Risk of investment losses from operations and casualties and insurance coverage decisions

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Abstract

Family business firms, like other firms, face internal and external risks such as accidents, errors, omissions, fire, unexpected casualties, natural disasters, the COVID-19 pandemic, etc., that can lead to investment losses. This study aimed to investigate the impact of the perceived risk of investment losses from operations (*RISK_ILFO*) and the perceived risk of investment losses from casualties (*RISK_ILFC*) on the commercial insurance coverage (*CIC*) decision of family business owners in India. This study utilized a survey research design to collect data from the owners of micro, small, and medium-sized family business firms located in India. The research participants were asked about their perceptions of the impact of *RISK_ILFO* and *RISK_ILFC* on *CIC*. Findings show that perceived *RISK_ILFO* and *RISK_ILFC* positively impact *CIC* decision of family business owners. The results also show that the impact of perceived *RISK_ILFO* on *CIC* is higher than the impact of perceived *RISK_ILFC* on *CIC*. This study contributes to the literature on the relationship between the risk of investment losses and insurance coverage decisions. Insurance planners may find results useful to provide suggestions to family business owners on commercial insurance coverage. Research scholars may find empirical results useful to develop further studies in risk management and insurance areas. Family business owners may find the results useful to mitigate the risk of investment losses.

Keywords*:* Investment Risk, Commercial Insurance, India

JEL Classification: G30, G32

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1. Introduction

Insurance coverage is necessary for risk mitigation, the firm's sustainability, and family business owners' economic utility. Family business firms are controlled by the family members who own most shares to control the firm (Gill, 2020). Like other corporations, micro, small, and medium-sized family business firms face internal and external risks, for example, fire, unexpected casualties, natural disasters, and the COVID-19 pandemic that can lead to investment losses. The COVID-19 pandemic, an exogenous shock, has hit the Indian economy hard and negatively impacted firm performance (Shen et al., 2020). Hence, nearly 64% of the micro, small, and medium-sized enterprises do not have funds to pay current salaries and to cover other expenses (Kumar, 2020). However, Gill et al. (2016) indicated that most family business firms operate with higher internal financing sources. Therefore, family business firms have a better chance to have commercial insurance coverage to mitigate the risk of investment losses.

Expected utility theory assumes that insurance consumers use a psychological pathway in which aversion to variability drives a risk preference (e.g., risk preference in the firm's operations) based on economic utility (Harrison and Ng, 2019). Environmental uncertainty, however, creates numerous difficulties for modern firms due to the increasing unpredictability of future events such as accidents, errors, omissions, fire, unexpected casualties, and natural disasters affecting the financial performance (Lawrence et al., 2009; Gill et al., 2018). Thus, environmental uncertainty increases the firm's probability of investment losses (Qi et al., 2014). Therefore, investment risk mitigation has become necessary for modern organizations.

While some strategies to manage financial risk include avoiding, controlling, and retaining the risk, another way to reduce the probability of investment losses is to transfer risk through insurance coverage (Clark, 2018). All firms face the risk of investment losses due to casualties from operations, economic crises, religious conflicts, changes in political systems (Vaishnav et al., 2016), natural disasters, terror attacks, and lawsuits. However, many business owners either do not buy insurance or do not have adequate insurance to cover the risk of investment losses (The Associated Press, 2013; Khan et al., 2013). Considering all these factors that increase the risk of investment losses, this study investigates the relationship between the risk of investment losses and insurance coverage decisions based on the research question, *"Do family business owners who perceive changes in the risk of investment losses change their commercial insurance coverage"?*

Palm (2011) argued that demographic variables (e.g., culture and government rules/regulations) distinguish between buyers and non-buyers of insurance. Treerattanapun's (2011) findings suggested that consumers may respond to insurance solicitations because of economic rationality and according to their cultural beliefs. Other studies by Eeckhoudt et al.

(1997) and Eeckhoudt and Schlesinger (2008) tested the relationship between risk and economic outcomes. The authors found that holding more riskless assets and insuring risky assets reduce portfolio risk. While a study by Palm (2011) argued the potential occurrence of hazard as an essential factor in insurance coverage, Hayakawa (2000) found that potential loss is the crucial driver of insurance coverage decisions. MacMinn's (1987) study indicated that insurance coverage reduces bankruptcy risk and improves the firm's sustainability. Since casualties such as violence and attacks are common in India (Hussein, 2017), leading to the risk of investment losses (Krishnakumar and Verma, 2021), this study sampled family business owners from India to test the relationship between the risk of investment losses and the commercial insurance coverage decision in line with previous studies.

