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Determinants of Crop Insurance Adoption in Sri Lanka: Empirical Evidence from the North Central Region

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ABSTRACT

Purpose: This study aims to identify the key factors influencing farmers' crop insurance purchase decisions in Sri Lanka, with particular emphasis on the North Central Province, where agricultural risk exposure is high.

Design/ Methodology: The study population consists of all farmers engaged in agricultural activities in the North Central Province 262,447 farmers and using the Morgan sampling table, a sample of 400 farmers was selected. Primary data was collected through a well-structured questionnaire. The selected variables include knowledge of crop insurance, previous crop insurance experience, trust in crop insurance companies, level of risk borne by the farmer, and the amount of crop insurance premium. Multiple regression analysis was employed to examine the impact of these factors on crop insurance purchase decisions, while Pearson correlation analysis was used to test the study hypotheses. Data analysis was conducted using SPSS.

Findings: The results reveal that knowledge of crop insurance, previous insurance experience, trust in insurance providers, and the level of risk faced by farmers have a significant positive relationship with crop insurance purchase decisions. In contrast, the amount of crop insurance premium shows a significant negative relationship with crop insurance adoption.

Originality/Value: This study addresses an important empirical gap in the Sri Lankan context by providing evidence-based insights into crop insurance demand. Although limited to a single geographic region, the findings offer valuable implications for insurance providers and policymakers seeking to enhance the promotion, design, and adoption of crop insurance schemes in Sri Lanka.

KEYWORDS

Crop Insurance, Crop Insurance Premium, Correlation, North Central

JEL CLASSIFICATION

G22, Q14

I. Introduction

Background

Agriculture in Sri Lanka contributes approximately 7–8% to GDP and employs about 25–30% of the labor force, underpinning rural livelihoods and national food security. Despite over six decades of crop insurance originating with a paddy pilot in 1958 and evolving under the Agricultural and Agrarian Insurance Board, penetration has remained minimal: only 2.45% of paddy land was insured between 1998 and 2017. In 2013, the government bundled voluntary insurance with fertilizer subsidies to boost coverage, yet uptake continued to lag, highlighting persistent structural, awareness, and affordability barriers.

The development of agricultural insurance in this context began with a pilot scheme introduced by the government in 1958. This was followed by the enactment of the Crop Insurance Act (No. 13 of 1961), which laid the foundation for subsequent insurance policies. In 1973, the Agriculture Insurance

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Law (No. 27 of 1973) was enacted, further solidifying the legal framework. By 1993, the enactment of the Agriculture and Agrarian Insurance Board Act (No. 20 of 1999) marked a new phase in regulatory oversight. The year 1999 saw the introduction of new crop insurance by a private insurance company, signaling a shift towards private sector involvement. In 2010, rainfall index insurance by a private company was introduced, followed by indemnity-based insurance. Compulsory crop insurance was bundled with fertilizer subsidies starting in 2013. A loan protection insurance scheme was introduced in 2016, and in 2018, the government provided budgetary support for the development of index insurance. (Wickramasinghe, 2019)

According to (Klein, J. M.,et al 2017) eight variables used to explain crop insurance purchases such as knowledge of crop insurance, previous purchases of crop insurance, trust of the crop insurance company, amount of risk taken on by the farmer, importance of low crop insurance premium, government as the main information source for crop insurance, role of head of village, and number of family members working in the city.

Table 1. Crop Insurance Purchases Variables

Variables	Research sources
Knowledge of Crop Insurance	Mishra & Goodwin (2006): Highlighted that knowledge about crop insurance is crucial for its adoption. Gao et al. (2016): Found that educational programs improve farmers' understanding and increase participation rates.
Previous Purchases of Crop Insurance	Tadesse et al. (2015): Identified previous experience as a strong predictor of current insurance decisions. Zhang et al. (2018): Confirmed that past behavior is a significant indicator of future purchasing decisions in agricultural insurance.
Trust in the Crop Insurance Company	Skees & Barnett (1999): Discussed how trust issues can lead to under-participation in insurance schemes. Barnett et al. (2008): Found that trust directly affects farmers' decisions to purchase insurance.
Amount of Risk Taken on by the Farmer	Just et al. (1999): Examined how risk aversion drives insurance decisions among farmers. Klein et al. (2017): Emphasized that higher risk levels lead to increased insurance demand.
Importance of Low Crop Insurance Premium	Goodwin (1993): Discussed the sensitivity of farmers to premium costs. Zhang et al. (2017): Found that subsidized premiums significantly increase participation rates among farmers.
Government as the Main Information Source for Crop Insurance	Mahul & Stutley (2010): Highlighted the government's role in facilitating access to insurance information. Berkhout & Lenders (2016): Suggested that government programs significantly influence farmers' perceptions and decisions.
Role of Head of Village	Swanson & Claar (1984): Discussed how local leadership impacts the diffusion of agricultural innovations, including insurance. Gibbs et al. (2013): Found that social networks, including village heads, significantly influence farmers' decisions.
Number of Family Members Working in the City	Ellis (2000): Examined how diversification of income

sources influences agricultural risk management strategies.
Benedict & Yawson (2017): Discussed how urban migration affects rural household risk management and insurance decisions.

As well as, according to another research done by (Ginder & Spaulding, 2009) found, the price was the most significant factors effect on crop insurance purchases decisions. Furthermore, an examination about factors influencing the use of forage index insurance has been disclosed by (Roznik & Porth, 2019) lower feed reserves are more likely to purchase forage index insurance. Also, mentioned, higher level of knowledge of crop insurance, perceive drought, weather risk and forage (food) index insurance premium price were the factors affecting crop insurance purchases in Canada. Similarly, farmers with higher risk exposure and perception about the insurance product are important factors in the crop insurance purchasing decision in Swedish (Brånstrand & Wester, 2014).

Increasing crop related risks day by day in Sri Lanka pose significant challengers for farming community, especially those in the dry zone. The North Central Province (NCP) is such as dry zone, located middle of Sri Lanka. Therefore, it is highly vulnerable to rainfall variations and extreme climate events such as droughts (Zubair & Ralapanawe, 2006).

