Credit Risk Management Techniques Used by the Banks of Southern Punjab for the Management of Highly Correlated and Localized Risks in Agricultural Finance

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Abstract
Purpose: Agricultural is an important sector in economy of Pakistan. Agriculture plays significant role in economic development of Pakistan. Its contribution to GDP is about 23% and approximately 60% of our total population lives in the rural areas and most of them earn their livelihood from agriculture. Due to green revolution rapid changes have been occurred in production technologies and methods have been changed. Too much capital is required to adopt these methods and technologies but small formers cannot afford them. They need finance for production and investment purpose. The small former has very limited ability to agricultural finance for both production and investment needs and they are facing shortfall of credit. Banks hesitate to award agriculture credit because of higher credit risk. The main purpose of this research paper is to find out the credit risk that faced by the banks of Southern Punjab Pakistan and risk management techniques used by the banks of Southern Punjab Pakistan.
Methodology: In this research paper quantitative study on credit risk faced and its management techniques used by the bank of Southern Punjab is being made. Standard questionnaire is used for the collection of data on credit risk and its management techniques from the banks. A sample of 45 banks branches from 17 banks that award agriculture credit was taken from two districts (Bahawalpur and Rahim Yar Khan).SPSS software is being used for the analysis purpose. The Frequency distribution was used for analysis.
Finding: The findings of this research article are that 82.2% of banks have faced the situation of credit risk in which farmers failed to pay back the credit to bank. 53.3% respondent considered the production, price and policy risk together affect all the farmers in a particular geographical area. 35% considered willfully rejection risk as important risk that arises due to individual farmer. Sixty percent respondents use the crop insurance for the management of production risk. 48.9% bank used no technique for the management of price risk. 75.6% respondent's views that improvement in laws and policies on land ownership will help in credit risk management. Sixty percent respondent does not insure the life of farmer. 77.8% use collateral management for the management of willfully rejection risk. According to 75.6% respondent fire/theft insurance of agricultural asset will help to manage this risk.
Value: The value of this research paper is that it gives us idea about the credit risk faced and it management techniques used by the banks of Southern Punjab Pakistan. It also gives us idea about the credit risk management techniques which are being used in the world but not in the Southern Punjab.
Research Implications: The research implications of this paper are to increase the understanding of factors which are basis for credit risk in agriculture finance and its management techniques used by the banks of Southern Punjab. .
Paper Type: Research Paper
Keywords: agricultural Finance, credit risk, credit risk management techniques in agricultural finance, crop insurance, highly correlated risk, localized risk, price smoothing.

1. Introduction

Agriculture is an important sector of Pakistan economy. It is the backbone of our economy. According to Pakistan Bureau of Statistic its contribution to our Gross domestic product is about 21percent and about 68 percent of total Pakistan's population directly or indirectly involved in forming and non-forming agricultural activities. It provides employment to almost 45 percent of labor force of Pakistan. Agricultural sector of Pakistan is very actively contributing in export earnings of Pakistan. Only food sector contribution in total export of Pakistan is 17.50 percent in 2010-11. Agriculture sector of Pakistan is also actively contributing in industrial development. It is a major supplier of raw material to industry. Because almost 60 percent of Pakistan's is industry agro base which depends upon agriculture for raw material supply e.g. textile and sugar industry. Due to this reason any factors that affect the agriculture affect the population and the economy as a

whole.

Formers require fertilizers, quality seeds, modern machinery, innovative techniques of production, labor, timely provision of adequate water, storage facilities, etc. Which required funds but most of farmers are small and do not have funds according to their requirements. Due to this reasons this need is fulfill by financial institutions, government banks, commercial banks, cooperative societies, NGO's or informal sources e.g. family, friends, relatives and social circles. But financial institutions are major source of fund supply in Pakistan (Ullah, 2007).