Empirical analysis shows that perceived risk of investment losses from operations (*RISK_ILFO)* and perceived risk of investment losses from casualties (*RISK_ILFC*) positively impact family business owners' decisions to increase commercial insurance coverage (*CIC)*. The results also show that the impact of perceived *RISK_ILFO* on *CIC* is higher than the impact of perceived *RISK_ILFC* on *CIC*. This study lends some support to the findings of Eeckhoudt et al. (1997), Eeckhoudt and Schlesinger (2008), Palm (2011), MacMinn (1987), Cao et al. (2020), and Hayakawa (2000) in that *RISK_ILFO* and *RISK_ILFC* increase insurance coverage to reduce the risk of investment losses from operations and casualties. This study contributes to the literature on the relationship between the risk of investment losses and family business owners' commercial insurance coverage decisions to mitigate investment losses risks. Insurance planners may find empirical results beneficial to provide suggestions to family business owners on commercial insurance coverage. Research scholars may find empirical results beneficial to develop further studies in risk management and insurance areas. Finally, family business owners may find the results helpful to mitigate the risk of investment losses. However, the results may only be generalized to firms similar to those that were included in this research.

The structure of the remaining research paper falls into five sections. Section two of this study shows the previous literature and develops hypotheses. Section three describes the data and methodology used to investigate the research question. Section four discusses the econometric model used in this study, empirical analysis, and describes results. Finally, section five concludes, describes the implications/limitations of the study, and provides recommendations for future research.

2. Review of literature

Managing risk is a fundamental concern in today's dynamic global environment (Gordon et al., 2009) to maintain corporate social responsibility (CSR), to protect assets, and to maintain the reputation of the firm (Shiu and Yang, 2017). Firms can mitigate risks such as demand for certain products and competition by having an active business and marketing plan. However,

other risks, such as exchange rate, property and equipment, operational, casualty, default, and legal hazards, can be managed with commercial insurance coverage to minimize financial losses. The mitigation of these risks reduces agency problems between the firms (agents) and principals (e.g., shareholders, government, society, and other stakeholders) described by Jensen and Meckling (1976). For example, economic responsibilities (e.g., profitability and sustainability of the firm); legal responsibilities (e.g., comply with labor law, environmental law, and criminal law); ethical responsibilities (e.g., environmental safety, workplace safety, and paying fair wages); and philanthropic responsibilities (e.g., donating service/money to benefit society) signal a sense of CSR of the firm (Story and Price, 2006). Commercial insurance coverage, for example, provides workers compensation in case of accidents and covers other liabilities such as credit defaults (Clark, 2018), which in turn reduces agency problems between the firm (agent) and stakeholders (principal) (Jensen and Meckling, 1976). Thus, commercial insurance coverage improves the sustainability of the firm. Sections 2.1 and 2.2 show a survey of previous literature, and section 2.3 summarizes the literature review.

2.1 Risk of investment losses from operations and insurance coverage decision

Insurance plays a crucial role in managing corporate risk (MacMinn, 1987), such as the risk of investment losses by reducing agency problems with society and maintaining CSR (Shiu and Yang, 2017). The critical factors influencing firms' commercial insurance coverage decisions are net income, assets, owner age, and owner experience with natural disasters such as earthquakes. In addition, risk perceptions influence risk mitigation decisions because risk affects all business firms (small and large), leading to investment losses. Barrese and Scordis (2003) argued that risk is the variation of actual outcomes around an expected average outcome.

Some people tend to underestimate risk (i.e., operational risk) because of overconfidence (Adam et al., 2015) and do not mitigate risk with the appropriate level of insurance coverage based on the risk. Insurance is one of the available financial tools for hedging against events' negative economic impact (Barrese and Scordis, 2003). Underinsurance or no insurance coverage causes an agency problem (Jensen and Meckling, 1976) and legitimacy issues with the stakeholders such as government and society. Thus, an appropriate level of insurance coverage is necessary since it increases normative legitimacy (Scott, 1995) by showing that the firm meets its insurance coverage needs required by law and expected by stakeholders.

It is essential to implement a framework so that all risk factors can be evaluated/analyzed effectively (Miller, 1992). Firms identify and evaluate the risk to classify potential investment losses as to whether the loss derives from casualties related to the firm's physical plant and equipment, its employees' actions, the sequence of operations, and the firm's external environment before making insurance coverage decisions. Among the firm's critical losses, cash flow losses and their resulting economic impact seriously affect shareholders' wealth (Barrese

and Scordis, 2003) and its success or failure.

Earlier empirical studies show different purposes of insurance coverage. MacMinn's (1987) findings indicated that the firm has an incentive to purchase insurance since this reduces the risk of bankruptcy and the risk of incurring agency costs. Main (1983) found that corporate insurance purchases are a tax minimization method of financing losses that arise from insurable risks. Palm (2011), using survey research in California, found that the perceived probability of occurrence continues to be a crucial factor in purchasing voluntary hazard insurance. Finally, Hayakawa (2000) used survey research to collect data from Japan and the U.S. and found that Japanese buy auto insurance to cover damages or harm done to others and to reduce personal stress about the consequences of an automobile accident. In contrast, Americans purchase insurance to protect themselves from lawsuits, cover damage done to their vehicle, and comply with the law. In summary, the limited availability of literature shows different operational risk factors that can cause investment losses and influence the firms' insurance coverage decisions.

