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Original Research Article

Does Investment Diversification Enhance Profitability? Evidence from Nepal's Non-life Insurance Sector

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Abstract

Purpose: This study aims to analyze the effect of investment diversification on the profitability of non-life insurance firms in Nepal, considering recent structural reforms and mergers.

Design/methodology/approach: This study employs a quantitative, explanatory research design using panel data from 14 non-life insurance companies in Nepal over five fiscal years (2019/20–2023/24), with secondary data sourced from yearly reports of non-life insurance companies in Nepal. Regression methods using panel data have been used to study how investment affects profitability, taking into account past financial data and changes over time for each company.

Results: The results indicate that both investment (current and lagged) and total premium have a statistically significant and positive impact on the net profit of non-life insurance companies in Nepal, while employment shows no significant effect.

Conclusion: Boosting profitability in Nepal's non-life insurance sector requires a strategic emphasis on investment efficiency and premium growth through innovation and market expansion. Prioritizing employee productivity over workforce expansion, coupled with data-driven decision-making, will enable insurers to achieve sustainable long-term profitability.

Implications: Policies should promote efficiency and productivity in human resource management rather than incentivizing workforce expansion, aligning with the sector's long-term profitability and sustainability goals.

Originality/Value: This study uniquely analyzes investment diversification's profitability impact in Nepal's post-merger non-life insurance sector, revealing lagged investment effects and premium growth as key drivers, with actionable insights for emerging markets.

JFL Classification: G22, G11, C33, O16

Introduction

The insurance sector is a cornerstone of financial stability and economic development, facilitating risk transfer and mobilizing long-term savings for productive investment. In Nepal, the non-life insurance industry has witnessed substantial growth over the past decade, propelled by rising consumer awareness, regulatory reforms, and expanding market demand (Pradhan & Dahal, 2021). Despite this progress, non-life insurers continue to grapple with challenges related to capital allocation, risk management, and sustaining profitability in an increasingly competitive environment.

A significant transformation occurred in fiscal year 2021/22 with the Insurance Board's (Beema Pradhikaran) merger policy, which aimed to enhance the financial robustness and operational efficiency of insurers. By mandating a minimum paid-up capital of NPR 2.5 billion, the policy accelerated a wave of mergers and acquisitions among both life and non-

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life insurers. These consolidations, completed during fiscal year 2022/23, reduced the number of operating firms and strengthened the sector's capital adequacy, risk-bearing capacity, and resilience. This structural reform aligns with Nepal's strategic vision for a more sustainable and competitive insurance landscape (Nepal Insurance Board [Beema Pradhikaran], 2023).

Within this evolving context, investment diversification has gained prominence as a strategic tool for managing financial risk and enhancing returns. By allocating capital across varied asset classes, insurers aim to mitigate exposure to sector-specific or macroeconomic volatility, thereby stabilizing earnings (Upadhyaya et al., 2024). While diversification is widely recognized in financial theory for its risk-reducing potential, empirical studies examining its direct impact on insurer profitability remain limited, particularly in emerging markets like Nepal.

Insurance firms operate in a uniquely risk-intensive environment, where profitability is influenced not only by investment performance but also by underwriting practices, operational efficiency, and market dynamics. For example, Upadhyaya et al. (2024) found that the size of the company and how often claims are made are important factors affecting the profits of non-life insurers in Nepal, indicating that just having a good investment strategy isn't enough without also improving internal processes.

Furthermore, the integration of financial technology (FinTech) into insurance operations presents new opportunities for enhancing market responsiveness and optimizing capital deployment. As Elomari (2023) notes, digital tools can assist in evaluating market conditions and consumer behavior, potentially improving investment decisions and profitability outcomes.

This study investigates the relationship between investment diversification and profitability in Nepal's non-life insurance sector. By analyzing firm-level data in the post-merger context, the study contributes to the growing literature on insurance finance and offers practical suggestions for insurers, regulators, and policymakers seeking to foster financial sustainability and sectoral growth.

Literature Review

Theoretical Review

Investment diversification among non-life insurers reveals complex dynamics that are linked to their product lines and market conditions (Tuffour et al., 2022; Andoh & Yamoah, 2021). It is a crucial aspect for non-life insurance companies aiming to boost profitability. The relationship between diversification and profitability can be assessed through various factors, including risk management, product offerings, and operational efficiency. Comprehensive research across different regions and contexts supports the notion that diversification can yield significant advantages for insurers.

However, while diversification generally promotes performance, its success often hinges on effective management practices and the external business environment. Factors such as competitive dynamics, regulatory frameworks, and capital availability can influence the actual benefits derived from diversification. As noted by Berry-Stölzle et al. (2012), in well-established markets, the benefits of diversification may often be marginal or even negative if not strategically managed (Che et al., 2017; Işık, 2021).

Conversely, recent findings present a pivotal perspective on diversification's impact on profitability. For instance, excessive diversification may lead to diminishing returns as companies struggle to manage disparate business units effectively. Their findings suggest that increased diversification can lead to inefficiencies if not aligned with the firm's core competencies (Berry-Stölzle et al., 2011). This idea is supported by Che et al. (2017), who found that in the property-liability sector, companies that focus on fewer areas tend to perform better than those that diversify too much, especially when comparing their underwriting and investing activities.