According to the categorization of agro ecological zones of Sri Lanka, North Central Province (NCP) of Sri Lanka related below low country dry zone, and it is the largest province in Sri Lanka coved 16% of total county's land area (Yapa et al., 2014). NCP divided by two districts as Anuradhapura and Polonnaruwa, as well as Anuradhapura is the largest district in Sri Lanka with 7128km2 (Figure 1.1). Similarly, NCP has been recognized as the largest agriculture area of Sri Lanka, because it contributes with the largest portion of rice production of the country's rice supply. Approximately 2.5 million people live in NCP, more than 95% of whom are farmers living in rural areas (Yapa et al., 2014). Among this population, Majority are representing the lower-level income category as well as the agriculture is their only income source for living. Due to the dry zone, drought, low level of income and having only one source of income, farmers of NCP have to face severe risks while engaging in agriculture.

Figure 1. Divisional Secretariats of North Central

Province, Sri Lanka

Source: www.researchgate.net

Research Problem

Recent literature highlights that farmers' crop insurance decisions are shaped by factors such as premium affordability, perceived production risk, trust in insurers, prior insurance experience, and government support mechanisms. While earlier international studies provide useful theoretical insights, their findings cannot be directly generalized to Sri Lanka due to differences in institutional structures, income levels, climate vulnerability, and policy frameworks. In the Sri Lankan context, agriculture is predominantly smallholder-based, highly dependent on monsoonal rainfall, and strongly influenced by government interventions such as fertilizer subsidies and state-sponsored insurance schemes.

Post-2020 studies and policy reports in Sri Lanka and South Asia emphasize that climate change–induced droughts, floods, and wildlife damage have intensified agricultural risks, yet insurance uptake remains low despite expanded government involvement and scheme redesigns. Recent evidence from Sri Lanka indicates that limited awareness, low trust in insurance providers, affordability concerns, and perceived inefficiencies in claim settlement continue to discourage farmers from purchasing crop insurance. Moreover, unlike neighboring countries where index-based and technology-driven insurance products have gained momentum after 2020, Sri Lanka's crop insurance market remains underutilized, particularly among dry-zone farmers.

Despite the growing relevance of crop insurance in national agricultural risk management strategies, recent empirical studies examining the determinants of crop insurance demand in Sri Lanka are scarce. Most existing post-2020 research focuses on policy evaluation or climate risk exposure rather than farmers' behavioral and decision-making factors. Therefore, a clear empirical gap exists in understanding how farmer-specific, institutional, and economic factors influence crop insurance purchase decisions in Sri Lanka. Addressing this gap is essential for designing effective, context-specific insurance products and policies, particularly in high-risk regions such as the North Central Province. This study examines the extent to which farmers' knowledge of crop insurance, prior experience with crop insurance, trust in insurance providers, perceived risk exposure, and crop insurance premium levels influence the decision to purchase crop insurance.

II. Literature Review

Theoretical Review

Crop Insurance

It can be recognized that there are two main categories of agricultural insurance: single and multiple peril coverage. Single peril coverage offers protection from single hazard and multiple peril provides protection from several hazards (Raju & Chand, 2008). According to World Bank (2011), it can be identified two types of crop insurance approaches such as conventional insurance approach and index insurance

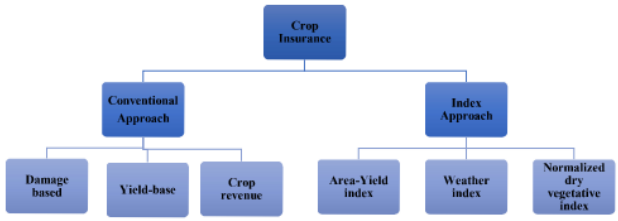

Figure 2. Types of Crop Insurance

Source: Research Report-Hector Kobbekaduwa Agrarian Research and Training Institute (HKART)

Conventional Insurance

Damage-based indemnity insurance is crop insurance in which the insurance claim is calculated by measuring the damage in the field immediately after the damage has occurred. The loss of damage measured in the field, less a deductible expressed as a percentage, is applied to the pre-agreed sum insured. The meaning of Yield-based crop insurance is crop insurance coverage in which an insured yield is established as a percentage of the farmer's historical average yield. Crop revenue insurance takes into account both the crop yield and loss of market price.

Index-Based Insurance

Agricultural index-based insurance is affordable risk management tool for smallholder farmers with limited government involvement and the potential for the use of index-based insurance products in agriculture is significant. When using index crop insurance, various measures can be used as indices such as meteorological variables (rainfall,

temperature, wind speed, etc.) satellite images, area yield, and price and even mortality rate of livestock. Most index-based insurance schemes address yield risk or price risk and target a specific crop.

Conditions Needed for Purchase Crop Insurance

Numbers of important conditions are needed for agricultural insurance to be successful. Without these conditions being met, then the insurance may fail. Those conditions for successful crop insurance are acceptable demand for crop insurance include the insurer's ability and willingness to pay consumer claims and ability to meet insurance conditions.

Acceptable Level of Demand for Crop Insurance

The following conditions must hold for occurring a sufficient demand for crop insurance. These factors certainly influence farmers to buy crop insurance (Boyd & Pai, 2011).

- There must not be better risk management substitutes/strategies available than crop insurance policy, if have, then customers will choose these substitutes, instead of purchasing crop insurance.
- The insurance premium should be affordable to the farmers, otherwise the farmers will opt for other risk management strategies.
- The losses that have to face to farmers due to risk must be of sufficient size and variability to be of concern, otherwise farmers would have no need to address risk or insurance considerations.
- The crop insurance policy that is bought by farmers must have the desired features that farmers prefer, otherwise farmers would not purchase the crop insurance.
- Farmers who must choose to take crop insurance be sufficiently risk averse, otherwise they would not be interested in purchasing insurance.

Capability and Willingness of Insurer to pay crop insured for Claims

If the insurance company cannot properly pay claims to the policy holder, then the insurance firm would fail. If there is a huge loss, the company will fail to compensate the customer because it does not have enough reserves. This problem can be avoided by coming up with an agreement with the reinsurance companies. When crop insurance companies are unable or unwilling to pay customers, the confidence of insurance consumers is broken. It may take decades for the insurance industry to rebuild this lost confidence in a certain insurance market and resume selling insurance. These factors such as the insurer's ability and willingness to pay customers influence the purchase of crop insurance (Boyd & Pai, 2011).

