the Republic of Indonesia in a sample of 3,315 cooperatives. The initial comparisons between cooperatives using external capital and those not utilizing it revealed significant differences, albeit descriptively and without accounting for potential confounding factors. To mitigate selection bias, we employed an ESR method that considered both observable and unobservable factors. Our estimation results confirmed the presence of selection bias when confounding factors were not appropriately addressed.

Overall, the empirical findings revealed a significant and positive relationship between adopting external capital and cooperative productivity, with adopters experiencing a notable profit increase of 2.8%. Cooperative assets and peer influence positively affected the decision to adopt external capital. In contrast, internal capital had a negative impact on this choice. This suggests that cooperatives with ample capital resources are less inclined to seek additional external funding. Furthermore, cooperative size demonstrated consistently positive and significant results across a range of size categories, with the most substantial impact observed among large-sized cooperatives. The positive implications for productivity increased with the size of the cooperative. These findings align with prior research, highlighting that many small cooperatives in Indonesia face challenges

in accessing funding, leading to low productivity and efficiency.

2. Implications

The findings of this study serve as a foundational reference for government initiatives aimed at enhancing the capital structure of cooperatives. Cooperatives require adaptable laws to remain competitive alongside other business entities in a rapidly evolving business landscape. This study underscores the pivotal role of external capital in boosting the productivity of agricultural cooperatives in Indonesia. It is imperative for the government to promptly enact legislation that addresses capital concerns while preserving the identity of cooperatives as small-scale enterprises rooted in populist principles rather than being capital-driven.

The government should implement a regulatory framework that facilitates cooperatives' access to external capital, such as long-term debt or investments, which can be obtained from financial institutions like banks. Additional capital can also be sourced from opening cooperatives up to internal investment resembling corporate stock ownership. These shares could be traded on secondary markets, allowing them to change ownership through buying and selling processes. Nevertheless, cooperative shares would differ from corporate shares in that they do not represent ownership of the cooperative, thereby preserving the fundamental principle that cooperatives are owned by their members.

3. Limitations and Suggestions for Future Research

This study has limitations related to the restricted data available on cooperatives in Indonesia. The data currently owned by the government are only cross-sectional data for 2022. If the government collected data in the form of panel data, it would have allowed for various in-depth analyses to be carried out. The quality of cooperative administrators, managers, and supervisors is also an important variable that impacts cooperative profitability; as such, the availability of data on these variables is essential for future research.

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Appendices

A. Determinants of Micro-sized Cooperative Capital Policy and theImpact on Profit

Variables	Selection	Profit	
		With external capital	Without external capital
Constant	-7.948 (1.662)***	22.181 (0.002)***	22.178 (0.002)***
Volume (log)	0.087 (0.075)	0.0003 (0.0001)**	0.001 (0.0002)***
Asset (log)	1.211 (0.287)***	0.0005 (0.0003)*	-0.0006 (0.0003)*
Internal capital (log)	-0.980 (0.284)***	-0.0003 (0.0001)*	0.0001 (0.0003)
Administrator	0.091 (0.185)	0.0001 (0.0001)	-0.00003 (0.0001)
Supervisor	-0.125 (0.095)	-0.00008 (0.00008)	0.00005 (0.0001)
Member	-0.0017 (0.0009)**	3.17e-06 (2.59e-06)	8.80e-07 (1.10e-06)
Peer effect	3.426 (0.345)***		
$Ln\sigma_{\mu M}$		-6.650 (0.164)***	
$\rho_{\mu M}$		0.210 (0.115)*	
$Ln\sigma_{\mu N}$			-6.083 (0.152)***
$\rho_{\mu N}$			0.116 (0.097)
Wald chi2(6)	47.13		
Log pseudolikelihood	2,108.791		
LR test of Indep. Eq.	5.46*		
Observations	469	182	287

Notes: The dependent variable is cooperative profit in logs. Standard errors are in parentheses.
**** p < 0.001, ** p < 0.05, * p < 0.01*