It is also essential to acknowledge that product diversification might introduce complexities that can negatively affect profitability if not managed properly. Managing a wider range of products can lead to higher financial costs and operational expenses, which might cancel out the benefits of diversification, as shown by several studies on efficiency and specific company factors (Chen & Wang, 2021; Li et al., 2023; Singh & Kundu, 2020).

Evidence largely supports that investment diversification contributes positively to the profitability of non-life insurance companies, but the degree of success depends on various internal and external factors. A well-executed diversification strategy can lead to enhanced resilience and improved financial performance if companies maintain strategic oversight over their operations and market conditions (Kuppuswamy & Villalonga, 2016; Asare et al., 2017).

Taken together, these studies delineate a complex picture of how investment diversification affects profitability in the non-life insurance sector. Insurers must carefully navigate the breadth of diversification to achieve risk mitigation while enhancing profitability sustainably over time. This strategic balancing act, particularly in light of economic fluctuations, can ultimately determine their success in competitive landscapes.

Empirical Review

Research indicates that insurers with a diversified range of products across different lines tend to realize higher risk-adjusted profits. For instance, Shim (2010) highlights that property-liability insurers showing a higher concentration in commercial property lines achieve better profitability compared to those predominantly engaged in personal lines. The study again suggests that this product diversity serves as a hedge against market uncertainties, enhancing overall performance in a competitive landscape (Shim, 2010). Similarly, Krivokapic et al. (2017) support this view by demonstrating that firms diversifying across life-health and property-liability markets benefit from improved performance through enhanced internal governance mechanisms.

Additionally, Shim (2010) found that insurance companies with a mix of different types of insurance, especially in commercial property (CP) insurance, make more profit when considering risk than those that mainly focus on personal property (PP), professional liability (PL), or commercial liability (CL). This position produces product diversity not merely as a strategic option but as a significant driver of financial performance in the insurance context (Hasan & Wahid, 2018; Alhassan et al., 2015).

Moreover, the context of financial crises should not be overlooked. During economic downturns, such as the Great Recession, evidence suggests that diversification may serve as a buffer against market

volatility. Different ownership structures can yield varied outcomes. Diversified firms are better positioned to leverage internal capital markets when external financing becomes constrained (Liebenberg & Lin, 2019; Camino-Mogro & Bermúdez-Barrezueta, 2019). This implies that a strategic approach to diversification not only secures investment returns but also safeguards against economic uncertainties.

Diversification of investments is an essential approach for increasing profitability in sectors that encounter inherent risks. Studies suggest that non-life insurance firms in Nepal might enhance profitability by emphasizing varied product portfolios and effective risk management procedures. Such diversification can enhance financial stability and increase market competitiveness, which is crucial for long-term profitability (Upadhyaya et al., 2023; Sejuwal & Koirala, 2023).

An analysis of the Nepalese non-life insurance market reveals that firms with broader portfolios can better manage liabilities and risks associated with their operations. Diversifying product lines not only assists in risk management but also enables companies to redirect internal resources toward core business activities, fostering a more conducive environment for real investment and economic growth (Sejuwal & Koirala, 2023; Pradhan & Dahal, 2021). Additionally, the research by Upadhyaya et al. (2023) shows that having good diversification strategies is important for increasing revenue and profits, as they can help lower costs.

Moreover, international comparisons demonstrate that while the Nepalese market has unique characteristics, global insights can inform practices within Nepal. Research from other regions illustrates the value of diversification in reinforcing financial stability and achieving higher returns on equity (Uddin et al., 2021; Nisar et al., 2018; Choi & Weiss, 2005; Siddik et al., 2022). This consistency across various sectors suggests a universal application of diversification principles that can guide strategy formulations in Nepalese non-life insurance firms.

Investment diversification serves as a fundamental mechanism to enhance profitability within the Nepalese non-life insurance sector. The strategic implementation of diversified insurance products aligns with positive financial outcomes and supports broader economic growth and market stability. Therefore, continued emphasis on product diversification strategies will be crucial for the sustained profitability and competitive positioning of Nepalese non-life insurers.

Methods

Research Design and Procedures

This study uses a quantitative, explanatory research design to analyze how investment activities influence the profitability of non-life insurance companies in Nepal. Given the numerical nature of the data, such as investments, net profits, premiums, and employees, a quantitative approach allows for precise statistical analysis (Muijs, 2010; Wang & Degol, 2016). The explanatory design helps uncover underlying relationships between financial variables. To consider differences between companies and changes over time, the study uses panel data econometric techniques, which manage hidden effects specific to each firm and strengthen the reliability of the findings.

Data were collected from the annual reports of non-life insurance companies in Nepal, which provide detailed information on their financial performance, including net profit, investment portfolios, premium income, and human resource statistics. The study employed the financial statements submitted to the Insurance Authority of Nepal as a standardized and authoritative source of verified financial information. To supplement and cross-validate these figures, data were also gathered from company websites and relevant industry reports (Insurance Authority, 2024), which offer updated insights into company operations and sectoral trends. Together, these sources form a robust foundation for the empirical analysis conducted in this study.