Some specialized financial institutions are working in Pakistan for the supply of agriculture finance for example Zarai Taraqiati Bank LTD. Commercial Bank's agriculture credit departments are also providing loans for this purpose (Ullah, 2007). According to Pakistan Economic Survey 2012-13 during July-March 2012-13 credit of about Rs 231 billion was provided to agriculture sector of Pakistan and there is an increment of 17 percent as compare to Rs 197.4 billion of last year. The distribution of agriculture credit according to institution is as follows

Institution	Amount
Commercial Banks	Rs. 123.7 billion
Zarai Taraqiati Bank Limited (ZTBL)	Rs. 38.0 billion
Domestic Private Banks	Rs. 51.0 billion
Microfinance Banks (MFBs)	Rs. 13.0 billion
Punjab Provincial Cooperative Bank Limited (PPCBL).	Rs. 5.4 billion

It is rely true that credit supply has increased but it is still not sufficient to meet the need of agriculture sector of Pakistan. The reason behind this is that there are many risks involved in agriculture sectors that why financial institutions hesitate to provide credit to agriculture sector.

The structure of the of the paper will be as follow

The first section is introduction. Second section will be consists on the literature review in which risk, credit risk, localized and highly correlated risks in agriculture and risk management techniques are being discussed. The Third section will be network diagram and in the fourth section results and discussion are given. The last section will be consists of conclusion and recommendations.

2. Literature Review

2.1 Risk

According to Business Dictionary.Com "A probability or threat of damage, injury, liability, loss or any negative occurrence that is causes by external and internal vulnerabilities, and may be avoided through preemptive action." Risk is the possibility that an event will take place. It is mostly used to express the possibility that a particular outcome will come after a particular experience (Burt, 2001).

Risk is the probability that the results of any act could bring unpleasant outcomes. Due to this outcome it is possibility of direct loss of earning or capital or it may affect the ability of bank to meet its business objectives (Ullah, 2007).

Risk can be describe as the probability of accordance of unfavorable outcomes due to uncertain and flawed knowledge in making decision (Drollette, 2009).

2.2 Credit Risk

Default risk is also known as credit risk e.g. the probability of loss due to borrowers inability to pay back the borrowed amount (principal and interest or one) to financial institution according to predefined terms and condition (Tanninen, 2013).

2.3 Credit Risk Management

According to Sherrie Scott credit risk management is the main cover for the lender financial institution to protect itself against the borrowers who are unsuccessful to meet the condition of loan or other owed funds that were extended to them. The success of banks depend upon that they manage their credit and take accounted risks that they can handle.

2.4 Risks in Agriculture

Agriculture risks occur due to the happening of uncertain event which we cannot perfectly predict for example change in weather condition, price fluctuations and uncertain demand of product in the market. Risks in Agricultural can be of two types

2.5 Localized risks:

which affect the individual farmer or lender for example death or illness, asset of a farmer and also for lender due incorrectly estimating the credit worthiness of farmers, willfully rejection from farmer side to pay credit and wrong estimation from lender side to estimate the cost of loan(Nair, 2009). Assets risk is mostly faced by the business and it include the loss of asset due to asset theft, fire, and different other reasons (Ngathou, Bukenya, & Chembezi, 2006).

2.6 Highly correlated risks:

These are the risk which affect the whole community as a whole for example price risk, weather risk, market risk, production risk and drought in a large geographic area.

2.6.1 Production Risk

Production risk occurs due to unpredictable nature of weather e.g. heavy rain, flood, drought, hail and attack of pets and large no of factors which create unpredictability about the crop production and livestock (Hardaker, 2004). Animals which are affected by diseases can reduce the growth rate of livestock in the country and it can also contribute in market risk because restriction on the export of animal can be imposed due to disease ((REAS), 2010). This risk cut back the formers capacity to pay back the loan and increase the default ratio of farmers due to this reason lenders hesitate to award loan to farmers and these risks are difficult to manage.