Capability to Cover Insurability Conditions

The insurance conditions listed below are mentioned in M. Boyd's book as the necessary conditions for a farmer to decide to buy an insurance that must be owned by an insurance company. These factors can influence the purchase of crop insurance directly and indirectly while farmers take crop insurance decisions.

- Losses must be Uncorrelated and Allow Pooling of Risks - If losses are highly correlated across individual customers, or geographic regions, the insurance company may be unable to properly diversify and premium pool its risks. If this is the case, when one farmer has to face a loss, many other farmers may have to face losses as well.
- Economically Feasible Premiums - The insurance premium charged to the customers should be more than or equal to the cost of insurance, if less the insurance company will incur long term losses. But, in the case of

crop insurance, farmers do not usually like to pay premiums equal to or greater than the cost of insurance, and so government must almost always subsidize the premium for the farmer.

- Limited Liability - in insurance contract, not only crop insurance but also other general insurance, the insurance company cannot accept unlimited liability, as this could cause the firm to fail. Usually, an insurance company may purchase crop reinsurance to avoid this situation.
- Losses must be Random - This is because farmers usually buy insurance only when a loss is expected, that is a common rational. Insurer can predict that the insurer will fail.

Risk

Risk can be defined as "The potential loss of equity capital. Risk has two components: uncertainty and exposure. If both are not present, then there is no risk. For risk to materialize there should be exposure to the uncertainty" (Parihar, 2003). Since the two terms risk and uncertainty are synonymous, they are two definitions that can be easily confused to give the same meaning (Hardaker & Huirne, 2004). (Newbold, 1991), risk can be divided into major parts as systematic, unsystematic and disastrous risks.

Risk and Risk Management in Agriculture

When Farmers decide to farm, they are well aware that they are involved in a sector with a high extent of risk. (Hansson & Lagerkvist, 2012), Farmers make their production and economic decision to the level and type of risk they are exposed to. Many farmers will in the future, face a greater exposure to risk because of the forces in a more competitive market. According to Boehlje et al., (2005), Risk in the agricultural sector can traditionally classified into the categories production risk, financial risk, market risk and institutional risk. As well as risk and uncertainty can be categorized into is strategic and tactical risk. Business risk and financial risk are coming under traditional risks which are the perceived by agribusiness firms and farmers.

Business risks are defined as "the inherent uncertainty in the performance of the firm independent of the way it is financed" (Boehlje & Gray, 2005). Price risk, production risk, and a number of factors influencing the variations are coming under business risk. The strategic risk is associated with strategic decisions, ineffective strategy implementation and uncertainties in the firm's business climate. Tactical risk is easier to manage than strategic risk. This is because there is sufficient information to measure these risks. These risks can also be transferred to others through existing risk management tools such as risk insurance. Many risks that are facing by farmers in agriculture are difficult to quantify. Therefore, the best method to manage the agriculture risk that face by farmers is crop insurance.

Table 2. Methods of Managing Agricultural Risk

		Informal Mechanisms	Formal Mechanisms	
			Market based	Publicly provided
E x-Ante Strategiess	On- farm	• Avoiding exposure to risk • Crop diversification and inter-cropping • Plot diversification • Diversificationof income source		• Agricultural extension • Pest management systems
	Sharing riskwith others	• Crop sharing • Sharing of agricultural equipment, irrigation sources, etc.	• Contract marketing • Insurance	
X-Post Strategiess	Coping withshock	• Reduced consumption patterns • Sale of assets • Migration • Reallocation of labor • Mutual aid	• Credit	• Rescheduling loans • Agricultural insurance • Supply of fodder • Cash transfer

Source: Crop Insurance- Strategy to minimize risk in Agriculture Shashi Kiran A. S. and K.B. Umesh

Expected Utility Theory

Expected utility theory explains decision-making under risk, where individuals choose actions such as purchasing insurance that maximize their expected utility based on personal preferences (Barry, 1984; Pindyck & Rubinfeld, 2005). It assumes decision-makers are rational, goal-oriented, and aware of potential outcomes and risks, expressed through probability density functions (Hardaker & Huirne, 2004). Preferences toward income or wealth vary and are categorized as risk-averse, risk-neutral, or risk-seeking (Varian, 2006). Risk-averse individuals prefer stable, lower-risk outcomes, often sacrificing potential higher income to avoid losses (Barry, 1984; Boehlje et al., 1984). This theory helps explain the complexity behind insurance-related decisions.

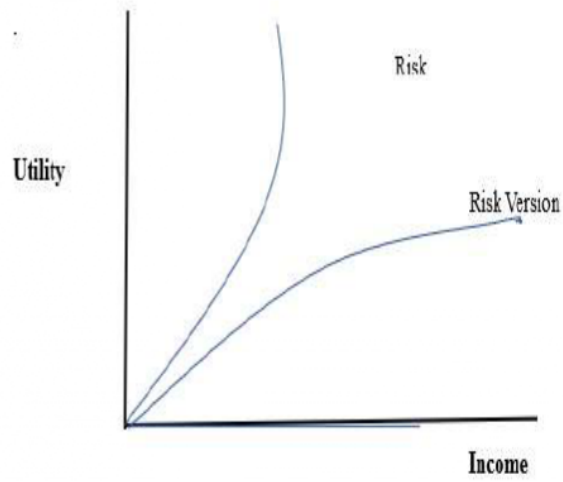

Figure 4. Expected Utility Theory

Empirical Review

Multiple studies have explored the factors affecting farmers' decisions to purchase crop insurance in various global contexts. Boyd et al. (2011) examined 220 farmers in Inner Mongolia, China, identifying eight variables influencing crop insurance uptake. Seven of these such as knowledge of crop insurance, prior insurance experience, trust in insurers, premium importance, risk level, information sources, village leadership role, and off-farm income were statistically significant, showing a positive relationship with insurance purchase decisions.

Linder et al. (2009) investigated crop insurance purchases in Northern Illinois, surveying 315 farmers. The study found that price had a significantly negative impact on the decision to purchase insurance. Using binary logistic regression, other influencing factors included weather concerns, risk tolerance, government subsidies, and a write-in positive factor. Notably, premium cost emerged as the most critical barrier.

Lin and Boyd (2015) conducted a study in Hainan, China, using a probit model on 134 farmers to assess willingness to purchase weather index insurance. Of 15 variables tested, 11 were statistically significant. Key influencing factors included a positive attitude toward weather index insurance, trust in insurance companies, and general willingness—highlighting the role of perception and trust.