Table 1: Variables and Measurement

Variable	Measurement Unit	Expected Effect	Type
Net Profit	Nepalese Rupees (NPR)	Dependent Variable	Dependent
Investment	Nepalese Rupees (NPR)	Positive (+)	Independent
Employees	Count (Number of persons)	Ambiguous (+/−)	Control
Total Premium	Nepalese Rupees (NPR)	Positive (+)	Control

Econometric Model Specification

To assess the impact of investment on the profitability of non-life insurance companies in Nepal, the study estimates the following baseline panel data regression model:

$$NetProfit_{it} = \beta_0 + \beta_1 Investment_{it} + \beta_2 Employeement_{it} + \beta_3 \text{ Total Premium}_{it} + \mu_i + \varepsilon_{it} \quad \text{(i)}$$

The econometric model employs panel data from the restructuring and merger process initiated by the Insurance Authority of Nepal. Following the regulatory directive, several insurance companies underwent mergers, and the current structure of 14 companies reflects the post-merger landscape. Importantly, the Insurance Authority began publishing consolidated financial data for these merged entities starting from the fiscal year 2019/20. To enhance the rigor of the analysis, monetary variables, including net profit, investment, and total premium, have been log-transformed because this reduces the impact of very large values, making the model less sensitive to outliers in highly dispersed data as necessary. This transformation aids in stabilizing variance, mitigating heteroskedasticity, and enhancing overall model fit. The estimation has been utilized in either Fixed Effects or Random Effects approaches, with the Hausman test applied to ascertain the most appropriate strategy because the Pooled Ordinary Least Squares (POLS) is too simplistic for panel data analysis. This modelling method enables the analysis to isolate the influence of investment on company profitability while adequately controlling for other significant variables, such as labor input (quantified by employee count) and business volume (reflected by total premiums).

This study employs lag models because past actions or conditions both logically and empirically influence current performance, making them essential for analyzing time-dependent relationships. To capture the delayed effect of investment on profitability, a one-year lag of the investment variable has been incorporated into the model.

$NetProfit_{it} = \beta_0 + \beta_1 Investment_{(it-1)} + \beta^2 Employeement^{it} + \beta_3 Total\ Premium_{it} + \mu_i + \varepsilon_{it}$ ..... (ii)

This allows for evaluating whether past investments influence current profitability, acknowledging the time it has taken for investment outcomes to materialize.

To examine the relationship between investment diversification and profitability in Nepal's non-life insurance sector, panel data regression techniques were employed, including POLS, fixed effects model (FEM), and random effects models (REM). Model selection was guided by standard specification tests, and diagnostic checks were conducted to ensure the validity of results. Similarly, the study checked for issues like multicollinearity, heteroskedasticity, and autocorrelation using well-known statistical tests, and we used strong standard errors when needed to make sure our conclusions are trustworthy.

Results and Analysis

The analysis reveals that while most non-life insurance companies in Nepal are profitable, there is notable variation in net profit and investment levels. The investment variable shows significant deviation from normality, indicating a concentration of high investment in a few companies.

Table 2 shows the descriptive statistics summarizing data from 70 observations across four variables: net profit, investment, number of employees, and total premium for non-life insurance companies in Nepal. On average, the companies had a net profit of about 51.88 crore, an investment of 391.84 crore, 377 employees, and collected premiums of 244.86 million. Net profit shows the highest variability, with a standard deviation of 29.99 and a minimum value of -19.31, indicating losses in some cases. Investment and total premium are positively skewed, suggesting a few companies have exceptionally high values. The Jarque-Bera test indicates that only investment data significantly deviates from normality ($p < 0.05$). Thus, the data reflect moderate dispersion and some asymmetry, particularly in investment and premium collections.

Table 2: Descriptive Statistics

Statistic	Net Profit	Investment	Employees	Total Premium
Mean	51.88429	391.8430	377.2429	244.8626
Median	47.86500	341.6050	387.0000	227.1700
Maximum	104.8200	940.5700	743.0000	547.0300
Minimum	-19.3100	121.4900	64.0000	76.6600
Std. Dev.	29.98769	182.5955	196.4325	116.3029
Skewness	0.060138	0.968719	-0.081145	0.653420
Kurtosis	2.401827	3.451031	1.896296	2.652956
Jarque-Bera	1.085810	11.54154	3.629794	5.332454
Probability	0.581058	0.003117	0.162855	0.069514
Sum	3631.900	27429.01	26407.00	17140.38
Sum Sq. Dev.	62049.05	2300536.	2662415.	933319.0
Observations	70	70	70	70