2.2 Risk of investment losses from casualties and insurance coverage decision

The association between politics and religion causes severe casualties (Mahapatral, 2017), and these casualties increase the risk of investment losses. Casualties in Asian countries are high (Hussein, 2017). These casualties can lead to investment losses for the firm and losses for the stakeholders by causing damages to their properties and harms to employees (Clark, 2018). Investment risk increases because of diverse types of political and religious casualties in India. Since 1946, Indians have suffered a massive loss of human lives and properties because of religious riots (Hussein, 2017). Therefore, an increase in insurance coverage is necessary to recover from losses related to human lives and properties. Freeman's (1984) stakeholder theory suggested that corporations are accountable to many stakeholders for their activities, damaging suppliers, shareholders, investors, employees, business partners, society, and society.

Decision theory (Simon, 1960) can help make an appropriate insurance coverage decision. Howard (2007) suggested four steps of decision analysis. In the first step, the decision-maker identifies available alternatives called risk management options. In the second step, the decision-maker identifies uncertain consequences (i.e., investment losses) or unhedged risk. In the third step, the decision-maker specifies his or her preferences among alternatives to hedge the risk. In the fourth step, the decision-maker computes the best alternatives for hedging risk (Borgonovo et al., 2018). These steps suggested by Howard (2007) can be useful to make an insurance coverage decision.

Literature shows some research that evaluates the relationships between various elements of economic behavior, including, among other things, risk tolerance and risk management. For example, Eeckhoudt et al. (1997) and Eeckhoudt and Schlesinger (2008) tested the relationship between risk and economic outcomes, and their findings suggested holding more of the riskless

assets and insuring the risky assets reduce portfolio risk. Changa and Berdiev (2013) found that countries with higher political risk levels experience higher insurance consumption. Natural disasters and higher number of deaths attributable to natural disasters contribute to insurance market development. Thus, the authors showed that natural disasters motivate individuals to purchase insurance and natural disaster insurance to cover the risk. Attanasi et al. (2020) argued that insurance coverage reduces the catastrophic risk for the firm. Moreover, the findings of Cao et al. (2020) and the argument of Mol et al. (2020) suggested that the risk of investment losses encourages agricultural firms to continue insurance coverage. In summary, the limited availability of literature shows that casualties can cause investment losses; therefore, insurance coverage changes have become necessary to manage business and investment risk.

2.3 Summary of literature

Literature shows that systematic and unsystematic risk factors increase the risk of investment losses for the stakeholders. Therefore, risk mitigation has become a need of modern firms to reduce risk asymmetry, which can cause losses for the stakeholders such as existing and potential shareholders, employees, and other stakeholders. Risk asymmetry develops when the agent (i.e., management of the firm) and the principal (stakeholders) share risks but have different outlooks toward the risk, resulting in a divergence in risk-making decisions (Eslami and Imomoh, 2016; Tan and Lee, 2015). The mitigation of investment losses risk reduces agency problems between the management and the stakeholders.

While systematic risk factors include, but are not limited to, religious causalities, political casualties, natural casualties, terrorist attacks, road traffic, economic crises, and fiscal crisis (Gill et al., 2014), unsystematic risk factors are firm-specific factors such as fire that can cause investment losses. Particularly in this study, unsystematic risk factors include the firm's operations, including, but not limited to, workplace hazards, damages to physical assets, damages to inventory, errors in products/services, and lawsuit(s) against the firm. Commercial insurance coverage decisions of family business owners can reduce these risk factors. For example, losses from operations and casualties can be mitigated with commercial insurance.

Regardless of national cultural influences in general, "culture is usually thought to influence economic outcomes by affecting personal traits such as honesty and work ethic" (Barro and McCleary, 2003, p. 760) that can affect the firm. However, although the literature shows the factors that can cause investment losses, it does not show clearly if the perceptions of changes in risk induce changes in commercial insurance coverage. Accordingly, the following hypotheses were used in this study to fill the literature gap:

> *First hypothesis: Family business owners' perceived increase in commercial insurance coverage is positively associated with their perceived increase in potential investment losses from the operations.*

Second hypothesis: Family business owners' perceived increase in commercial insurance coverage is positively associated with their perceived increase in potential investment losses from casualties.

3. Methods

Considering that a survey research design (a non-experimental field study design) helps study sensitive matters (Gall et al., 1996), it was used to collect data. After borrowing all the measures about insurance coverage decisions from Porter and Garman (1993) and Edwards (1991), all the scale items were reworded to apply to Indian research participants, and the reliability of these reworded items was re-tested. In the survey questionnaire related to the risk of investment losses from operations, the risk of investment losses from casualties, and commercial insurance coverage, respondents were asked to indicate their agreement with each item, using a five-point Likert scale ranging from "Decreased a lot" to "Increased a lot" for all the scale items. In the survey questionnaire related to firm performance, respondents were asked to indicate their agreement with each item, using a five-point Likert scale ranging from "Gone up a lot" to "Gone down a lot" for all the scale items.