Roznik et al. (2019) explored the use of forage index insurance among 87 cattle producers in Alberta and Saskatchewan, Canada. Their probit model revealed that six out of eleven variables were statistically significant. These included perceived drought risk, youth, knowledge of insurance, and positive attitudes. Interestingly, the cost of forage index insurance was not a significant factor, contrasting with Linder et al. (2009).

Liesivaara et al. (2014) studied 5,000 Finnish farmers to understand willingness to pay for crop insurance in Northern Europe. Results showed higher demand among younger farmers and those with more arable land. The study, similar to Linder et al., found that willingness to pay was highly sensitive to premium price levels.

Addey et al. (2019) found that 61% of rice farmers would consider buying crop insurance despite limited prior experience. Key influencing factors included the proportion of income from rice, perceived reliability of insurance schemes, and the risk of failing to meet yield targets.

Makki and Somwaru (2001) concluded that decisions to purchase crop insurance depend on premium levels, expected compensation, risk exposure, and availability of alternative risk management tools. Similarly, Ginder and Aslihan (2006) emphasized that insurance price was the most influential factor, with choices grounded in the expected utility framework.

Adinolfi et al. (2012) examined insurance in France and Italy, showing that business-related variables such as farm size, crop diversity, and premium levels had more impact on insurance decisions than weather. This study also relied on expected utility theory.

Smith & Baquet (1996), focusing on wheat farms in Montana, reinforced that premium cost, debt levels, expected yield, and yield risk significantly influence crop insurance decisions under an expected utility framework.

Table 3. Literature Review of Independent Variables

	Independent variables (Relationship with purchase of crop insurance)				
	Knowledge of crop insurance	**Previously purchased crop insurance**	**Trust of crop insurance company**	**Amount of risk taken on by the farmer**	**Amount of crop insurance premium**
Boyd et. al (2011)	+	+	+	+	-
Linder et. al. (2009)				+	-
Lin et. al. (2015)	+		+		
Roznik et.al. (2019)	+	+	+		
Liesivaara et al. (2014)					-
Makki & Somwaru (2001)				+	-
Adinolfi et al. (2012)		+			-

III. Methodology

Research Design

The research design includes the identification of factors affecting the purchase of crop insurance in Sri Lanka.

Research Logic – Deductive

The deductive approach is concerned with "developing a hypothesis (or hypotheses) based on existing theory and then designing a research strategy to test the hypothesis". In this research the deductive approach is used as the research approach because of its ability to explain the factors influencing the purchase of crop insurance and the relationship between those factors and farmers' decision to purchase crop insurance.

Research Approach – Quantitative

In quantitative research the data which are collected by the primary or secondary sources are quantifiable or numerical. They can be shown by numbers with different measures (m, cm, units, l, ml, etc.). Qualitative research are the research where the responses are not in quantifiable form. Therefore, in this study is applied the Quantitative approach, and this study will carry out a survey by administering questionnaires.

Conceptual Framework and Operationalization

Conceptual Framework

The study established a conceptual framework for the investigation, which is shown in Figure 1, based on a detailed literature review. Also, based on the research problem, research objectives and the literature review this conceptual

framework has been built. factors affecting crop insurance purchase (crop insurance premium, knowledge about crop insurance, previously purchased crop insurance, confidence in the crop insurance company and the amount of risk taken by the farmer) were considered as independent variables in the framework, whereas Purchase of crop insurance was treated as a dependent variable.

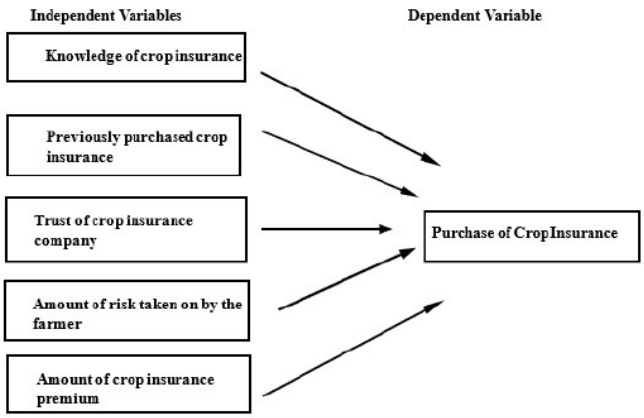

Figure 5. Conceptual framework

Operationalization

Table 4. Operationalization

Concept	Variable	Indicator	Measures	Question Numbers	Source
Factors affecting crop insurance purchases	Knowledge of crop insurance	Knowledge and understanding of crop insurance and types of crop insurance	5-point Likert scale (1 = Strongly disagree to 5 = Strongly agree)	6–8	Adapted from Boyd & Pai (2011); Lin & Boyd (2015)
	Previously purchased crop insurance	Experience, productivity, and satisfaction with crop insurance	5-point Likert scale	9–11	Adapted from Ginder et al. (2009); Liesivaara et al. (2014)
	Trust of crop insurance company	Trust, transparency, accountability, and claim compensation	5-point Likert scale	12–14	Adapted from Lin & Boyd (2015); Klein et al. (2017)
	Amount of risk taken by the farmer	Perceived risk level and probability of crop hazards	5-point Likert scale	15–17	Adapted from Roznik et al. (2019); Adinolfi et al. (2015)
	Amount of crop insurance premium	Premium affordability and premium cost per hectare	5-point Likert scale	18–20	Adapted from Ginder et al. (2009); Makki & Somwaru (2001)

Population and Sample Selection

Population

The population of the study consists of the All farmers engaged in agriculture in North Central Province. According to the department of census and statistics of Sri Lanka, there will be 262,447 farmers engaged in agriculture in the North Central Province by 2014.

Sample Selection

According to table for Determining Sample Size from a Given Population Morgen Table (Appendix 1), the sample size will be 400 farmers' responses from an unknown farmers' population in north central province. Probability sampling and clustering sampling technique is applied to this study to collect information from farmers in north central province, and it is the best way of getting information quickly and efficiently. According to the cluster sampling technique, 400 farmers have been selected based on the secretariats of Anuradhapura and Polonnaruwa districts.

