International Journal of Agricultural Management and Development (IJAMAD)
Available online on: www.ijamad.iaurasht.ac.ir
ISSN: 2159-5852 (Print)
ISSN:2159-5860 (Online)

The Analysis of Iran Cotton Producers' Risk Degree Based on Non-Linear Mean-Standard Deviation Model

Ebrahim Moradi [1] and Asma Abdollahi Darmian [2]*

Received: 29 October 2015,
Accepted: 13 December 2015

Abstract

As regards decreasing cotton cultivation in Iran during these years, the degree of risk taken by a cotton cultivator in the agricultural part is important. The studies showed that the cotton crop yield during the past years did not have enough growth and the cotton cost product in the period of study cotton production costs, has increased. In this paper, the risk orientation of cotton cultivators was investigated; the researchers have done this employing a parametric approach and the Saha Mean-Standard Deviation Model. Statistical information and the cost product of provinces which produce cotton between 2000-2010 were collected. Econometric models with panel data were estimated. The results showed that cotton cultivator aversion, risk, and the trend increased when the income and the fluctuation cost product went up in each hector.

Keywords:
Iran, cotton, cost product, Mean-Standard Deviation Model, risk

[1] Assistant Professor, Department of Agricultural Economics, University of Sistan and Baluchestan, Zahedan, Iran
[2] MSc Student, Department of Agricultural Economics, University of Sistan and Baluchestan, Zahedan, Iran
* Corresponding author's email: eb_moradi@eco.usb.ac.ir

INTRODUCTION

Farmers have to decide in risky conditions, and economic decisions are affected by their risky decisions. These decisions are about level production, inputs purchase, and the use of technology. Decision component of producers determined and implemented under the influence risk and uncertainty.

Determined and implemented. In 2000, the amount of cotton cultivator was 246000 hectares. In the years 1962-2013 the cotton level crop in the country was about 81 thousand hectares that was equal to 7% total product level and 14.4% of total level crop industry productions and 9.7% for watery plant land. Dry farming land is 3% and just in Golestan and Mazandaran Provinces, we have dry farming. As regards significant decrease of cotton plantlevel in Iran during these years, studies about risky behavior of cotton cultivators are important. Considering continental potential, exiting source, the quality of country seed producing, and the demand of loom industry for cotton, scientific studies must be done on the increasing production of this strategic product.

In general, people based on their behavior toward risk are divided into three groups:

Aversion to risk people: person's behavior shows that most of them are aversion, risk and risk aversion is a general behavior method. People view towards risk is determined by their utility function. Aversiontorisk people have a concave utility function and convex in different utility caves towards origin coordinates. This group prefers no-risk position to risky position with equal expected value.

Neutral Risk People: regardless of risky position with linear utility function. So their final utility is fixed.

Risky People: this person has convex utility function and their final utility is ascending.

These people select a fair game when they are confronted with a certain selection and an equal expected value game and even may select an unfair game which its unfair degree has.

In general, risk refers to uncertain results of the verbal act and clear action inthe future and danger concept too is accepted as an artificial, (Ferdosi & Koopahi, 2005).

As forrisk management in agriculture, Abdulkadri et al. (2003) estimated the coefficient of aversion, risk for dry farming wheat, watery corn, and husbandry in Kansans. They used non-linear Mean-Standard deviation (Saha) for farmers view, and Arrow-Prat criterion, nonlinear complementary method, is added. The results showed that in producing dry-farming wheat, the effect of economic-social variables on farmer's aversion, risk, and the study of the family size, the position of sources ownership had aneffect on risk aversion. From among socio-economic factors, risk aversion related to the role of labor, credit and amount of fertilizer. As for the size of the family and sources, ownership has a positive effect, and the available capital for farmer have a negative effect on risk aversion.

Dashti and Khaksar Khayabani (2013) estimated the trend of Tabriz onion cultivator at risk by using of non-linear standard deviation. That gathered 233 information about onion cultivators by two- step extraneous sample method, between 1989-2010 and used Saha parameter approach Mean-Standard Deviation. The results showed that farmers are risk aversion and this risk aversion goes up with their increasing activity risk and goes down with their increasing income.