Although survey research provides advantages such as low cost, helps collect data from a large population, and easy to study sensitive matters (Gall et al., 1996), one should not ignore the problems such as psychological, sampling, non-response, self-report biases, etc. (Story and Tait, 2019), which may cause some validity of data issues. For example, cultural differences cause response styles and psychological biases (Kemmelmeier, 2016). However, Cronbach's alpha helps researchers minimize some problems related to the validity of scale items. Cronbach (1946) was the first author who argued that research participants' response style is an essential factor that threatens the survey measurement's validity. Cronbach's alpha coefficient closer to 1 shows greater internal consistency of the scale items (Gliem and Gliem, 2003). Table 1 shows measurements of independent, dependent, and control variables.

Table 1. Measurement of variables

Variables		Measurement
Commercial Insurance Coverage	*CIC*	*CIC* measures the extent to which business owners increase or decrease perceived commercial insurance coverage to minimize their financial losses; that is, an increase in commercial property insurance *coverage*, business equipment insurance *coverage*, business casualty insurance *coverage*, and property and casualty insurance *coverage* to minimize financial losses. Survey responses are categorized on a five-point Likert Scale assigning 1 as "Decreased a lot" and 5 as "Increased a lot."
Risk of Investment Losses from Operations	*RISK_ILFO*	*RISK_ILFO* measures the extent to which business owners perceive an increase or decrease in the risk of investment losses from i) workplace hazards, ii) damages to physical assets, iii) damages to inventory, iv) errors in product/service, v) lawsuit(s) against the firm, and vi) the overall risk of business failure. Survey responses are categorized on a five-point Likert Scale assigning 1 as "Decreased a lot" and 5 as "Increased a lot."
Risk of Investment Losses from Casualties	*RISK_ILFC*	*RISK_ILFC* measures the extent to which business owners perceive an increase or decrease in the risk of investment losses from i) religious casualties, ii) political casualties, iii) natural casualties, iv) terrorist attacks casualties, v) road traffic casualties, vi) economic crises casualties, and vii) financial crisis casualties. Survey responses are categorized on a five-point Likert Scale assigning 1 as "Decreased a lot" and 5 as "Increased a lot".
Firm Performance	*FP*	*FP* measures the extent to which business owners perceive an increase or decrease in i) net profit margin, ii) cash flow from operations, iii) return on assets, iv) return on short-term investment, v) return on long-term investment, and vi) return on total investment. Survey responses are categorized on a five-point Likert Scale assigning 1 as "Gone down a lot" and 5 as "Gone up a lot".

Firm Age	*F_AGE*	*F_AGE* is measured as the actual age of the business firm.
Assets	*ASSETS*	*ASSETS* variable is measured as the actual assets of the business firm.
Sales	*SALES*	*SALES* variable is measured as the actual sales of the business firm.
Employees	*EMP*	*EMP* variable is measured as the actual number of employees.
Family Ownership	*F_OWNERSHIP*	*F_OWNERSHIP* is measured as the actual percentage of family ownership of the firm over the last five years.
Owner Age	*O_AGE*	*O_AGE* is measured as the actual age of business owners.
Owner Education	*O_EDU*	*O_EDU* is a categorical variable with an assigned value of 1 = High school or less 2 = College diploma 3 = Bachelor's degree 4 = Master's degree 5 = PhD degree or more.
Owner Experience	*O_EXP*	*O_EXP* is measured as the actual number of years of owner experience.
CEO Duality	*CD*	*CD* is a dummy variable with an assigned value of 1 if a business owner is both CEO and Chair of the Board of Directors in the same company, 0 otherwise.
Firm Location	*F_LOC*	*F_LOC* is a dummy variable with an assigned value 1 if a research participant lives in an urban and 0 if a research participant lives in a rural area.
Gender	*GENDER*	We assigned 1 for male respondents and 0 for female respondents.
Industry	*IND*	We assigned 1 for production firms and 0 for service firms.

Note: To reduce heteroscedasticity (i.e., stabilize variance), the natural logarithm (ln) was calculated for firm age, assets, sales, owner age, and owner experience was calculated.

We selected India as a data collection site because violence and attacks are common in India (Hussein, 2017), leading to the risk of investment losses (Krishnakumar and Verma, 2021). The research population is an "abstract" (Huck, 2008). It was impossible to obtain a list of all members of the focal population; therefore, we used a non-probabilistic (purposive) sample to

collect data from family business owners. The population included family business owners from India. Family business owners living in Punjab, Haryana, Himachal Pradesh, Maharashtra, Rajasthan, and the Utter Pradesh States were the sampling frame for data collection. An exhaustive list of family business owner's names and telephone numbers was created to distribute surveys and conduct telephone interviews. The training was provided to the data collection team to select the research participants who represented the target population.