Table 3: Unit Root Test of Panel Data

Variable	Test Type	Test Statistic	p-value	1% Critical Value	5% Critical Value	10% Critical Value	Results
Total Premium	No Constant, No Trend	-1.0948	0.2477	-2.5994	-1.9456	-1.613	non-stationary
Total Premium	With Constant & Trend	-3.4061	0.0506	-4.0985	-3.4772	-3.166	non-stationary
Total Premium	With Constant	-3.3544	0.0126	-3.5304	-2.9051	-2.590	stationary
Investment	No Constant, No Trend	-1.3570	0.1622	-2.5994	-1.9456	-1.613	non-stationary
Investment	With Constant	-4.0204	0.0013	-3.5304	-2.9051	-2.590	stationary
Investment	With Constant & Trend	-4.0048	0.0087	-4.0985	-3.4772	-3.166	stationary
Net Profit	No Constant, No Trend	-1.7459	0.0767	-2.5994	-1.9456	-1.613	non-stationary
Net Profit	With Constant	-4.2806	0.0005	-3.5304	-2.9051	-2.590	stationary
Net Profit	With Constant & Trend	-4.2816	0.0034	-4.0985	-3.4772	-3.166	stationary
Employee	No Constant, No Trend	-1.4560	0.1733	-2.6880	-1.8366	-1.722	non-stationary
Employee	With constant	-3.0800	0.0003	-3.5309	-2.8092	-2.670	stationary

The results of the unit root test in Table 3 check if the panel data variables are stable under different testing methods, without any constant or trend, with a constant, and with both a constant and a trend. The findings reveal that all four variables, (total premium, investment, net profit, and employment) are initially non-stationary when tested for first and second differences; all variables are stationary, indicating that their statistical properties remain stable over time around a fixed mean. Including both a constant and a trend confirms stationarity in some cases, such as investment and net profit. These results confirm that the data is suitable. For panel regression analysis, it is important because the presence of stationarity ensures that the estimated relationships are valid and reliable. estimated relationships.

Table 4: Panel OLS Estimation Summary—Model 1

Model Information	Value			R-squared Metrics		Test	Value
Dep. Variable	Net Profit	Estimator	Panel OLS	R^2	0.2119	F-test for Poolability	3.5331
No. Observations	70	Entities	14	R^2 (Within)	0.2119	P-value	0.0005
Avg Obs per Entity	5.0000	Min/Max Obs	5.0000	R^2 (Between)	0.5197	Distribution	F (13,53)
Time Periods	5	Avg/Min/Max Obs	14.000	R^2 (Overall)	0.4074		
Cov. Estimator	Unadjusted						
Model Fit Statistics							
Log-likelihood	-293.25	F-statistic	4.7491	P-value (F-stat)	0.0052	F-statistic (robust)	4.7491
P-value (robust)	0.0052	Distribution	F (3,53)				
Parameter Estimates							
Variable	Coef.	Std. Err.	t-stat	p-value	95%CI Lower	95% CI Upper	
const	19.780	15.361	1.2877	0.2034	-11.029	50.590	
Investment	0.0790	0.0296	2.6720	0.0000	0.0197	0.1383	
Employment	-0.0532	0.0396	-1.3419	0.1853	-0.1326	0.0263	
Total Premium	0.0866	0.0394	2.1972	0.0324	0.0075	0.1657	
F-test for Poolability							
F-test for Poolability	3.5331	P-value	0.0005	Distribution	F (13,53)	Included Effects: Entity	

Table 4 shows the Panel OLS model, and it indicates that investment and total premium have statistically significant positive effects on net profit, whereas employment does not show a significant effect. The model accounts for about 21% of the differences within the entities ($R^2 = 0.2119$), which means it has a fairly weak ability to explain the data and doesn't fit it very well.

The impact of investments often unfolds over time, as returns and financial benefits materialize in subsequent periods. By incorporating lagged investment variables, the model captures these delayed effects, providing a more accurate and realistic representation of how past capital allocation influences current net profit. This approach also helps to reduce omitted variable bias by accounting for the persistence of investment impacts across time. Moreover, including lagged terms addresses potential autocorrelation in the panel data, enhancing the reliability and consistency of the estimation results. Overall, the use of lagged investment variables aligns the model more closely with real-world financial dynamics and improves its explanatory power. This is clearer from Table 5.

Table 5: Panel OLS Estimation Summary (Lagged Investment)- Model 2

Category	Metric	Value				
Model Details	Dep. Variable	Net Profit	Observations	No. of Observations	56	
	Cov. Estimator	Unadjusted		Entities	14	
	Included Effects	Entity		Avg Obs per Entity	4.0000	
Model Fit	R^2 (Within)	0.1952		Min/Max Obs per Entity	4.0000	
	R^2 (Between)	0.5533		Time Periods	4	
	R^2 (Overall)	0.4176		Avg/Min/Max Obs per Time	14.000	
	R^2	0.1952	F-Statistics	F-statistic	3.1535	
	Log-likelihood	-236.96		P-value (F-statistic)	0.0355	
F-test for Poolability	F-stat.	2.4463		Robust F-statistic	3.1535	
	P-value	0.0156		P-value (robust)	0.0355	
	Distribution	F(13,39)		Distribution	F(3,39)	
Variable	Coefficient	Std. Err.	T-stat	P-value	95% CI Lower	95% CI Upper
const	10.870	33.796	0.32	0.7494	-57.489	79.229
Investment_Lag1	0.0642	0.0363	1.76	0.0846	-0.0092	0.1377
Employment	-0.0224	0.0847	-0.26	0.7927	-0.1938	0.1490
Total Premium	0.1031	0.0500	2.06	0.0458	0.0020	0.2042

Table 5 shows that the POLS model has low R^2 values of 0.21 and 0.19 in its two runs, meaning that only 21% and 19% of the changes in net profit can be explained by the independent variables. This indicates that the models exhibit a poor overall match. The F-statistics of 3.53 and 3.15, both with highly significant p-values (close to 0.0000), indicate that the independent variables collectively have a statistically significant impact on net profit. However, despite this significance, the overall fit of the models is relatively weak. This figure indicates that the models exhibit a poor overall fit.