Yusef et al. (2015) studied the poverty and the approach of risk aversion in the north of Nigeria. The approach of farmers towards risk by using Tobit Regression Model showed that 58.9% of farmers was aversion risk. The position of farmer's poverty, membership in organizations and high school education had been effected at farmers' aversion risk.

Liu and Huang (2013) studied the tendency on risk and decision for accepting China Technologiescotton plant. The result showed that constraint credit has a positive relationship with aversion risk.

Shahnooshi et al. (2013) studied the effect of the government protection policy on the income risk and cost production for garden production (pistachio, date apple and orangery). Information was gathered from FAO organization, the Islamic republic of Iran customs, and central bank of garden part of the agriculture department, insurance bank of agriculture product transportation organization and the idea of garden experts, all modifications were done in formal exchange rate. For studying income risk on selected cost production in cost production function, in addition to producing factor cost and product, income risk was considered to estimate the producing factor on cost product. The results showed that protection averagely could decrease the product income risk and cost product was decreased too. As regards cost protection have the most effect on the decreasing of producers income risk. The writers proposed that government increase the costs.

Saeedian (2013), to evaluate the utility and welfare of Mazafati date producers with regards of production risk in Suran city used parameters of Means of Production variance functions for estimating growth effects of using produce factor in the utility, cost production, and farmer monetary welfare. The result of changed index of welfare variables showed that between 2011-2012 technique charge of the production Mean function is positive and at the same time risk, cost has less increase and in general caused the trivial increase of producers Monetary welfare, averagely 6%.

Zibaee and Mirzaee (2013) studied the effective factors on accepting supplementary insurance in Rafsanjan County, Iran. For estimating the coefficient of aversion, risk uses the direct estimation method, the method of SFR certainty first formula is one the best methods for measuring risk. This method preferred in empirical works because it doesn't need the estimation priority utility a rain function.

The results showed that the effect of activity background variables, the size of the garden and the number of the gardens of the accepted insurance is positive and meaningful.

Mousavi et al. (2012) studied the role of insurance income in the management of farmer's risk (case study: Darab Cotton cultivators). The results showed that because the correlation coefficient between cost and function is negative, considering the direct relationship, because the decrease of income insurance with risk fluctuation decrease related to cost and production considered as the best way for less income.

Shahraki et al. (2011), have measured the technical efficiency of rice production with risk. In their study, by Transcendental Logarithmic function does at the same time to estimate the stochastic frontier production function and technical inefficiency. The marginal risk estimation results showed that the consumer has no significant effect on production changes.

In general aversion, risk is accepted as an artificial reality in agriculture. It is expected when wealth goes up, aversion risk decreases. This risky trend is known to decrease aversion, risk appropriately and this is a logical behavior pattern for aversion risk farmers. Although, there are some problems for estimating other risky trending structures with Arrow-Prat criterion, the findings show the existence of other risky trends among farmers (Abdulkadri & Langemeier, 1999).

Farmers decisions under uncertainty conditions are model based on expected utility which was introduced by Van New man and Morgenshtain. Later, Tobin (1958) and Markowitz (1952) separately introduced Mean-Variance approach. Based this approach, the utility from extraneous expectations can be distributed as two first torque about output average. The general problem for estimating is the lack of flexible utility function, this function shows the different structure of risky prefers.

Arrow-Prat is defined as maximizing expected utility and utility as a function of uncertain wealth, a utility with a decreasing rate goes up when utility is added. Absolute risk aversion criterion A-P describes the change of risk aversion as a wealth level change and relative risk aversion criterion A-P does cribs the changes in risk aversion as a risky prospect and wealth level that change in the same ratio.