The sample included approximately 1000 research participants encompassing family business owners. Three hundred thirty-nine (339) surveys were collected from India, and twenty-six of them were non-usable. Thus, the response rate was 33.90%. The remaining population was assumed to be similar to the research participants. All the research participants were assured that their confidentiality would be strictly maintained. Of course, no one was forced to participate in the study. The majority of surveys came from micro and small family business firms.

4. Empirical models and analysis of results

4.1 Empirical models

The risk of investment losses from operations (*RISK_ILFO*) and casualties (*RISK_ILFC*) affect the commercial insurance coverage (*CIC*); therefore, *RISK_ILFO* and *RISK_ILFC* were used as main explanatory variables to estimate the following regression model:

$$CIC_i = \alpha_0 + \alpha_1 RISK\_ILFC_i + \alpha_2 RISK\_ILFO_i + \sum \beta X_i + \varepsilon_i. \qquad (1)$$

In the model, *i* refers to the family business firm, *CIC* is the commercial insurance coverage, and X_i represents individual control variables corresponding to a family business firm *i*. ε_i is a normally distributed disturbance term. Considering Equation (1), we used OLS to test the first hypothesis and second hypothesis. We also used the ordered logistic model as a robustness check and calculated odds ratios (Cameron and Trivedi, 2005).

We calculated the scale items' average to convert them into one variable to use the ordered logistic model. Thus, we converted scale items into four variables: *RISK_ILFO, RISK_ILFC, FP,* and *CIC*. Average scores were adjusted to make even numbers. For example, we changed the 2.69 average scores to 3.

4.2 Descriptive statistics

While Table 2 shows descriptive statistics, Table 3 provides the Pearson bivariate correlation analysis. Table 2 shows that family business owners perceive the higher level of *RISK_ILFO* (mean = 20.22 ÷ 6 = 3.37) than *RISK_ILFC* (mean = 22.98 ÷ 7 = 3.28) in India. The distribution of *CIC, RISK_ILFC, RISK_ILFO,* and *FP* is almost symmetrical around their mean values, and thus, there is no outlier present in either index. The skewness value for all the

scales used in this study is within the range of -0.320 to -0.552, which can be considered an excellent range. Mason et al. (1991) showed that skewness values usually range from -3 to +3 when the data are normally distributed.

The principal component analysis was used to reduce dimensionality (i.e., reduce the number of variables). Factor analysis extracted four factors (denoted as Component 1, Component 2, Component 3, and Component 4) and all the items loaded on the expected factors, which shows that common factor bias is not a concern. Varimax rotation explains 88.85% of the variance in the original scores. The test statistic for Kaiser-Meyer-Olkin (KMO), a Measure of Sampling Adequacy, is 0.80. Kaiser (1974, p. 36) suggests accepting values higher than 0.50 to indicate factor analysis's validity.

Each question subset was analyzed to calculate the weighted factor scores. Due to the transformation using factor analysis, the mean values of *CIC, RISK_ILFC, RISK_ILFO,* and *FP* are zeros because factor analysis produces standardized scores (DiStefano et al., 2009). Cronbach's alpha was also calculated for each variable. George and Mallery (2003) provide the following rules of thumb for Cronbach's alpha values: > 0.90 excellent, $0.80 \geq \alpha \leq 0.90$ good, $0.70 \geq \alpha \leq 0.80$ acceptable, $0.60 \geq \alpha \leq 0.70$ questionable, $0.50 \geq \alpha \leq 0.60$ poor, and < 0.50 unacceptable (p. 231).