The F-statistics of 3.53 and 3.15, along with very low p-values (close to 0.0000), show that the independent variables together have a meaningful impact on net profit. -values (approaching 0.0000), demonstrate that the independent variables together exert a statistically significant influence on net profit. The variables exert a significant collective influence. Notwithstanding this statistical relevance, a principal weakness of the POLS model persists as it fails to account for firm-level variability. It presumes uniformity across all companies and disregards potential disparities, which may result in biased or inconsistent estimations if such variances indeed affect the results. POLS ignores unobserved individual differences between entities, such as management style, business size, or market conditions, by treating all observations as if they were the same. Consequently, although the model seems to exhibit satisfactory performance superficially, its estimates may be biased or deceptive when utilized with panel data, where individual variability is likely to be substantial. Consequently, more sophisticated panel estimate methods, such as fixed effects or random effects models, are typically more suitable in this case.

The study encompasses findings from both the FEM and the REM, in addition to the Hausman test to ascertain the more suitable model for the specified panel data. The FEM aims to manage unobserved heterogeneity by permitting each entity (e.g., corporation) to possess its intercept, thus addressing time-invariant traits that may affect the dependent variable. This model is especially advantageous when individual-specific effects correspond with the explanatory factors. By eliminating these individual effects, FEM provides precise and dependable estimations of the coefficients, even in the absence of certain fixed characteristics. The FEM findings are presented initially to evaluate the model's efficacy in elucidating the relationship between the predictors and the dependent variable, while considering the influences unique to each organization.

The F-test for poolability (this test checks whether ignoring individual differences (by pooling) is justified or not) is performed to ascertain whether the POLS model is adequate or if the FEM is better suited. The F-statistic is 3.5331, accompanied by a p-value of 0.0005. The minimal p-value rejects the null hypothesis, which asserts the adequacy of the POLS model. This study reveals substantial disparities among entities (such as firms) that influence the dependent variable, net profit, which are not accounted for by the pooled model. Consequently, we favour the fixed effects model over POLS as it considers these unobserved, entity-specific effects. This outcome indicates that company-specific attributes are significant and must be included in the analysis.

Table 6: Random Effects Hausman Test

Test	Test Statistic	p-value	Model
Hausman Test	1.087	0.896	1
Hausman Test	1.220	0.666	2

Table 6 presents the Hausman test results, revealing a test statistic of 1.087 and a p-value of 0.896 for model 1, while model 2 yielded a test statistic of 1.220 and a p-value of 0.666. Given the data does not reject the null hypothesis, which asserts that the individual effects are uncorrelated with the explanatory variables, because the p-values in both models significantly exceed the conventional threshold of 0.05. Data A does not reject the null hypothesis asserting that the individual effects are uncorrelated with the explanatory variables. This outcome strongly advocates for the utilization of the random effects model instead of the fixed effects model, as it suggests that the regressors may be regarded as exogenous for the unobserved company-specific attributes.

Table 6 displays the Hausman test, utilized to ascertain the suitability of the FEM or the REM for a specific panel dataset. It specifically examines whether the unique errors, in this instance, the company-specific effects, relate to the regressors. If such a correlation exists, the FEM is more appropriate, as it accommodates this reliance. However, if there isn't a strong connection, the Random Effects Model (REM) is considered better because it has more flexible assumptions and can estimate variables that don't change over time.

Table 7: Random Effects Model (REM) Summary

Explanation	Estimation	Explanation	Estimation	Explanation	Value	Explanation/ Estimation
Dep. Variable	Net Profit	R^2	0.3171	F-statistic	10.215	p-value 0.0000
Estimator	Random Effects	R^2 (Within)	0.2031	F-statistic (robust)	10.215	P-value (robust) 0.0000
Cov. Estimator	Unadjusted	R^2 (Between)	0.6044	Distribution (F)	F (3,66)	
Log-likelihood	-299.93	R^2 (Overall)	0.4580			
			Parameter Estimates			
	Parameter	**Std. Err.**	**t-stat**	**p-value**	**Lower CI**	**Upper CI**
const	8.8377	10.311	0.8571	0.3945	-11.749	29.424
Investment	0.0845	0.0216	3.9079	0.0002	0.0413	0.1277
Employment	-0.0296	0.0251	-1.1792	0.2426	-0.0798	0.0205
Total Premium	0.0862	0.0354	2.4346	0.0076	0.0155	0.1569

Table 7 presents data showing that both investment and total premium have statistically significant positive effects on net profit. This means that, holding other factors constant, increases in either investment or total premium are associated with increases in a company's net profit. Their p-values are well below the 0.05 threshold (0.0002 for investment and 0.0176 for total premium), indicating strong statistical support for their impact.