Distribution of the Sample by Divisional Secretariat Areas

Table 5. Distribution of the Sample by Divisional Secretariat Areas

Anuradhapura Secretariats

Divisional Secretariat	Number of Farmers
1. Kahatagasdigiliya	18
2. Thirappane	26
3. Galenbindunuwewa	39
4. Nachchaduva	36
5. Horowpothana	39
6. Kekirawa	42
7. Rajanganaya	45
8. Mihintale	33
9. Thambuttegama	37
10. Palagala	13

Polonnaruwa Secretariats

Divisional Secretariat	Number of Farmers
1. Polonnaruwa	12
2. Minneriya	12
3. Madirigiriya	12
4. Bakamoona	16
5. Lankapura	20

Data collection

Sources of Data

In this study the primary data which was factors affecting crop insurance purchases was obtained from individual farmers in the north central province.

Data Collection Method

In this study, the researcher utilized a structured questionnaire consisting of standardized questions, which was distributed to farmers through the agriculture officers of each Divisional Secretariat in Sri Lanka's North Central Province. The questionnaire was designed based on a conceptual framework focusing on five key variables: crop insurance premium, knowledge about crop insurance, previous insurance experience, confidence in the insurance company, and the level of risk undertaken by the farmer. The primary objective was to examine whether these variables influence the farmers' decision to purchase crop insurance.

The questionnaire included 23 questions, organized into three sections: social factors, industry-related factors, and preferences regarding crop insurance. The initial section addressed social and business aspects, such as the farmer's age, education, farm size, and geographic location. The subsequent section focused on perceptions of crop insurance, attitudes toward risk, past experiences, and familiarity with crop insurance schemes.

To ensure clarity and accessibility, the questionnaire was originally written in English and then translated into Sinhala. A cover letter explaining the study's objectives was attached, along with clear instructions for completing the questionnaire. This comprehensive approach aimed to collect accurate, relevant data while ensuring respondents fully understood the purpose and structure of the survey.

Analysis of Data

Data analysis of this study involved converting a series of recorded observations into descriptive statements and inferences about relationships. In this study the SPSS 20 version was used to elaborate various statistical tests and interpret the results of the analysis. The data would be presented by diagrams, histograms and pie charts.

Pilot Test

A pilot test was conducted prior to the main survey to assess the clarity, reliability, and suitability of the questionnaire for the Sri Lankan agricultural context. The pilot study involved 30 farmers from the North Central Province who were not included in the final sample. Feedback from the pilot test was used to refine question wording, improve clarity, and ensure that the pre-designed and validated questionnaire items were easily understood by respondents. Reliability analysis was performed using Cronbach's alpha, and all constructions exceeded the acceptable threshold of 0.70, confirming the internal consistency of the measurement instrument.

Descriptive Statistics

In this study, frequency distributions were calculated for demographic variables including gender, marital status, age, education level, and work experience. These were presented using detailed tables for clear visualization. Measures of central tendency (mean) and dispersion (standard deviation) were computed for both independent and dependent variables to evaluate respondents' reactions and the effectiveness of questionnaire items. The

mean, a commonly used measure of central tendency, and standard deviation, a reliable indicator of data spread, were utilized to assess response patterns. A five-point Likert scale measured respondents' levels of agreement or disagreement with various statements. The midpoint value of 3 on the scale was used as a reference for interpretation. Decision rules were formulated accordingly to guide analysis based on this scale.

1. If Mean< 3, then the level of agreement of the respondents for each variable is high.
2. If Mean = 3, then, the level of agreement of the respondents for each variable is moderate.
3. If Mean > 3, then, the level of agreement of the respondents for each variable is low.

Bivariate Analysis

Bivariate analysis refers to measuring the relationship between two variables. In this study Pearson's co-efficient correlation was adopted under bivariate analysis. Karl Pearson's coefficient of correlation was applied in this study as it is the most widely used method of measuring the degree of relationship between two variables. Following decision rules were used to measure it.

1. If the Pearson's coefficient of correlation is close to 1 (> 0.5) with a high significant level (F< 0.05) then there is a strong positive relationship between the two variables.
2. If the Pearson's coefficient of correlation is close to -1 (> - 0.5) with a high significant level (F< 0.05) then, there is a strong negative relationship between the two variables.
3. If Pearson's coefficient of correlation is close to 0 (< 0.5 or - 0.5) with a high significant level (F< 0.05) then, there is a positive or negative relationship between the two variables, but not so strong.

Table 6. Correlation conditions

Positive scale		Negative scale	
Range	**Type of correlation**	**Range**	**Type of correlation**
r > 0.80	Very Strong positive	**r > - 0.80**	Very Strong negative
0.60< r < 0.79	Strong positive	**-0.60< r < -0.79**	Strong negative
0.40< r < 0.59	Moderate positive	**-0.40 < r <-0.59**	Moderate negative
0.20< r < 0.39	Weak positive	**-0.20 < r <-0.39**	Weak negative
0 < r < 0.19	Very Weak positive	**-0 < r < -0.19**	Very Weak negative

Hypotheses Development

H1: There is a significant impact of knowledge of crop insurance on crop insurance purchase by farmers.

H2: There is a significant impact of previously purchased crop insurance on crop insurance purchases by farmers.

H3: There is a significant impact of trust of crop insurance company on crop insurance purchase by farmers.

H4: There is a significant impact of amount of risk taken on by the farmer on crop insurance purchases by farmers.

H5: There is a significant impact of amount of crop insurance premium on crop insurance purchase by farmers.

IV. Findings and Discussion

Demographic Information

Data analysis was carried out using responses collected from 400 farmers in the North Central Province. The dataset was carefully screened for completeness, accuracy, missing values, and outliers prior to analysis. The results indicated that there were no significant outliers in the data. A small number of questionnaires contained missing or incomplete responses and were excluded from the analysis.

Gender of the Sample

Table 7. Analysis of gender

	Frequency	Percent	Cumulative Percent
Female	197	49.3	49.3
Male	203	50.8	100.0
Total	400	100.0	

According to the table 4.1, 49.3% (N=197 of respondents are female respondents while 50.8% (N=203) are male respondents. Majority of the respondents in the sample are male farmers.