Table 2. Descriptive Statistics

| | *Mean* | *SD* | *Minimum* | *Median* | *Maximum* | *Factor Scores* | | | |
						1	*2*	*3*	*4*
CIC#	0.00	1.00	-2.11	0.49	1.35				
CIC1	3.46	1.22	1	4	5				0.914
CIC2	3.45	1.21	1	4	5				0.932
CIC3	3.42	1.21	1	4	5				0.906
CIC4	3.42	1.22	1	4	5				0.905
RISK_ILFO####	0.00	1.00	-2.13	0.10	1.47				
RISK_ILFO1	3.33	1.20	1	4	5			0.855	
RISK_ILFO2	3.36	1.14	1	4	5			0.894	
RISK_ILFO3	3.39	1.14	1	4	5			0.908	
RISK_ILFO4	3.37	1.18	1	4	5			0.884	
RISK_ILFO5	3.35	1.24	1	4	5			0.848	
RISK_ILFO6	3.42	1.18	1	4	5			0.856	
RISK_ILFC###	0.00	1.00	-1.96	012	1.47				
RISK_ILFC1	3.20	1.29	1	3	5	0.858			
RISK_ILFC2	3.25	1.22	1	4	5	0.904			
RISK_ILFC3	3.29	1.24	1	4	5	0.901			
RISK_ILFC4	3.27	1.24	1	4	5	0.893			
RISK_ILFC5	3.31	1.26	1	4	5	0.879			
RISK_ILFC6	3.36	1.23	1	4	5	0.884			
RISK_ILFC7	3.30	1.25	1	4	5	0.880			
FP#####	0.00	1.00	-3.43	0.38	1.65				
FP1	3.72	0.81	1	4	5		0.935		
FP2	3.74	0.80	1	4	5		0.929		
FP3	3.67	0.86	1	4	5		0.938		
FP4	3.68	0.86	1	4	5		0.928		
FP5	3.70	0.84	1	4	5		0.937		
FP6	3.69	0.83	1	4	5		0.952		
F_AGE	2.40	0.64	0.00	2.40	4.17				
ASSETS	14.59	1.23	10.99	14.51	18.42				
SALES	15.63	1.12	12.21	15.89	18.60				
EMP	1.98	1.03	0.00	2.20	4.09				
F_OWNERSHIP	0.65	0.28	0.10	0.70	1.00				
O_AGE	3.67	0.23	2.94	3.71	4.17				
O_EDU	2.48	1.01	1	3	4				
O_EXP	2.50	0.63	0.00	2.64	3.69				
CD	0.74	0.44	0	1	1				
F_LOC	0.79	0.41	0	1	1				
GENDER	0.77	0.42	0	1	1				
IND	0.03	0.16	0	0	1				

Notes: Variables include commercial insurance coverage (*CIC*), risk of investment losses from operations (*RISK_ILFO*), risk of investment losses from casualties (*RISK_ILFC*), firm age (*F_AGE*), firm's assets (*ASSETS*), sales (*SALES*), firm performance (*FP*), number of employees (*EMP*), firm ownership (*F_OWNERSHIP*), owner age (*O_AGE*), owner education (*O_EDU*), owner experience (*O_EXP*), CEO duality (*CD*), firm location (*F_LOC*), gender (*GENDER*), and industry (*IND*). SD = Standard Deviation
Cronbach Alpha: *CIC* = 0.964. Four factors of *CIC* (CIC1, CIC2, CIC3, and CIC4) index explain

approximately 90.18% of the variation. The eigenvalues of the four principal components are 3.607, 0.201, 0.137, and 0.055, respectively.

Cronbach Alpha: *RISK_ILFO* = 0.973. Six factors of *RISK_ILFO* (*RISK_ILFO1, RISK_ILFO2, RISK_ILFO3, RISK_ILFO4, RISK_ILFO5*, and *RISK_ILFO6*) index explain approximately 88.39% of the variation. The eigenvalues of the six principal components are 5.303, 0.336, 0.181, 0.094, 0.055, and 0.031, respectively.

Cronbach Alpha: *RISK_ILFC* = 0.976. Seven factors of *RISK_ILFC* (*RISK_ILFC1, RISK_ILFC2, RISK_ILFC3, RISK_ILFC4, RISK_ILFC5, RISK_ILFC6,* and *RISK_ILFC7*) index explain approximately 87.34% of the variation. The eigenvalues of the seven principal components are 6.114, 0.400, 0.224, 0.124, 0.083, 0.038, and 0.017, respectively.

Cronbach Alpha: *FP = 0.976.* Six factors of *FP* (*FP1, FP2, FP3, FP4, FP5*, and *FP6*) index explain approximately 89.50% of the variation. The eigenvalues of the six principal components are 5.370, 0.294, 0.173, 0.093, 0.041, and 0.029, respectively.

Factor analysis was conducted to check the convergent validity, and all the items load on the expected factors. Varimax rotation explains 88.85% of the variance in the original scores. The test statistic for Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy is 0.80. Kaiser (1974) suggests accepting values greater than 0.50 as indicative of the validity of factor analysis.

The Pearson correlation coefficient matrix exhibits that *RISK_ILFO, RISK_ILFC, ASSETS, SALES, FP, F_OWNERSHIP,* and *O_EDU* are positively and significantly correlated with *CIC* ($\rho_{RISK\_ILFC, CIC}$ = 0.386; $\rho_{RISK\_ILFO, CIC}$ = 0.345; $\rho_{ASSETS, CIC}$ = 0.119; $\rho_{SALES, CIC}$ = 0.206; $\rho_{FP, CIC}$ = 0.225; $\rho_{F\_OWNERSHIP, CIC}$ = 0.170; and $\rho_{O\_EDU, CIC}$ = 0.194), suggesting that i) increase in perceived risk of investment losses from operations and casualties, ii) assets, iii) sales, iv) firm performance, v) higher level of family ownership, and vi) owner education positively impacts the decision of family business owners to increase commercial insurance coverage in India. Likewise, the Pearson correlation analysis shows that *GENDER* and *IND* are negatively and significantly correlated with *CIC* ($\rho_{GENDER,CIC}$ = -0.149 and $\rho_{IND, CIC}$ = -0.114), suggesting that there is gender and industry differences related to the decision of family business owners to increase commercial insurance coverage in India.