B. Determinants of Small-sized Cooperative Capital Policy and theImpact on Profit

Variables	Selection	Profit	
		With external capital	Without external capital
Constant	-3.207 (1.518)**	22.125 (0.019)***	22.050 (0.040)***
Volume (log)	0.055 (0.054)	0.002 (0.0005)***	0.006 (0.001)***
Asset (log)	0.623 (0.138)***	0.002 (0.001)*	0.002 (0.002)
Internal capital (log)	-0.586 (0.135)***	-0.0007 (0.0007)	-0.0007 (0.002)
Administrator	-0.137 (0.074)*	-0.0009 (0.0004)*	0.003 (0.002)
Supervisor	-0.004 (0.045)	0.0003 (0.0002)	-0.0003 (0.0007)**
Member	-0.00001 (0.00009)	-1.27e-06 (5.7e-07)**	7.73e-07 (2.12e-06)
Peer effect	3.165 (0.636)***		
$Ln\sigma_{\mu M}$		-4.486 (0.237)***	
$\rho_{\mu M}$		0.800 (0.408)**	
$Ln\sigma_{\mu N}$			-4.192 (0.140)***
$\rho_{\mu N}$			0.035 (0.101)
Wald chi2(6)	30.80		
Log pseudolikelihood	3,332.56		
LR test of Indep. Eq.	3.98		
Observations	1,261	835	426

Notes: The dependent variable is cooperative profit in logs. Standard errors are in parentheses.
**** p < 0.001, ** p < 0.05, * p < 0.01*

C. Determinants of Medium-sized Cooperative Capital Policy and the Impact on Profit

Variables	Selection	Profit	
		With external capital	Without external capital
Constant	-4.674 (1.304)***	21.711 (0.072)***	21.732 (0.247)***
Volume (log)	0.010 (0.035)	0.006 (0.001)***	0.016 (0.004)***
Asset (log)	0.328 (0.069)***	0.013 (0.003)***	0.012 (0.015)
Internal capital (log)	-0.178 (0.057)***	0.002 (.002)	-0.007 (0.007)
Administrator	0.032 (0.087)	0.005 (.005)	0.002 (0.015)
Supervisor	0.055 (0.053)	0.001 (.001)	0.008 (0.003)***
Member	5.29e-06 (0.00003)	-1.44e-06 (8.04e-07)	–1.32e-06 (1.77e-06)
Peer effect	2.439 (0.669)***		
$Ln\sigma_{\mu M}$		-2.844 (0.183)***	
$\rho_{\mu M}$		1.287 (0.370)***	
$Ln\sigma_{\mu N}$			-2.530 (0.274)***
$\rho_{\mu N}$			0.013 (0.114)
Wald chi2(6)	45.74		
Log pseudolikelihood	1,550.29		
LR test of Indep. Eq.	12.06***		
Observations	1,333	1,083	250

Notes: The dependent variable is cooperative profit in logs. Standard errors are in parentheses.
**** p < 0.001, ** p < 0.05, * p < 0.01*

D. Determinants of Large-sized Cooperative Capital Policy and theImpact on Profit

Variables	Selection	Profit	
		With external capital	Without external capital
Constant	-1.353 (3.242)	23.047 (1.654)***	18.710 (1.046)***
Volume (log)	-0.002 (0.074)	0.030 (0.016)*	0.056 (0.020)***
Asset (log)	0.243 (0.135)*	-0.055 (0.063)	0.015 (0.024)
Internal capital (log)	-0.252 (0.061)***	-0.014 (0.027)	0.084 (0.037)**
Administrator	0.010 (0.206)	0.046 (0.049)	0.042 (0.078)
Supervisor	-0.148 (0.109)	-0.007 (0.040)	0.0005 (0.026)
Member	0.00006 (0.0001)	0.00002 (0.00001)	-0.00003 (0.00003)
Peer effect	4.100 (0.549)***		
$Ln\sigma_{\mu M}$		-0.622 (0.408)	
$\rho_{\mu M}$		0.182 (0.081)**	
$Ln\sigma_{\mu N}$			-1.557 (0.273)***
$\rho_{\mu N}$			-0.345 (0.309)
Wald chi2(6)	20.70		
Log pseudolikelihood	-213.877		
LR test of Indep. Eq.	6.58**		
Observations	252	205	47

Notes: The dependent variable is cooperative profit in logs. Standard errors are in parentheses.
**** p < 0.001, ** p < 0.05, * p < 0.01*