Saha (1997) showed that Arrow-Prat criterion impose appropriate restrictions on risk aversion ratio, which were estimated based on selected function shapes. Therefore, Saha proposed a risk version non-linear Mean-Standard Deviation that remove this restriction and in the cloud all risky preferences. In other words, this includes fixes and growth of absolute and relative risk aversion. This new function shows a strong prediction about farmer risky preferences. Absolute and relative risk aversion and risky mean that the growth of absolute risk aversion shoes that when the level of risk activity goes up, the risk aversion of producers goes up too, and relative risk aversion means that farmers who have much more income are more risk aversion farmers (Toledo & Engler, 2008).

Below Saha non-linear Mean- Standard Deviation approach, utility defines as two first torques of certainty wealth and risky trends in negative variables defined as the proportion of partial differential of utility function with standard deviation and wealth mean. The size of risky trends shows that risk aversion indifference towards risk or risk is related to ratio sign. Under certain conditions risk aversion, the size of risky trend reflexes the degree of risk aversion. Another absolute and relative characteristics of risk aversion are defined by the amount of utility function provides the reflex ion of types and degrees of risky trends (Abdulkadri & Langemeier, 1999).

Other studies havebeen done by other researchers included Abdulkadri et al. (2003), Toledo and Engler (2008), Sekar and Ramasamy (2001), Saha (1997). In evaluating Iran cotton cultivator trend in risk, with non-linear Standard Deviation, used information about the 12 cotton producing provinces in the country. The purpose of this paper was to study the trend of risk Cotton cultivator and to show policies about risk management.

In the next part we will explain the theoretical approach and then based on a theoretical approach, model and the results have been determined and after debating and consideration the results for political suggestion have been shown.

MATERIALS AND METHODS

As was explained earlier, the proposed function is related to two first token: mean and variance. If a utility function defined as:

$$U=U(\mu ,\sigma) \qquad (1)$$

where U is utilized, u is income mean and σ shows income standard deviation. Saha proposed a utility function that decisions taken based on mean and standard deviation of extraneous wealth, these variables is shown by *S, M* respectively. so:

$$U(\mu,\sigma)=U (M,S) \qquad (2)$$

Meyer (1987) introduced characteristics that provide Arrow-Prat size for Standard Mean-Variance (MV) approach. Therefore, trend to risk (A) with Arrow-Prat is defined as

$$A(M,S) \equiv - (US / UM) \qquad (4)$$

This criterion determines risky preferences based on submersion utility function that is derived from the first and second derivatives of functions. u_s and u_m show partial differential utility function, proportion to Standard Deviation and mean wealth. Risk aversion, indifference and trend for risk are coordinated for respectively. In risk aversion condition

$$A(M,S)>0 , \qquad A(M,S)=0, \qquad A(M,S)<0,$$

Shows the degree of risk aversion. The derive sign of risky trend, as regards to the amount of wealth (A_M), considered as the absolute risk aversion size. The decreasing (DARA), constancy (CARA) and increasing(IARA) of absolute risk aversion are showed A_M:0, $A_M<0$, $A_M>0$ respectively (Abdulkadri & Langemeir, 1999). The inflexibility utility function is defined as:

$$U(M ,S)=M\theta - S\gamma \qquad \theta > 0 \qquad (5)$$

where, θ and γ determine the type of risky trends, if Meyers results can be used in saha proposed function, function 6 will define risky preference:

$$A(M,S) = - (US/UM) = (\gamma/\theta) M1- \theta S\gamma-1 \quad (6)$$

based on this formula, risk aversion, indifferent towards risk and risky will be γ<0, γ=0, γ> 0respectively. We will have decreased, constancy and increasing absolute risk aversion or risky if $\theta<1$, $\theta=1$, $\theta>1$ respectively. We will have decreased, constancy and increasing relative risk aversion or risky if θ>γ, θ=γ, θ<γ respectively. Therefore, all risky preference structures will be possible under different parameters. If farmers were having completely in a competitive market and extraneous wealth is a function of production extraneous cost, so the wealth of producers will define as:

$$\hat{W} = P^{\sim} Q - C(r,Q) + w \quad (7)$$

Where Ŵ shows producers extraneous wealth, P˜cost product, Q product level, *C(r,Q)* is cost function that is defined with input cost or product level and M is the producers out of farm income. So, extraneous wealth and cost standard deviation can be estimated based on (*S, M*) variables.