Table 3. Pearson Bivariate Correlation Analysis

	CIC	RISK_ILFO	RISK_ILFC	F_AGE	ASSETS	SALES	FP	EMP
CIC	1							
RISK_ILFO	0.386**	1						
RISK_ILFC	0.345**	0.587**	1					
F_AGE	0.038	-0.003	0.011	1				
ASSETS	0.119*	0.105	0.026	0.138*	1			
SALES	0.206**	0.169**	0.168**	0.199**	0.623**	1		
FP	0.225**	0.223**	0.162**	-0.003	0.116*	0.044	1	
EMP	0.086	0.097	-0.018	0.158**	0.638**	0.652**	0.160**	1
F_OWNERSHIP	0.170**	0.043	-0.023	0.060	0.325**	0.127*	0.124*	0.143*
O_AGE	0.000	-0.018	-0.034	0.532**	0.219**	0.179**	0.028	0.227**
O_EDU	0.194**	0.094	0.001	-0.104	0.152**	0.143*	0.149**	0.240**
O_EXP	0.019	0.046	-0.011	0.639**	0.281**	0.203**	-0.015	0.230**
CD	-0.010	-0.002	-0.029	0.210**	0.167**	0.109	-0.032	0.129*
F_LOC	-0.025	-0.047	-0.082	-0.051	0.173**	0.009	-0.009	0.200**
GENDER	-0.149**	0.019	-0.052	0.053	-0.004	-0.150**	-0.040	-0.148**
IND	-0.114*	-0.051	0.025	0.056	0.191**	0.065	0.036	0.129*

	F_OWNERSHIP	O_AGE	O_EDU	O_EXP	CD	F_LOC	GENDER	IND
F_OWNERSHIP	1							
O_AGE	0.041	1						
O_EDU	0.135*	-0.057	1					
O_EXP	0.061	0.722**	-0.150**	1				
CD	0.097	0.294**	-0.013	0.233**	1			
F_LOC	0.176**	0.015	0.071	0.032	0.108	1		
GENDER	-0.007	0.088	-0.121*	0.130*	0.212**	0.005	1	
IND	0.017	0.111*	-0.037	0.037	0.004	-0.167**	0.039	1

Notes: * $p<0.05$ and ** $p<0.01$; Variables include commercial insurance coverage (*CIC*), risk of investment losses from operations (*RISK_ILFO*),   risk of investment losses from casualties (*RISK_ILFC*), firm age (*F_AGE*), firm's assets (*ASSETS*), sales (*SALES*), firm performance (*FP*), number of employees (*EMP*), firm ownership (*F_OWNERSHIP*), owner age (*O_AGE*), owner education (*O_EDU*), owner experience (*O_EXP*), CEO duality (*CD*), firm location (*F_LOC*), gender (*GENDER*), and industry (*IND*).

4.3 Regression results and discussion

Table 4 reports the estimated coefficients of Equation (1). The results show that *RISK_ILFO, RISK_ILFC, SALES, FP, F_OWNERSHIP,* and *O_EDU* positively and gender and industry negatively impact the family business owners' commercial insurance coverage decision in India.

The coefficients of *RISK_ILFO* and *RISK_ILFC* in column (I) are positive and significant at the 1% and 5% levels, respectively, implying that perceived risks of investment losses from operations and casualties positively impact the decision of family business owners on the commercial insurance coverage. Furthermore, an increase in the risk of investment losses from operations and casualties increase the probabilities of the Indian business owners seeking higher commercial insurance coverage; that is, they are more likely to increase the insurance coverages in response to the risks associated with the firm's operations, casualties, and investment losses. Thus, the first and second hypotheses are fully supported. Likewise, the coefficients of *GENDER* and *IND* in column (I) are negative and significant at 5%, indicating that there are gender and industry differences related to commercial insurance coverage decisions.

As we would like to interpret and compare the perception and decision of family business owners related to *RISK_ILFO* and *RISK_ILFC*, we have calculated the odds ratios shown in column 3 of Table 4. These are the proportional odds ratios that can be obtained by exponentiating the ordered logit coefficients. For example, if the family business owners perceive an increase in the *RISK_ILFO* and *RISK_ILFC*, the odds of the possible increase in *CIC* are 1.51 and 1.42 times greater than the reduction in the coverages, respectively, in India.

In summary, this study employs ordered logit models to conduct a robustness analysis. As a result, the perceived risks of investment losses from operations and casualties positively impact family business owners' commercial insurance coverage decisions. Also, the results indicate that Indian businesses are more sensitive to operational risk than casualties' risk.