Age of the Sample

Table 8. Analysis of age

	Frequency	Percent	Cumulative Percent
18 - 29	75	18.8	18.8
30 - 39	51	12.8	31.5
40 - 49	98	24.5	56.0
50 Above	176	44.0	100.0
Total	400	100.0	

Above table describes the age distribution of the respondents in this study. 18.8% (N=75) of respondents are 18-29 years and respondents between 30-39 years are 12.8% (N=51). 24.5% (N=98) of respondents are between 40-49 years while 44% (N=176) of respondents were between the age limit of 50 above. Majority of respondents of the sample were 50 above year's maturity farming community.

Education Level of the Sample

Table 9. Analysis of education level

	Frequency	Percent	Cumulative Percent
O/L	308	77.0	77.0
A/L	57	14.3	91.3
Graduate	14	3.5	94.8
Other	21	5.3	100.0
Total	400	100.0	

Education level of the respondents was classified as O/L, A/L, Graduate and other qualifications. According to above results 77.0% (N=308) of respondents were qualified in only O/L. 14.3% (N=57) of respondents were qualified in A/L while 3.5% (N=14) of respondents were followed diplomas. Other qualifications were obtained

by 5.3% of the respondents. Majority of respondents of the sample are O/L qualified farming community.

Farming Experience of the Sample

Table 10. Farming Experience

	Frequency	Percent	Cumulative Percent
Below 2 years	26	6.5	6.5
2-5 years	116	29.0	35.5
5-10 years	126	31.5	67.0
10 above	132	33.0	100.0
Total	400	100.0	

Source: SPSS Output 2024

The Farming experience of the respondents was categorized as below 2 years, 2-5 years, 5-10 years and over 10 years. According to table 8, 6.5% (N=26) of respondents have farming experience below 2 years. Between 2-5 years' farming experience was obtained by 29% (N=116) of the respondents while 31.5% (N=126) of respondents have work experiences between 5-10 years. 33% (N=132) of the respondents have work experience over 10 years. Majority of respondents of the sample are above 10 years' farming experienced farmers in north central province.

Distribution of the Sample

Table 11. Distribution of the Sample

	Frequency	Percent	Cumulative Percent
Kahatagasdigiliya	18	4.5	4.5
Thirappane	26	6.5	11.0
Galenbindunuwewa	39	9.8	20.8
Nachchiduwa	36	9.0	29.8
Horowpathana	39	9.8	39.5
Kekirawa	42	10.5	50.0
Rajanganaya	45	11.3	61.3
Mihinthale	33	8.3	69.5
Thambuththegama	37	9.3	78.8
Payagala	13	3.3	82.0
Polonnaruwa	12	3.0	85.0
Minneriya	12	3.0	88.0
Madirigiriya	12	3.0	91.0
Bakamuna	16	4.0	95.0
Lankapura	20	5.0	100.0
Total	400	100.0	

There are 15 divisional secretariats in north central province that has been used for data collection process. The total sample size is 400. Out of the total sample size, the largest number of samples was represented by Kekirawa Rajangana divisional secretariats. It is a percentage of 11.3% (N=45) and 10.5% (N=42) of poison. Majority of respondents of the sample are represented in rajanganaya divisional secretariat anuradapura district. The minority of the respondents are represented in polonnaruwa and minneriya divisional secretariat in polonnaruwa district.

Descriptive Analysis

Reliability

The Cronbach's alpha reliability coefficients of the independent and dependent variables were obtained to assess the stability and consistency of the instrument which measured the concept of the study. Cronbach's alpha indicated how well the items in a set were positively correlated to one another. The closer the reliability coefficient to 1.0 is the better. In general, reliability less than .60 are considered to be poor, those in the .70 range acceptable and those over .80 good. Cronbach's alpha values for all constructs are in acceptable range.

Table 12. Reliability analysis

	Variable	Cronbach's Alpha
Independent variables	Knowledge of crop insurance	.763
	Previously purchased crop insurance	.845
	Trust of crop insurance company	.750
	Amount of risk taken on by the farmer	.820
	Crop insurance premium	.790
Dependent variable	Purchase of Crop Insurance	.773

Source: SPSS Output

Correlation Analysis

The Pearson's Correlation was used to find the correlation between two independent and dependent variables. The values of the Pearson Correlation range from -1 to +1 with negative numbers representing a negative correlation and positive numbers representing a positive correlation.

Relationship between Purchase of Crop Insurance and Knowledge of Crop Insurance

Table 13. Correlation between Purchase of crop insurance and Knowledge of crop insurance

	Knowledge of crop insurance	Purchase of crop insurance
Knowledge of crop insurance	Pearson Correlation	1	.730
	Sig.		.000
	N	400	400
Purchase of crop insurance	Pearson Correlation	.730	1
	Sig.	.000	
	N	400	400

Source: SPSS Output

According to table 13, Pearson Correlation Coefficient between Knowledge of crop insurance and Purchase of crop insurance is .730. It indicates that there is a positive relationship between the two variables. The found relationship is statistically significant because the significance value is 000. Therefore, it can be statistically indicating that there is a significant, positive relationship between knowledge of crop insurance and Purchase of crop insurance.

Relationship between Purchase of Crop Insurance and Previously Purchased Crop Insurance

Table 14. correlation between Purchase of crop insurance and previously purchased crop insurance

	Previously purchased crop	Purchase of crop insurance
Previously purchased crop insurance	Pearson Correlation	1	.664
	Sig.		.000
	N	107	107
Purchase of crop insurance	Pearson Correlation	.664	1
	Sig.	.000	
	N	400	400

Source: SPSS Output 2024

According to table 14, Pearson Correlation Coefficient between Previously purchased crop insurance and Purchase of crop insurance is 0.664. It indicates that there is a positive relationship between the two variables. The relationship is statistically significant because Sig. value is 0.000. Therefore, it can be statistically indicated that there is a significant and positive relationship between previously purchased crop insurance purchases and purchase crop insurance.

Relationship between Trust of Crop Insurance Company and Purchase of Crop Insurance

Correlation value for Trust of crop insurance companies and purchases crop insurance is 0.022 and it is a positive relationship. In below table the Sig. value is .0.005. Therefore, it can be statistically emphasized that there is a significant and positive relationship between the two variables.