$$M = p^{\sim} Q - C(r, Q) + w \quad (8)$$

$$S = \sigma p Q \quad (9)$$

where σ_P, (15) is product cost standard deviation.If producer maximize the derived utility, producers' optimization will be:

$$MaxQ\ U(M,S) \equiv U(p^{\sim}Q - C(r,Q) + w, \sigma p Q \quad (10)$$

The first condition for this function in formula 16 will be:

$$[p^{\sim} - Cq(r,Q)] = (\gamma/\theta) M1- \theta S\gamma-1\sigma\gamma p \quad (11)$$

where C_q is final cost. If γ=0, it means thatthe producer is indifference towards risk, so the formula (11) will be summarized to equal cost and final cost. Formula (11) says that the difference between cost and final cost can be defined by producer's risky preferences. If we get log from formula (11), we will have:

$$Ln[P_i - C_q(r_i, Q_i)] = ln(\gamma/\theta) + (1-\theta) lnM_i + \gamma ln\sigma_{pi} + (\gamma-1) ln Q_i + \varepsilon_i$$

Where P_i, is the cost of selling products by it farmer? Formula (12) shows the difference between cost and final cost as an independent variable. This means that risky value which producer expected it show risky preferences (Toledo & Engler, 2008). Because Saha proposed Method is the most comprehensive among risky trends types, we will use this Method in this paper. Saha et al. (1994) method needs information such as total farmer primary wealth. In this paper, we used wealth variables instead of rural family income mean.

In this formula P_{it} is the sold product cost mean by farmers in the province. M_{it} is rural farmer income in each province: C_q is computable after the estimation of product cost functional. In above formula for estimating the final cost first we have to estimate cotton product function and then derive this proportion to the amount of product. Cost function includes input cost and the amount of producing product with total cost of product produce. For this cost function, Cob- Douglas, Transcendental, Translogand Quadratic are estimated. Among then generalized quadratic cost function is known, its total from in panel data is:

$$c(r_{it}) = \alpha_0 + \sum_{i=1}^{n} \beta_{it}\chi_i + 1/2\sum_{i=1}^{n} \gamma_{iit}(\chi_i^2) + \sum_{i=1}^{n}\sum_{j=2}^{n} \gamma_{ijt}(\chi_i)(\chi_j), i \neq j \quad (13)$$

Its empirical pattern is shown as formula (14):

$$c_{it} = \alpha_0 + \beta_1 Q_{it} + \beta_2 pla_{it} + \beta_3 pf_{it} + \beta_4 ps_{it} + \beta_5 plb_{it} + \beta_6 pp_{it} + \beta_7 Q^2_{it} + \beta_8 pla^2_{it} + \beta_9 ps^2_{it} + \beta_{10} pf^2_{it} + \beta_{11} plb^2_{it} + \beta_{12} Q_{it}.pla_{13} + \beta_{12} Q_{it}.ps_{it} + \beta_{14} Q_{it}.plb_{it} + \beta_{15} pla_{it}.ps_{it} + \beta_{16} pla_{it}.pf_{it} + \beta_{17} pla_{it}.plb_{it} + \beta_{18} ps_{it}.plb_{it} + \beta_{19} pf_{it}.plb_{it} + \beta_{20} ps_{it}.pf_{it} \quad (14)$$

where, C_{it} is total cost of cotton produce (IRR), (Pla_{it}) is the rent of per hectare (IRR), (Ps_{it}) is the cost of per kilogram Seed (IRR), (Pf_{it}) is the cost of per kilogram consumption fertilizer (IRR), (Pp_{it}) is the cost of per liter consumption Poison, Plb_{it} is the cost of per day labor and (Q) is the amount of produced cotton seed.