Table 4. Regression analysis

Dependent variable = CIC

	OLS	Ologit	Odds Ratios
Variables	I	II	III
	CIC	CIC	CIC
RISK_ILFO	0.231**	0.411**	1.509**
	(3.57)	(3.38)	(3.38)
RISK_ILFC	0.155*	0.353**	1.423**
	(2.38)	(3.11)	(3.11)
F_AGE	0.056	0.047	1.049
	(0.54)	(0.21)	(0.21)
ASSETS	0.005	0.010	1.010
	(0.07)	(0.08)	(0.08)
SALES	0.115†	0.160	1.173
	(1.67)	(1.08)	(1.08)
FP	0.122*	0.251†	1.285†
	(2.24)	(1.70)	(1.70)
EMP	-0.090	-0.135	0.873
	(-1.15)	(-0.83)	(-0.83)
F_OWNERSHIP	0.443*	1.196**	3.307**
	(2.22)	(2.81)	(2.81)
O_AGE	-0.129	-0.456	0.633
	(-0.38)	(-0.64)	(-0.64)
O_EDU	0.127*	0.305*	1.356*
	(2.32)	(2.59)	(2.59)
O_EXP	0.032	0.163	1.177
	(0.24)	(0.58)	(0.58)
CD	-0.048	0.143	1.153
	(-0.37)	(0.53)	(0.53)
F_LOC	-0.084	-0.196	0.822
	(-0.60)	(-0.67)	(-0.67)
GENDER	-0.270*	-0.609*	0.544*
	(-2.09)	(-2.20)	(-2.20)
IND	-0.679*	-1.614*	0.199*
	(-2.00)	(-2.17)	(-2.17)
Constant	-1.765		
	(-1.18)		
N	313	313	313
F-test statistic /LR / χ^2-test	6.52**	88.05**	88.05**
R^2 / Pseudo R^2	0.256	0.100	0.100

Notes: † $p<0.10$, * $p<0.05$, and ** $p<0.01$; In the regression models, the dependent variable is commercial insurance coverage (CIC). Independent variables include risk of investment losses from operations (*RISK_ILFO*), risk of investment losses from casualties (*RISK_ILFC*), firm age (*F_AGE*), firm's assets (*ASSETS*), sales (*SALES*), firm performance (*FP*), number of employees (*EMP*), firm ownership (*F_OWNERSHIP*), owner age (*O_AGE*), owner education (*O_EDU*), owner experience (*O_EXP*), CEO duality (*CD*), firm location (*F_LOC*), gender (*GENDER*), and industry (*IND*).

5. Conclusion, implications, and recommendations for future research

This study investigated the impact of the perceived risk of investment losses from operations (*RISK_ILFO*) and the perceived risk of investment losses from casualties (*RISK_ILFC*) on the decisions of family business owners to the commercial insurance coverage (*CIC*). This study's findings show that *RISK_ILFO* and *RISK_ILFC* positively impact family business owners' decisions toward *CIC* in India. The findings of this study lend some support to the findings of Eeckhoudt et al. (1997), Eeckhoudt and Schlesinger (2008), Palm (2011), MacMinn (1987), Cao et al. (2020), and Hayakawa (2000) in that *RISK_ILFO* and *RISK_ILFC* increase insurance coverage to reduce the risk of investment losses from operations and casualties.

Sales, firm performance, family ownership, and owner's education positively impact family business owners' decision to increase the commercial insurance coverage. Moreover, there is gender and industry differences related to insurance coverage decision India. Besides, family ownership and owner education increase the sales and profitability of the firm. Therefore, family business owners should consider increasing family ownership and receive some training to improve survivability during and after the COVID-19 pandemic. Furthermore, table 3 also shows that owner experience increases sales. Therefore, firms should consider involving experienced partners to improve the survivability and prosperity of the firm during and after the COVID-19 pandemic.

Although the findings of this study provide valuable results, the limitations should not be ignored. The family business owners who perceive a higher level of investment losses from operations and casualties are more likely to perceive a higher level of commercial insurance coverage. Operations and casualties risks may not have the same impact on the individual firm. The results may not be generalized to every family business owner in India. Therefore, the findings should be used with caution. Moreover, this is survey research and there is a possibility of psychological, sampling, and self-report biases in the study. Finally, the data collection is limited to seven states of India (i.e., Punjab, Haryana, Himachal Pradesh, Maharashtra, Rajasthan, and the Utter Pradesh States); therefore, the sample size is small.

The research was limited to parts of India; therefore, the generalizability of its results and implications requires further research, one of both a quantitative and qualitative nature, conducted among other regions of India and its demographics and in other countries. In addition, future studies can improve the methodological focus and framework by collecting data from many different industry firms and including, among the investigated variables, other qualifying elements such as corporate governance.

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