2.6.2 Price Risk

This is the risk due to inability of farmer to know about the price of input e.g. seed, pesticides, fertilizer and water/electricity and also the prices of output in the market. Farmers cannot about the price in the start of cultivation because agriculture crops are of long duration and it is not possible for farmers to rightfully estimate the price of inputs and output. The competition in the local and international market has also increase this risk. Exchange rate risk also increase the price risk (Hardaker, 2004). Prices of inputs in agriculture sector is also affect due to gap between input purchase decision and production decision means how much we want to produce((REAS), 2010). Especially the prices of agriculture output is based on the demand and supply forces when demand of agricultural output is low price will also be low but when demand is high price will also be high. Nature of commodity is also affecting factor when commodity is of perishable nature e.g. milk and storage cost in high the price will be more volatile but when commodity can be store easily and at low cost the price e.g. wheat then price will be comparatively high because farmer has the option to store it more time ((REAS), 2010).

2.6.3 Institutional/Policy Risk

Government policies are another source of risk for the farmer. The change in any rule and regulation may have affect negative or positive on the farm product and ultimately affect the profitability of farmers e.g. any change in tax law or change in various subsidies payments will affect the farmer. Historically the farmer are negatively affected due to law of prohibition of pesticides utilization in the farm and owners of poultry farms are also negatively affected due to prohibition of not utilization of drug and other medicines for the prevention of diseases. Political risks are also included in these kinds of risks. The government failure to do agreement with foreign government to do an agreement which is favorable for the agriculture is also called government risk. Risk of breach of agreement between the organization is also a type of institutional risk e.g. breach of agreement between the parties in management of supply chain is also a reason of more risk in the modern age of agriculture business (Hardaker, 2004) .

2.7 Risk Management

2.7.1 Price Risk Management

For price risk management two main instruments are used future and option contracts that allow agent to cover that risk. It future contract both parities decide an agreed price on that price both made the purchase and sale of agriculture commodities. Option is a agreement between two parties in which buyer has the option to buy or sell a commodity at some future date but it is right but not the obligation for buyer but in contrast in future contract it is obligation which buyer has to fulfill at any cost (Fissha, 2009). Contract farming is another technique to manage price risk in which farmer may contract with a contractor to deliver the specific quality, quantity and other specification at specific price. The contractor can also provide credit to farmer at some specified interest rate and can deduct the original amount of credit plus interest at the time of purchase of crop (Larson, Anderson, & Varangis, 2004). Outgrower schemes are another form of contract forming in which contract is made for the long term. The contractor may make contract to grow same crop at the specified area. In which it can offer the basic input and advisory services to farmer. The specifications of packaging requirement can also be specified at some predetermine price. These types of contracts are usually done by big supermarkets(Jessop & Harms, 2012). Another technique which is mostly used in developed countries is agricultural factoring in which factoring company almost delivers 70 percent of price of crop to former it is mostly use for tea crop because it take time to sell. Farmer has not to sell crop at lower price due to low demand at that time because of need of funds. Invoice in issued by factoring company when farmer sell the crop original amount plus 2.50 percent will be automatically deposited into the account of factoring company. Warehouse receipt is also another arrangement which help the farmer to manage price risk. The customers deposit its crop in the warehouse and get a receipt and by depositing receipt into bank he can get loan 70 percent of the whole deposited crop. It is mostly used in grain. It helps farmers to not sale crop when price are low in the market. When farmer sell the crop it make the principal plus interest payment into the bank by this way he can make more profit(Jessop & Harms, 2012)..

Price smoothing is another techniques which is being used in the world to manage the price risk in which price of commodity usually cotton is set by taking five year average price. If the prices of cotton increase in the world market the increased price is deposited in the price smoothing fund if the price decreased the balance is paid to farmer from the price smoothing fund. It is an important technique to manage price risk (Jessop & Harms, 2012).

2.7.2 Production Risk Management

This risk can be management by offering crop insurance in agriculture sector. In case of any loss to crop is compensated by insurance company but this is very risky task and most of insurance programs fails in the world.

This can only be made only possible with the help of government and other international organization through subsidies (Narayana, 1992). Traditional crop insurance is affect by moral hazard and adverse selection of insurance contract. In both cases the reason of loss is that farmer has better knowledge of crop and land fertility than the insurance provider and they are in a better position to take more actions to take more payout from the insurance provider (Larson et al., 2004). Diversification of crop is an important technique at farm level to manage the production risk because if one crop fails due to bad weather or pets attack it can be compensated by another crop (Jessop & Harms, 2012).