Final cost is computable from the cost function, proportion to the amount of product for farmers in each province. When we estimate cost function and final costs and being known the other variables, then formula 12 will be:

$$\ln\left[p_{it} - C_{qit}(r_{it}, Q_{it})\right] = \ln(\gamma/\theta) + (1-\theta)\ln M_{it} + \gamma \ln\sigma_{pit} + (\gamma - 1)\ln\sigma_{Qit} + \varepsilon \quad (15)$$

where, (σ_{pit}) is the mean degree of producing cotton seed by farmers in each province and standard deviation of selling cotton seed cost by each farmer, (M_{it}) is the mean farmer, is the mean farmer yearly income for each province and the mean of producers 'cotton seed sales cost is computable for estimating risky parameters θ, γ.

RESULTS AND DISCUSSION

Selection of appropriate method is the most effective factor in the results. Accordingly, the study of formulas, by using the best estimating method which is known a no unbiased, is important. Some problems in time series include multi collinearity between variables, normalized residuum sentences in synthetic methods or panel data to some extent are removed, but among panel data, the researcher had to select a method for estimating, we have used F testing (Ashrafzadeh & Mehregan, 2008).

For estimating and aversion model and choosing among pooling methods and synthetic data, fist Limer F testing has performed. For testing the periodic constancy effects and the periodic extraneous effects have used F statistics and the Hausman test, respectively. The existing shows the selection of pooling method and its priority. Because and with probability value, which is more than the amount of table, is Meaningful. So the equality of intercept for is accepted and Pooling method is selected (Mohammadv & Nahidi , Qolipour Feizi, 2012).

The cotton product cost function for final cost which by Saha (1997) has been proposed components' function is estimated, final cost is used for estimating cotton cultivator risky trends. The best determining coefficient and Baltagi statistics are the criterion for choosing and appropriate function form. Meaningful variables in this function are input fertilizer cost, the cost of the work force and crisscross data.

Table 1
Descriptive Statistics for Variables

Variable	Description	Cases	Unit	Mean	SD	Minimum	Maximum
TC	Production cost per hectare	132	IRR	8564297	3829351	2550610	17525220
Q	Yield per hectare	132	Kg	2654	588	1507	5629
PLa	Rent of one hectare land	132	IRR	2134013	1642163	101730	9212547
PS	Price of one kg cotton seed	132	IRR	804	408	200	2056
PP	Price of one Liter agricultural poison	132	IRR	44821	34923	12340	190400
PF	Weighted mean of price of one kg fertilizer	132	IRR	4569	1428	1861	9595
PLB	Labor wage	132	IRR	72200	46571	15382	198348

Source: The Ministry of Agriculture- Jihad of Iran and research calculations, 2000-2010 years, available at: *http://dbagri.maj.ir/zrt/*

Table 2
The Computation of Limer and Baltagi Statistics for Quadratic Cost Function

	Statistics	Probability
F	133.89	0
Baltagi	1.389	0.23856

Table 3
The Result of Cotton Cost Function Estimation

Parameter	Coefficient	Probe. |t| >T*
α	-182.68	0.04293
β_1	-0.00000023805	0.4165
β_2	8.15831	0.1106
β_3	-824.219	0.8695
β_4	4539.64***	0.0017
β_5	-0.000028980	0.9843
β_6	3.06194	0.7041
β_7	0.0	0.0
β_8	-0.17838***	0.0008
β_9	-68040.5***	0.0067
β_{10}	-0.00000009365*	0.0668
β_{11}	0.0***	0.0002
β_{12}	0.0	0.1797
β_{13}	0.00000005156	0.8733
β_{14}	0.0	0.71150
β_{15}	49.4060***	0.0352
β_{16}	421.518**	0.0169
β_{17}	-0.0000079249	0.6823
β_{18}	0.04160*	0.0510
β_{19}	-0.19263	0.2455
β_{20}	225175***	0.0040
F=133.89844	R^2=0.95986	Baltagi=1.38909

*p<0.1, **p<0.05, ***p<0.01

Based on Table1 contains 132 observations. The average of cotton production is 2654 kg and the minimum production is 1507 kg and the maximum production is 5629 kg.The results are shown in Table 2

In the above table F=0.00 and is less than 5% so the zero assumption is accepted and data aren't Panel and Baltagi statistics are small too and its probability is more than 5% so Pooled function is accepted. The results are shown in Table 3.