Table 15. correlation between Trust of crop insurance company and Purchase of crop insurance

	Previously purchased crop	Purchase of crop insurance
Pearson Correlation	1	.022
Trust of crop insurance company Sig. (2-tailed)		.005
N	400	400
Pearson Correlation	.022	1
Purchase of crop insurance Sig. (2-tailed)	.005	
N	400	400

Source: SPSS Output 2024

Relationship between Amount of Risk Taken on by the Farmer and Purchase of Crop Insurance

Table 16. correlation between Amount of risk taken by farmers and Purchase of crop insurance

	Amount of risk taken on by the farmer	Purchase of crop insurance
Pearson Correlation	1	0.724
Amount of risk taken on by the farmer Sig. (2-tailed)		.000
N	400	400
Pearson Correlation	0.724	1
Purchase of crop insurance Sig. (2-tailed)	.000	
N	400	400

Source: SPSS Output 2024

The correlation value for amount of risk taken by farmers and purchase of crop insurance and benefit is .724 and it is a positive relationship. In the above table the Sig. value is.000. Therefore, it can be statistically emphasized that there is a significant and positive relationship between the two variables.

Relationship between Amount of Crop Insurance Premium and Purchase of Crop Insurance

Table 17. Correlation between Amount of crop insurance premium and Purchase of crop insurance

	Amount of crop insurance premium company	Purchase of crop insurance
Pearson Correlation	1	-.764
Amount of crop insurance premium company Sig. (2-tailed)		.000
N	400	400
Pearson Correlation	-.764	1
Purchase of crop insurance Sig. (2-tailed)	.000	
N	400	400

Source: SPSS Output 2024

Correlation value for Amount of crop insurance premium and Purchase of crop insurance is -0.764 and it is a negative relationship. In the above table the sig. value is .000. Therefore, it can be statistically emphasized that there is a significant and

negative relationship between the two variables.

Regression Analysis

Regression Analysis of purchase of crop insurance and factors affecting crop insurance purchase. In regression analysis, purchase of crop insurance was entered as dependent variable and Knowledge of crop insurance, previously purchased crop insurance, trust of crop insurance company, Amount of risk taken on by the farmer and Amount of low crop insurance premium were entered as predictor/independent variables. The results are produced in the following tables.

Table 18. Model Summary of purchase of crop insurance and factors affecting crop insurance purchase

Model Summary

Model	R	R Square	Adjusted RSquare	Std. Error of the Estimate	Durbin-Watson
1	.150[a]	.702	-.026	.4555	1.955

a. Predictors: (Constant), Amount of crop insurance premium, Knowledge of crop insurance, previously purchased crop insurance, trust of crop insurance company, Amount of risk taken on bythe farmer

b. Dependent Variable: Purchase of crop insurance

Source: SPSS Output 2024

According to table 18, model summary used to explain the dependent variable (Purchase of crop insurance) by using four predictor variables: Amount of crop insurance premium, Knowledge of crop insurance, previously purchased crop insurance, trust of crop insurance company, Amount of risk taken on by the farmer.

Here, the R square value is taken into consideration, which is 0.702 and it concludes that, perches of crop insurance can be explained 70.2% by using four predictor variables: Amount of crop insurance premium, Knowledge of crop insurance, previously purchased crop insurance, trust of crop insurance company, Amount of risk taken on by the farmer.

Table 19. ANOVA of purchase of crop insurance and factors affecting crop insurance purchase

ANOVA[a]

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	.483	5	.097	213.652	.000[b]
1Residual	20.953	101	.207		
Total	21.436	106			

a. Dependent Variable: Purchase of crop insurance

b. Predictors: (Constant), Amount of crop insurance premium, Knowledge of crop insurance, previously purchased crop insurance co, trust of crop insurance company, Amount of risk taken on by the farmers.

Source: Author Compiled based on SPSS Output 2024

According to the above ANOVA table, the significance value is (Sig') 0.000 and the F value of 213.652 is significant at the 0.001 level. It explains the significant relationship between dependent variables and independent variables. The results mean that 70.2% of the variance (R-square) in Purchase of crop insurance has been significantly explained by the four predictor variables.

Table 20. Coefficient of purchase of crop insurance and factors affecting crop insurance purchases Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.134	.818		3.831	.000
	Knowledge of crop insurance	0.148	.123	-.035	-.348	.163
	Previously purchased crop insurance	1.826	.431	-.003	-.031	.000
	Trust of crop insurance company	0.469	.131	.131	1.293	.001
	Amount of risk taken on by the farmer	0.168	.113	-.030	-.291	.100
	Amount of crop insurance premium	0.272	.084	-.029	-.284	.017

a. Dependent Variable: Purchase of crop insurance

Source: SPSS Output 2024

According to the above table, the researcher mainly considers coefficients and significant values. In here the researcher developed the multiple regression models as follows by presenting the coefficients of each independent variables and the constant value. The constant value indicates that though there are not any independent variables present, at that moment there is a value in dependent variable. According to this study there may be 3.134 while there are not any independent variables available.

$$\boldsymbol{Y = 3.134 + 0.148X1 + 1.826X2 + 0.469X3 + 0.168X4 - 0.272X5} \quad \textbf{(1)}$$

Y – Purchase of crop insurance

X1 – Knowledge of crop insurance

X2 – Previously purchased crop insurance

X3 – trust of crop insurance company

X4 – Amount of risk taken on by the farmer

X5 – Amount of crop insurance premium

All independent variables, except premium amount, positively impact crop insurance purchases. Knowledge (+0.148), prior purchase (+1.826), trust (+0.469), and risk taken (+0.168) increase purchases. Premium amount negatively affects purchases (–0.272). Significance values determine if these impacts are statistically meaningful.

Hypothesis Testing

Table 21. Hypothesis Testing

Hypotheses	*Relationship*	*Accept, Reject*
H1- There is a significant impact of knowledge of crop insurance on crop insurance purchases by farmers.	Significant	**Accept**
H2 - There is a significant impact of previously purchased crop insurance on crop insurance purchase by farmers.	Significant	**Accept**
H3 -There is a significant impact of trust of crop insurance company on crop insurance purchase by farmers.	Significant	**Accept**

H4 - There is a significant impact of amount of risk taken on by the farmer on crop insurance purchase by farmers.	Significant	**Accept**
H5 - There is a significant impact of amount of crop insurance premium on crop insurance purchases by farmers.	Significant	**Accept**

The results of the hypothesis testing indicate that all proposed hypotheses were accepted. Knowledge of crop insurance, previous crop insurance experience, trust in crop insurance companies, and the level of risk borne by farmers were found to have a significant and positive impact on farmers' crop insurance purchase decisions. In contrast, the amount of crop insurance premium demonstrated a significant negative impact, confirming that higher premium costs discourage farmers from purchasing crop insurance. Overall, these findings highlight that both informational and institutional factors, along with economic considerations, play a critical role in influencing crop insurance adoption among farmers in Sri Lanka.