Index insurance is another recent development in agriculture insurance. It is an instrument in which payment to the farmer is linked with the threshold when the index crosses that threshold payment to farmer is made without the excess of loss. This type of insurance contract decreases the moral hazard and risk of adverse selection of insurance contract. In index insurance contract different threshold are define with increase payment as risk event increase. The index can be calculated on the bases of rainfall, moisture, event of locusts, level of water in river, temperature of sea surface, hail, etc. For index insurance calculation of weather index different types of weather stations are used (Jessop & Harms, 2012).

. Contingences Fund for disaster relief management can be created by the government in order to compensate the farmer in case of disaster. This fund helps farmers to prevent themselves against the bad luck/fortune (Fissha, 2009).

2.7.3 Policy Risk Management

Government should introduce policies and law which are related to land owner and other policies which are related to agriculture sector. The land is served as collateral security in agriculture finance when proper legislation is done access to agriculture finance can be increased. The warehouse receipt in also a burning issues government has to introduce proper legislation for this. The free trade agreement has to be done with foreign countries in order to increase the export of agriculture products. The government has to introduce proper legislation regarding the institutional reforms (Jessop & Harms, 2012).

2.8 Management of localized Risk In agricultural Finance

The risk which faced by the individual farmer or financial institution is called localized risk. Followings are the measures to manage localized risks.

2.8.1 Collateral Management

Collateral management is easy for the bank or financial institution when it accept immovable security e.g. land, building, etc. as collateral then the movable security e.g. car because there are some risks which are associated with movable security. So bank or financial institution should accept immoveable security as collateral for big, medium and long duration loans and immovable securities can be accepted for short term loans (M. R. Mustafa, 2011). For short term financing group financing can be used in case farmers do not have moveable or immovable security as collateral. In group monitoring and financing costs are low because of group member are responsible for each other (Finance, 2012-13).