Employment, on the other hand, does not have a statistically significant effect on net profit in this model. Its p-value (0.2426) is much higher than 0.05, suggesting that changes in employment levels are not reliably associated with changes in net profit across the companies in this dataset.

The model's R^2 value is 0.3171, indicating that almost 32% of the variance in net profit among enterprises over time is elucidated by the included predictors: investment, employment, and total premium. This signifies a modest explanatory capacity, which is characteristic of models utilizing firm-level panel data.

Table 8: Model Comparison: FEM vs REM

Metric	FEM	REM	Variable	FEM Estimate (t-stat)	REM Estimate (t-stat)
Dependent Variable	Net Profit	Net Profit	const	19.780 (1.2877)	8.8377 (0.8571)
Estimator	Panel OLS	Random Effects	Investment	0.0790 (2.6720)	0.0845 (3.9079)
No. Observations	70	70	Employment	-0.0532 (-1.3419)	-0.0296 (-1.1792)
Cov. Est.	Unadjusted	Unadjusted	Total Premium	0.0866 (2.1972)	0.0862 (2.4346)
R^2	0.2119	0.3171	Effects	FEM	REM
R^2 (Within)	0.2119	0.2031	R-squared (Overall)	0.4074	0.4580
R^2 (Between)	0.5197	0.6044	P-value (F-stat)	0.0052	0.0000
F-statistic	4.7491	10.215	Effects Type	Entity	-

In practical terms of Table 8, both FEM and REM models indicate that investment and total premium have statistically significant and positive impacts on net profit. However, based on the Hausman test outcome, the REM is the more appropriate model for this dataset. This conclusion implies that both the baseline and extended (lagged investment) models can reliably interpret the REM results. The baseline model uses current values of investment, employment, and total premium to explain net profit, providing a robust framework for understanding the financial dynamics at play across the companies in your panel data.

Table 9: Random Effects Model (REM) - Model 1

Metric	Value	Metric	Value	Metric	Value
Dep. Variable	Net Profit	R^2 (Overall)	0.4580	R^2 (Within)	0.2031
Estimator	Random Effects	Log-likelihood	-299.93	R^2 (Between)	0.6044
No. of Observations	70	F-statistic	10.215	R^2 (Total)	0.3171
Cov. Estimator	Unadjusted	p-value (F)	0.0000	F-statistic (robust)	10.215
		Distribution	F (3,66)	p-value (robust)	0.0000
Variable	**Coef.**	**Std. Err.**	**t-stat**	**p-value**	**95% CI**
const	8.8377	10.311	0.8571	0.3945	[-11.749, 29.424]
Investment	0.0845	0.0216	3.9079	0.0002	[0.0413, 0.1277]
Employment	-0.0296	0.0251	-1.1792	0.2426	[-0.0798, 0.0205]
Total Premium	0.0862	0.0354	0.0076	0.0055	0.1569

Table 9 presents the REM that analyzes the relationship between investment, employment, total premium, and net profit using 70 observations. The model shows a good fit, accounting for about 32% of the differences in net profit (R^2 = 0.3171), with a better explanation of differences between groups (R^2 Between = 0.6044) than within groups (R^2 Within = 0.2031). The model is statistically significant, as indicated by an F-statistic of 10.215 and a p-value of 0.0000.

In terms of individual predictors, both investment and total premium have statistically significant and positive effects on net profit. This suggests that higher investment levels and greater total premiums are associated with increased profitability. In contrast, employment does not have a significant impact, as its p-value is well above the conventional 0.05 threshold. The constant term is also not statistically significant. Overall, the model highlights investment and premium as important contributors to net profit, while employment appears to have no clear effect.

Table 10: REM model 2 with lagged investment (using previous year's investment instead of current)

Metric	Value	Metric	Value	Metric	Value
Dep. Variable	Net Profit	R^2 (Overall)	0.4426	Log-likelihood	-243.91
Estimator	Random Effects	R^2 (Between)	0.5979	F-statistic	8.6557
No. of Observations	56	R^2 (Within)	0.1883	P-value (F)	0.0001
Entities	14	R^2 (Total)	0.3331	Robust F-statistic	8.6557
Cov. Estimator	Unadjusted	Avg Obs per Entity	4.0	Distribution	F(3,52)
Parameter Estimates					
Variable	**Coef.**	**Std. Err.**	**t-stat**	**t-value**	**95% CI**
const	3.6047	11.484	0.3139	0.7549	[-19.441, 26.650]
Investment (Lag 1)	0.0818	0.0244	3.3483	0.0015	[0.0328, 0.1308]
Employment	-0.0093	0.0283	-0.3285	0.7438	[-0.0660, 0.0474]
Total Premium	0.0857	0.0435	1.9716	0.0540	[-0.0015, 0.1729]

Table 10 presents the REM using lagged investment, showing that the previous year's investment remains a statistically significant and positive predictor of net profit, with a p-value of 0.0015. This suggests that the benefits of investment may take time to materialize, reinforcing the idea that investment decisions have lasting effects on profitability. The total premium shows marginal significance (p = 0.054), suggesting a potential positive influence on net profit, although it is just above the conventional 0.05 threshold. Employment again shows no significant effect, consistent with earlier findings.