V. Conclusion

Knowledge of Crop Insurance

The knowledge of crop insurance variable shows a positive coefficient (0.148) as expected. This positive coefficient can be interpreted as when farmers gain more knowledge about crop insurance, they are more likely to purchase crop insurance. This variable is statistically significant at 5% due to p value is 0.163. The knowledge variable is potentially important, as both the Sri Lanka Government and private crop insurance companies have recently attempted to provide farmers with more crop insurance information, in order to increase farmers 'knowledge of crop insurance, in hopes of increasing the crop insurance adoption rate. According to Hu et al. (2011), in some cases, lack of knowledge has prevented farmers from understanding their crop insurance policy coverage and details.

Previously Purchased Crop Insurance

Previous purchase of crop insurance, the variable which assumes affecting crop insurance purchases shows a positive coefficient (1.826) as expected. The variable also shows high statistical significance, at the 5 percent level as well as a 1 percent. These results show that if farmers bought crop insurance last year, they are likely to buy it again this year. By repurchasing crop insurance, it indicates that farmers who purchase it repeatedly have a favorable view of it and therefore purchase it again.

Farmers have the opportunity to go for renewal of insurance policies to save search cost and search time. This may affect to purchase of crop insurance. This can be assumed to be a factor affecting the purchase of liability insurance, rather than farmers spending excessive time and money on detailed analysis of all other new and existing risk management options related to crop insurance. Furthermore, positive as well as negative experiences of previous crop insurance purchases may affect the purchase of crop insurance. Positive experiences can influence repurchase of crop insurance as well as negative experiences can influence repurchase of crop insurance. It is clear that the value of the coefficient here is positive.

Trust of Crop Insurance Company

The variable, trust of the crop insurance company, has results showing that the coefficient is positive (0.469) as expected. Results are statistically significant at the 1 percent level or better and the p value of variable is 0.001. There is a positive relationship between variables. It can be concluded that the more trust in insurance institutions, the more inclined to buy crop insurance. These results indicate that farmers' trust in a crop insurance company is associated with crop insurance purchases. Therefore, the more farmers trust a crop insurance company, the more likely they are to purchase crop insurance. According to the Tuo, (2010), this trust variable is important

for crop insurance policy, as there have been some defaults on crop insurance contracts by crop insurance companies where the crop insurance companies were either unable to pay or refused to pay. These results indicate that farmers are more likely to purchase crop insurance if they trust the company, but less likely to purchase crop insurance if they do not trust the company.

Amount of Risk Taken on by the Farmer

Expected utility theory explains that a risk adverse individual prefers a certain alternative before an uncertain, if the expected utility is the same for both alternatives. Therefore, this expected utility theory also can apply for purchase of crop insurance. Risk preferences should have an impact on the choice to insure, and a high level of risk aversion is expected to be positively correlated with the choice to insure (Varian, 2006). In this study, the variable, the amount of risk taken on by the farmer, results show a positive coefficient (0.168) as expected, and the results are statistically significant at the 5 percent level or better. The positive coefficient shows that as farmers take more risk, they are more likely to purchase crop insurance. Thus, the risk reduction provided by crop insurance will help reduce other high risks taken by farmers. This is a very strong reason why risk influences the purchase of crop insurance. The effect of this risk can also influence the purchase of crop insurance in the opposite way. These results also imply that farmers who take on less risk would purchase less crop insurance, reflecting their reduced needs for crop insurance.

Amount of Crop Insurance Premium

The variable, importance of crop insurance premium, showed a negative coefficient

(- 0.272) and statistical significance at the 5 percent level or better. The negative sign indicates that that a lower crop insurance premium is associated with higher levels of crop insurance purchasing. In other words, results indicate that the demand for crop insurance is negatively sloping as expected, and that as the crop insurance premium decreases, farmers will purchase more crop insurance. This price sensitivity to premium cost also highlights the importance of the government crop insurance subsidy to farmers

Implication

Sri Lanka often faces instability or disasters in the agricultural sector, and this makes often be costly and may result in reduced growth for the agricultural sector as well as famers' productivity and wealth. Therefore, crop insurance provides an effective means for managing production risk. So, the main significant of this study to find was what factors affecting crop insurance purchased by farmers in Sri Lanka. The ultimate target of this study is the information that has been granted should be useful for insurance companies and government policy makers to increase purchase and adoption rate of crop insurance in Sri Lanka. As well as the study helps to launch awareness and training programs for farmers about the primary knowledge of crop insurance and what they cover and how payouts are measured. Furthermore, by doing this, it will help in increasing the confidence of the farmers in the crop insurance scheme. as a finally, this study will help to all Sri Lankan's famer to select a productivity risk management tool for protecting against the number of risk and hazard that they are facing in agriculture field.

Limitations

A possible limitation of the study is that data include only one geographic area, inner central north, Sri Lanka, and so the results may not be always fully generalized to all regions of Sri Lanka, for all situations. As well as there are very limited previous studies related Sri Lanka, and the reliability of data is depending on the respondents and perceptions.

Suggestions for Future Research

The range of crop insurance products in Sri Lanka is limited to insurance covering liability risks provided by insurance companies. With increased awareness of risks, especially weather risks, demand may arise for diversified crop risk management such as new products, especially insurance coverage during disasters such as floods and droughts. It would be interesting to examine the Sri Lankan farmers demand for these products and the problem with the absence in the market. This study has not examined the influence of information on the farmers' choice of crop insurance. Another focus could be to analyses if there are differences between farmers with and without insurance. There could also be of interest to evaluate how Sri Lankan. Government provides crop insurance to protect farmers by using social insurance schemes.

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Appendices

Appendix 1 – Morgen Table

TABLE 1
Table for Determining Sample Size from a Given Population

N	*S*	*N*	*S*	*N*	*S*
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	1000000	384

Note.—*N* is population size.
S is sample size.