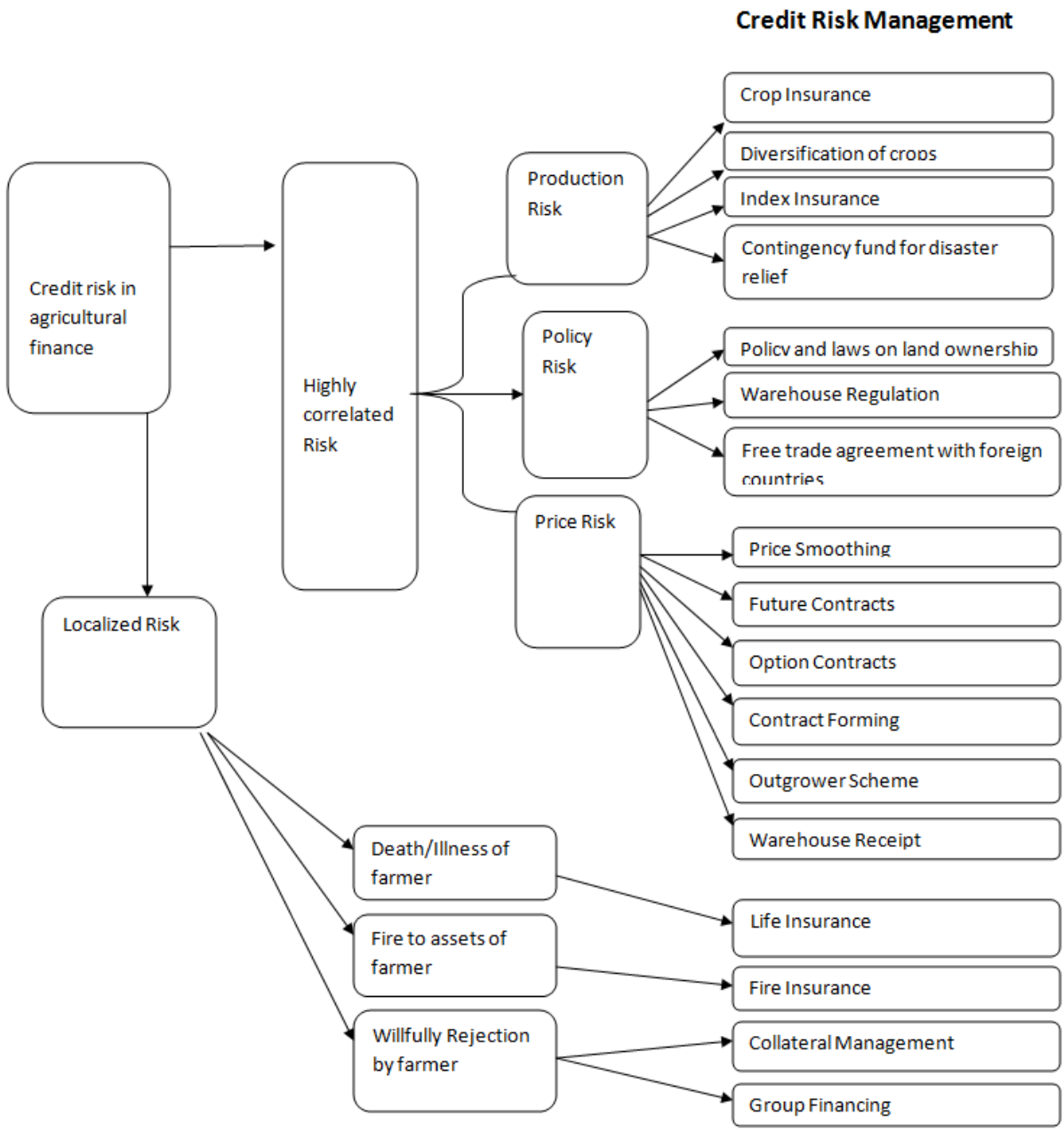
2.8.2 Fire Insurance

In order to cover loss due to fire insurance is used like for loss of agricultural machinery, building and for grain. The losses due to fire are pay by the insurance company. In Morocco the area of grain for fire insurance does not exceed 200000 ha in case of good forming season (M. R. Mustafa, 2011).

2.8.3 Life Insurance

The banks demand insurance to cover the risks related to life of farmer and for the investment project before awarding loan to the borrower essentially for investment purpose loans. The requirements of insurance are necessary to cover the whole amount of credit and remain enforce until the whole amount is recovered. The premium for insurance is paid by the farmer and in case of farmer failure to pay partial or whole amount due to death or disability of farmer is recovered from the insurance company (M. R. Mustafa, 2011).

3. Network Diagram



3.1Research Methodology

The research is quantitative in nature. Survey research methodology is being used in the research paper. The standard questionnaire is used for collected of response from the Bank's Agri Credit Department. Standard questionnaire will be used for the collection of response from the banks about the risks being faced and techniques which can be employed for the management of credit risk in payment of agricultural credit. Area of study is Pakistan but due to scarcity of time and resources Southern Punjab is selected for this purpose. Random sample is taken. The sample is consists of 45 branch's of Two specialized banks Zarai Taraqiati Bank and Punjab Provisional Cooperative Banks Limited and five major commercial banks (United Bank Limited, Allied Bank Limited, , National Bank of Pakistan, Muslim Commercial Bank Limited, Habib Bank Limited) and ten domestic commercial banks(Askari Bank Limited, Bank of Punjab, Bank AL-Habib, Bank AL-Falah, The Bank of Khyber, Faysal Bank, Sindh Bank, KASB Bank, Soneri Bank, Silk Bank Limited. The sample will be taken from the above mentioned bank's branches of district Bahawalpur and Rahim Yar Khan. The software which will be used for data analysis is SPSS. Frequency distribution will be used for analysis.