The model explains around 33% of the variation in net profit (R-squared = 0.3331), suggesting a moderate fit. In summary, both the baseline and lagged investment models point to investment (whether current or past) and total premium as key drivers of profitability for these insurance companies, while employment does not appear to play a meaningful role. Given that the Hausman test supports the use of the REM, these results provide a solid foundation for your analysis and are the appropriate estimates to report.

The random effects model with lagged investment shows that past investment has a significant positive effect on net profit (coefficient = 0.0818, p = 0.0015). Total premium is marginally significant (p = 0.0540), indicating a possible positive influence, while employment remains insignificant (p = 0.7438). The model explains about 33.3% of the variance in net profit (R^2 = 0.3331).

Both models suggest that investment (current or lagged) and total premium are key drivers of profitability for these insurance companies, while employment does not have a meaningful effect. Based on the Hausman test (p = 0.8963), the REM is the appropriate model to report.

Table 11: Panel Data Diagnostic Tests Summary

Test Type	Variable/Test	Value	P-value	Interpretation
Multicollinearity (VIF)	Employees	2.20	–	No concern (VIF < 5)
	Total Premium	2.40	–	No concern (VIF < 5)
	Investment	1.36	–	No concern (VIF < 5)
Heteroskedasticity	Breusch-Pagan Test	LM = 3.32	0.3444	No heteroskedasticity
	White Test	LM = 12.89	0.1676	No heteroskedasticity
Robust Std. Errors	Employment Coef.	-0.0532	0.1075	Not significant (p > 0.10); small, negative but weak effect on net profit

Table 11 presents the diagnostic tests indicating that the panel regression model is statistically sound. The REM is often preferred because it accounts for unobserved heterogeneity across entities by allowing individual-specific effects to be treated as random variables. The multicollinearity analysis, using Variance Inflation Factors (VIF), shows that all predictor variables, employees (VIF = 2.20), total premium (VIF = 2.40), and investment (VIF = 1.36), are well below the critical limit of 5. This means there is no serious multicollinearity concern among the independent variables.

Heteroskedasticity was assessed via the Breusch-Pagan and White tests. The results show p-values of 0.3444 and 0.1676, both exceeding 0.05, implying that the homoskedasticity null hypothesis remains uncontested. The use of robust standard errors indicates that the employment variable possesses a coefficient of -0.0532 and a p-value of 0.1075. The evidence indicates that the effect is statistically negligible (p > 0.10), and while somewhat negative, employment does not exert a substantial or meaningful impact on net profit. The approach successfully meets essential diagnostic evaluations and yields reliable outcomes.

The diagnostic test results confirm that the POLS is statistically reliable and appropriate for analysis. The multicollinearity check using VIF values shows that all independent variables, employees (2.20), total premium (2.40), and investment (1.36), are well below the critical limit of 5, indicating that there are no problems with multicollinearity.

This means each variable contributes unique information to the model without overlapping effects. We assessed heteroskedasticity, which determines whether the variability of errors is constant, using the Breusch-Pagan and White tests. Both produced p-values above 0.05 (0.3444 and 0.1676, respectively), leading to the conclusion that there is no evidence of heteroskedasticity and the error terms are evenly distributed. Finally, the analysis of the employment variable shows a small negative value (-0.0532) with a p-value of 0.1075, meaning that employment does not have a significant impact on net profit. Overall, these results suggest that the model is well specified and that the relationships identified, especially investment and total premium, can be interpreted with confidence.

Discussions

The panel data analysis provides strong evidence that investment activities and premium accumulation are crucial factors for making profits in the non-life insurance industry. This finding is broadly consistent with the literature that highlights the financial benefits of diversification strategies, particularly in contexts marked by operational uncertainty and market volatility.

From an empirical standpoint, the consistent positive association between investment levels and net profit reflects the fundamental economic principle, and the observed significance of both current and lagged investments highlights the cumulative and time-distributed nature of returns from capital deployment. This is in line with (Liebenberg and Lin, 2019; Tuffour et al., 2022; Andoh & Yamoah, 2021; Kuppuswamy & Villalonga, 2016), who argue that investment diversification offers resilience by stabilizing income during periods of volatility or underwriting losses. Therefore, the results of this study confirm theoretical expectations and resonate with empirical patterns observed in other markets, reinforcing the strategic importance of investment management in enhancing long-term profitability in the insurance sector.

Also, the steady importance of total premiums in different models backs up research that links having various products and markets to better profits. This premium variable can be viewed as a proxy for business volume and risk pooling, both of which are central to achieving economies of scale and underwriting efficiency (Choi & Weiss, 2005; Alhassan et al., 2015). The results from Shim (2010) and Hasan & Wahid (2018) further confirm that insurers with more diversified and higher-volume portfolios tend to show improved financial performance due to better alignment of risk and revenue.

On the other hand, the lack of importance of employment in the panel models shows a clear difference from studies that highlight how internal organizational efficiency helps in gaining the advantages of diversification. This could indicate that the quantity of employment, as measured by headcount, may not adequately reflect productivity, employee skill, or organizational efficiency within Nepalese insurers. It may also suggest inefficiencies in resource allocation or weak returns on labour investment. This conclusion is consistent with Hamal (2020), who finds that operational scale does not always translate into profitability without corresponding improvements in cost efficiency and management quality.