After the derivative of the cost function to the amount of product (Q), the marginal cost function for panel data is estimated. Baltagi statistics are less than two, so we use Pooled data instead of panel data. By using these numbers and other

Table 4
The Computation of Flimer and Baltagi for Saha Model

	Statistics	p-value
F	3.987	0.00939
Baltagi	3.253	0.0712

Table 5
The result of risky trend parameters

	Variable
1.2764***	$Ln(\gamma/\theta)$
0.7820	$Ln(M_i)$
0.7813***	$Ln(\sigma P_i)$
-4.42509**	$Ln(Q_i)$

*p<0.1, **p<0.05, ***p<0.01

parameters (θ, γ).

In under the table the probability of F statistics is less than 5% so the zero assumption is accepted and data aren't Panel and Baltagi statistics is small too and its probability is more than %5suppliedfunctionis accepted. The results are shown in Table 4.

By using these numbers and other existing component in formulating (9) this formula estimates for computing risky trend parameters (θ.γ). The results are shown in Table 5.

Parameter is computed from above function.

0.7813=ϒ 0.218=θ, 0.7820= θ-1

Since the amount is bigger than zero, as we mentioned in materials and methods part. We conclude that cotton cultivator farmers are risk aversion and there is meaningful relation, between costs standard deviation and the amount of product. Since use new technologies for machineries and seeds with high function, is risk aversion and do not have enough income is not used. Employed in non-agriculture jobs and plant other products are different ways for overcoming risk. Farmersarebeing risked aversion cause use of these methods. In addition to, instability of prices and cost product in market and weather shocks that cause a significant damage to product are factors that help risk aversion among farmers.

The amount of θ, is less than one, so that there is an increasing absolute risk aversion among farmers, it means increasing cotton produce activity risk, cotton cultivators risk aversion goes up too. Since θ<ϒ, there is a relative risk aversion among farmers, it means when farmer income goes up, risk aversion goes up too. The government does not protect farmers and the function of the product is down, thus producing cotton is not economical and farmers are not certain about enough profit, so they are risk aversion.

CONCLUSION AND RECOMMENDATIONS

In this article, as regards the decline area under cotton cultivation in recent years, the researchers embarked on the study of Iran cotton cultivator risky trend parameters using the Saha Mean Standard Deviation. The results showed Iran cotton cultivators are risk aversion and the trend increased when the income and the fluctuation cost product went up in each hector. This results are the same with that by Toledo and Engler (2008), They have estimated Bib-Bio Chili raspberry cultivator with the same method. The similarity between these two methods is when farmer income goes up, their risk aversion goes up, too. Abdulkadri et al. (2003) used this method and evaluated risk aversion between corn cultivators of Kansas State. They also estimated absolute and relative risk aversion. Liu and Hunang (2013) used risky trend utility function method for accepting technology in China. Therefore, restriction credit has a positive relation with risk aversion and people with restricted credit suffer from bias. However, with more performance can gather much more wealth. Thus, as regards to risk aversion among Iran cotton cultivator, extending insurance product can be a useful service for an Iran cotton cultivator. Insurance product is a good way for overcoming the risk of producing this product. In addition to, more financial protection for buying cotton harvesting machineries in provinces which producing cotton and importing seeds with higher function.

ACKNOWLEDGEMENT

Authors would like to thank Dr. Hashmitabar, Dr. Yaghobi and all those who helped us in the conduct of the present study.

REFERENCES

Abdulkadri, A., Michael, O., & Langemeir, R. (2003). Estimation of risk aversion cofficient for dry land wheat and irrigated corn enterprises in Kansas. *Applied Economics, 35*(7), 825-834.