4. Results and discussion

Table 1 Distribution of respondent by experience

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 5 years	19	42.2	42.2	42.2
	5-10 years	19	42.2	42.2	84.4
	11-15 years	1	2.2	2.2	86.7
	16-20 years	1	2.2	2.2	88.9
	over 20 years	5	11.1	11.1	100.0
	Total	45	100.0	100.0	

In the table 1 the frequency distribution of respondents by work experience in the bank is given. It shows that large portion of respondents 42.2% have work experience of less than 5 years the other 42.2% have also experience of 5-10 years in the bank. Only 2.2% respondents have experience of 11-15 years and 16-20 years respectively. Respondent which have experience over 20 years consists of 11.1%..

Table 2 Distribution of respondent by credit risk faced

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	37	82.2	82.2	82.2
	No	8	17.8	17.8	100.0
	Total	45	100.0	100.0	

Table 2 shows the distribution of respondent by the credit risk faced by the banks in agricultural finance. Large portions 82.2% of respondent have faced the situation of credit risk (farmers failed to pay back credit to bank). Only 17.8% have not faced the situation of credit risk. This indicates that credit risk exist in the Southern Punjab banks of Pakistan.

Table 3 Distribution of respondent by perception of highly correlated risk in agriculture

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Production Risk	10	22.2	22.2	22.2
	Price Risk	6	13.3	13.3	35.6
	Policy Risk	5	11.1	11.1	46.7
	All of the above	24	53.3	53.3	100.0
	Total	45	100.0	100.0	

Distribution of respondent by perception of highly correlated risks (Risk that affect all the farmers in particular geographical area) is illustrated in table 3. A large portion of respondent 53.3 percent considered all of above (production, price and policy risks) as highly correlated risk. On the other hand 22.2% considered production risk as highly correlated risk. Only 11.1% are considering policy risk as highly correlated risk. According to 13.3% respondent's price risk is the risk that affects all the farmer in particular geographical area. .

Table 4 Distribution of respondent by perception of localized risk in agriculture

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Death of farmer	3	6.7	6.7	6.7
	Illness of farmer	2	4.4	4.4	11.1
	Fire/ theft of asset	2	4.4	4.4	15.6
	willfully rejection by farmers	16	35.6	35.6	51.1
	both 1&2	8	17.8	17.8	68.9
	all of the above	14	31.1	31.1	100.0
	Total	45	100.0	100.0	

The distribution of respondent according to perception of localized risk is showed in table 4. According to 35.6%

respondent willfully rejection by farmer is the risk that arises due to individual farmer. Only 6.7% considered death of farmer, 4.4% illness of farmer. 4.4% fire/theft of asset, 17.8% both death and illness of farmer as localized risk. A large portion of respondent 31.1% considered all the above discussed risk (death, illness, fire/theft of asset and willfully rejection by farmer) as localized risk.

Table 5 The Distribution of respondent by production risk management technique adoption

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Crop Insurance	27	60.0	60.0	60.0
	Contingency fund for disaster relief	2	4.4	4.4	64.4
	Both 1&2	11	24.4	24.4	88.9
	Other	5	11.1	11.1	100.0
	Total	45	100.0	100.0	

The table 5 shows the distribution of respondent according to production risk management technique adoption. A large portion of respondent 60% considered crop insurance as production risk management technique. Only 4.4 % considered contingency fund for disaster relief as production risk management technique. No respondent relay only on diversification of crop for production risk management. Sixty percent of the respondents manage the production risk by insuring the crop. On the other hand 11.1% and 24.4% respondent respectively use other techniques and both crop insurance and diversification of crop for production risk management.

Table 6 Distribution of respondent by price risk management techniques adoption

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Price Smoothing	9	20.0	20.0	20.0
	Future Contracts	10	22.2	22.2	42.2
	Option contracts	1	2.2	2.2	44.4
	Contract farming	2	4.4	4.4	48.9
	Warehouse Receipt	1	2.2	2.2	51.1
	None	22	48.9	48.9	100.0
	Total	45	100.0	100.0	

Table 6 illustrates the frequency distribution of respondents by price risk management techniques adoption. A large portion of the respondent 48.9% does not employing any technique for the management of price risk in agricultural finance. Twenty percent depends upon the price smoothing for the management of price risk in agricultural finance. Only 22.2% considered future contract, 2.2% option contract, 4.4% contract farming, and 2.2% considered warehouse receipt as the important technique for the management of price risk in agriculture finance.