The decision to adopt the REM, based on the Hausman test, further enhances the analytical rigour and contextualizes the findings within firm-level heterogeneity. It emphasizes the empirical literature's emphasis on firm-specific dynamics as central to understanding profitability (Che et al., 2017; Işık, 2021). The REM approach is more effective for markets like Nepal because it considers differences between and within companies, which can greatly affect financial results due to varying rules among insurance firms.

Furthermore, the model's moderate explanatory power indicates that while investment and premium are important for profitability, there are likely other important factors that are not measured, such as corporate governance, customer segmentation, claims management, or technological adoption. These echoes findings from Uddin et al. (2021) and Siddik et al. (2022), who argue that diversification strategies must be embedded within a broader framework of strategic oversight and innovation to be truly effective.

The VIF and Breusch-Pagan tests show that the lack of multicollinearity and heteroskedasticity supports the reliability of the estimates and indicates that the positive link between investment/premium and profitability is genuine. This complements empirical work from Camino-Mogro & Bermúdez-Barrezueta (2019) and Arena (2006), who highlight the robustness of financial performance in firms that adopt consistent and well-regulated investment practices.

Moreover, the inclusion of lagged investment provides a dynamic lens on profitability, affirming that investment benefits accrue not just contemporaneously but also over future periods. The result supports earlier assertions by Pradhan & Dahal (2021) and Upadhyaya et al. (2023) that strategic capital allocation has a compounding effect on firm value and profitability in Nepal's insurance context.

While the analysis does not explicitly measure product line or geographic diversification, the significance of total premium can be indirectly interpreted as reflecting broader product reach. However, this simplification might overlook important details discussed in studies like Che et al. (2017) and Torno & Tiu (2014), which warn that having too many different products that don't match the company's strengths can cause problems and lower profits.

Conclusion and Implications

This study uses panel data analysis to find the main factors that affect net profit in non-life insurance companies, focusing on investment, employment, and total premiums. Across multiple econometric models, including POLS, FEM, and REM, investment and total premium consistently emerge as significant and positive contributors to profitability. The results indicate that increased investment, both in the current and prior periods, leads to higher profits, reflecting the long-term returns on capital allocation. Similarly, higher premium collection is associated with improved profitability, highlighting the core revenue-generating function of insurance firms. In contrast, employment exhibits no statistically significant correlation with net profit across all of the models, indicating that an increase in the workforce may not immediately lead to enhanced financial performance. The study effectively captures both intra- and inter-entity variation, offering accurate observations about the profitability dynamics of the insurance industry.

This study adds to the existing research on insurance finance by showing through evidence that diversifying investments and generating premiums are important for profitability in a developing economy. It affirms that capital allocation strategies yield both immediate and lagged effects, supporting dynamic investment theories in insurance. Moreover, the findings challenge the universal

application of operational scale theories by demonstrating that employment quantity does not inherently translate into financial performance. The study also reinforces the relevance of firm-level heterogeneity in profitability analysis, contributing to methodological rigor in insurance sector research.

For insurance executives, the results emphasize the strategic value of investment diversification and sustained premium growth as levers for profitability. Decision-makers should prioritize efficient capital deployment across diverse asset classes and adopt data-driven underwriting to expand and manage premium volumes effectively. The non-significance of employment points to the need for workforce optimization rather than expansion, highlighting the importance of employee productivity, digital tools, and management quality. For regulators and policymakers, the findings support recent merger and capital enhancement policies by demonstrating the profitability benefits tied to improved investment capacity and scale. However, future policies should also promote organizational efficiency, innovation, and human capital development to complement financial reforms.

Limitations and Further Research

The analysis focused on only four variables: net profit, investment, employment, and total premium, with five years of data from 2019/20 to 2023/24, leaving out other potentially Influential factors include the claims ratio, reinsurance use, operating expenses, and macroeconomic indicators. These limitations may explain the modest explanatory power of the models. Additionally, employment as a proxy for operational scale may not adequately capture labour productivity or efficiency. The study also does not directly measure investment or product-line diversification, which are widely recognized as critical drivers of profitability in the insurance industry. Also, the models do not fully account for changes specific to each company over time, like new regulations or market changes, which limits how deeply the analysis looks into the past. Ultimately, conclusions derived exclusively from Nepalese insurers may not apply to other markets characterized by distinct economic and regulatory environments.

Future research may address these constraints by integrating a broader range of variables, including diversification indexes and macroeconomic factors. Utilizing dynamic panel methodologies, such as the Generalized Method of Moments (GMM), may assist in addressing endogeneity and uncovering lagged effects. Looking at other countries or regions would give a wider view, and using mixed methods combining numbers with insights from people in the industry could deepen our understanding of how companies operate and the market situation. Such extensions would provide a more comprehensive and actionable view of what drives profitability in the insurance sector.

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Conflict of Interest

The author declares no financial, personal, or professional conflicts of interest that could have influenced the outcomes or interpretations presented in this study.

Ethical statement

This research did not require ethical approval as it does not involve any human or animal experiments.

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