Abdulkadri, A., & Langemeier, R. (1999). Estimation of risk aversion coefficients For dryland wheat and irrigated corn enterprises in Kansas," 1999 Annual meeting, August 8-11, Nashville, TN 21658, American Agricultural Economics Association (New Name 2008: Agricultural and Applied Economics Association).

Ashrafzadeh, H.R., & Mehregan, N. (2008).

Econometrics of panel data, Tehran, Tehran university Research and Cooperation Institution.

Dasti, Q., & Khaksar Khiabani, F. (2013). The evaluating of Tabriz Onion cultivator trends toward risk by nonlinear Mean-Standard Deviation Model. *Agricultural Economics and Development, 21*(83), 173-189.

Esfandiari, M., Shahraki, J., & Karbasi, A. (2011). Determine the technical efficiency of Rice production with risk (case study: Marvdasht Fars province). *Agronomy Journal, 100*(1), 76-87.

Farzin, M., Torkamani, J., & Mousavi, S.N. (2012). The role of income insurance on Darab Cotton tiller's risk management (case study: Darab Cotton cultivator). *Agricultural Economics Reserches,15*(4); 143-168.

Ferdosi, R., & Koopahi, M., (2005). Determination of wheat growers' attitude towards risk A case study of Golestan province farmers. *Agricultural Economics and Development, 13*(52), 27-43.

Liu, E., & Huang, J., (2013). Risk preferences and pesticide use by Cotton Farmers in China. *Journal of Development Economics, 103*, 202-215.

Markowitz, H. (1952). Portfolio selection. *The Journal of Finance, 7*(1), 77-91.

Meyer, J. (1977). Choice among distributions. *Journal of Economic Theory, 14* (2): 326-336

Mohammadvand Nahidi, M., & Qolipour Feizi, M., (2012). The study of the relationship between macroeconomics variables and environmental pollution in selected countries (cotton seed panel data). *Regional Development and Economics, 19*(4), 100-113.

Rezaee, Z., Shahnooshi, N., Mohammadi, H. & Kiani rad, A., (2013). The effects of government support policies on income risk and production cost of selected horticultural products (Pistachio, Date, Apple and Citrus). *Agricultural Economics Research, 5*(20), 131-159

Saeedian, Sh. (2013). *Measuringthe productivity and welfare of mazafati date farmers in the presence of production risk in Suran city*. Unpublished Thesis, Department of agricultural economics, Sistan and Bluchestan University.

Saha, A. (1997). Risk preference estimation in the nonlinear mean standard deviation approach. *Economic Inquiry, 35*(4), 770-782.

Saha, A. Shumway, C.R., & Talpaz, H. (1994). Joint estimation of risk preference structure and technology using Expo-power Utility. *American Journal of Agricultural Economics, 76*(2), 173-184.

Sekar, I. & C. Ramasamy (2001). Risk and Resource Analysis of Rainfed Tanks in South India. *Journal of Social and Economic Development, 3* (2), 208-215.

Tobin., J. (1958). Liquidity preference as behavior towards risk. New haven, Conn. U. A. A. 66-86.

Toledo, T. R., & Engler, P.A (2008). Risk Preferences Estimation for Small Raspberry Producers in the Bio-Bio Region, Chile. *Chilean Journal of Agricultural Research, 68*(2), 175-182.

Yusuf, S. A., Ashagidigbi, W. M. & Bwala, D.P. (2015). Poverty and Risk Attitude of Farmers in North-Central, Nigeria. *Environmental and Agricultural Sciences, 3*, 1-7.

Zibaee, M. & Mirzaee, A., (2013). The study of Eeffective factors for accepting Adoption of supplemental insurance options in Rafsanjan *Agricultural Economics and Development, 28*(1), 26-34.

How to cite this article:
Moradi, E., & Abdollahi Darmian, A. (2016). The analysis of Iran Cotton producers' risk degree based on Non-Linear Mean-Standard Deviation Model. *International Journal of Agricultural Management and Development, 6(4), 515-523.*
URL: http://ijamad.iaurasht.ac.ir/article_527306_5bdef9d7950e0d8de3621ab8d1262c1b.pdf