Table 7 Distribution of respondent about the policy making regarding credit risk management

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Improvement in policies and laws on Land ownership	34	75.6	75.6	75.6
	Policy making regarding warehouse receipt	6	13.3	13.3	88.9
	Free trade agreement with foreign countries	5	11.1	11.1	100.0
	Total	45	100.0	100.0	

The table 7 shows the distribution of respondent by policy making for the management of policy risk in agricultural finance. A large portion of respondents 75.6% viewed that improvement in policies and laws on land ownership will be helpful in the management of credit risk. According to 13.3% respondents policies regarding the warehouse receipt should be made. Only 11.1% respondents were in the favor of free trade

agreement with foreign countries.

Table 8 Distribution of respondent by Life Insurance of farmer usage

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	18	40.0	40.0	40.0
	no	27	60.0	60.0	100.0
	Total	45	100.0	100.0	

Frequency distribution of respondent by life insurance of farmer in order to manage death/illness risk in agricultural finance is showed in table 8. A large portion of respondents 60% are not doing life insurance of farmer for the management of death/illness risk. Only 40% of respondent are employing life insurance of farmers while awarding agricultural credit.

Table 9 Distribution of respondent by adoption of techniques for the management of willfully rejection risk

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Group financing	2	4.4	4.4	4.4
	Collateral management	35	77.8	77.8	82.2
	Both 1&2	6	13.3	13.3	95.6
	other	2	4.4	4.4	100.0
	Total	45	100.0	100.0	

In table 9 the distribution of respondent by the adoption of techniques for management of willfully rejection risk is shown. A very large portion of respondents are using the collateral management technique for the management of willfully rejection risk by farmer. Only 4.4% use group financing 13.3% use both group financing and collateral management and 4.4% use other techniques for the management of this risk.

Table 10 Distribution of respondents by usage of insurance for the management of theft/fire of assets risk

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	34	75.6	75.6	75.6
	no	11	24.4	24.4	100.0
	Total	45	100.0	100.0	

Table 10 shows the distribution of respondent by the usage of insurance for the management of theft/fire risk in agricultural finance. A large portion of respondents 75.6% are using insurance of assets for the management of fire/theft risk. Only 24.4% of respondents are not employing any insurance for the management of this risk.

5. Conclusion

The banks of Southern Punjab are facing the problem of credit risk in agricultural finance about 82.2% banks have face this kind of situation. According to 53.3% respondents production risk, price risk and policy risk are risks that are affecting all the farmers in the particular geographical area. The willfully rejection, death/illness, fire/theft of asset are the risks that affect the individual farmer. Mostly banks about 60% use the crop insurance as an important production risk management technique. About 48.9% respondents is not using any technique for the management of price risk other respondent are relying on price smoothing, future contracts, contract farming. In the views of 75.6% respondent government should improve the laws and policies regarding the land ownership. Sixty percent banks do not insure the life farmer in order to cover the death or illness risk. Most of the banks about 77.8% use collateral management for the management of willfully rejection risk and about 75.6%

insured the agricultural assets in order to cover the fire/theft of farmer's assets risks.

5.1 Suggestions

- Government should make policies and laws regarding the warehouse receipt because it the one of innovative technique which is being used in the world for the management of price risk in agricultural finance.
- Courses regarding the management of credit risk in agricultural finance should be included in the university and college level.
- The State Bank of Pakistan should expand its program of training of agricultural staff of commercial banks. The commercial banks should also initiate its own programs for the training and development of agricultural credit department staff.
- Before awarding the credit for agricultural purpose farmer history should be tracked carefully.
- Banks should charge variable interest rate if farmer deposits the credit before date interest rate should be reduced it will motivate the farmer.
- The use of credit should be properly monitored so that misuse can be prevent because sometime farmers used it for domestic purpose e.g. marriage.
- Attention on the education of farmer should be given.
- Government should also facilitate the index insurance in Pakistan which will help in the management of production risk.

5.2 Limitations

The research is done only in the banks of Southern Punjab one can done it on national level.

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