YIELD AND PRICE RISK OF COMMONLY GROWN AGRICULTURAL PRODUCTS IN ADANA PROVINCE OF TURKEY

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ABSTRACT

In this paper, it is aimed to analyze the yield and price risk of commonly grown agricultural products in Adana province of Turkey by using "Variation Measurement" and "Random Variation Measurement" methods. In this study, the yield and price (the price in the hands of farmers) series are used covering 1994 - 2013 period for cotton seed, oilseed sunflower, soybeans, melons and watermelons. Research data was obtained from Turkey Statistical Institution and Food, Agriculture and Livestock Ministry the Provincial Directorate of Adana. To eliminate the effect of inflation on the price series are expressed in 2013 prices by using the PPI (1994 = 100). In order to attain the set objectives, coefficient of variation and random coefficient of variation are calculated and interpreted for seed cotton, oilseed sunflower, soybeans, melons and watermelons. In order to determine a suitable trend equation, Cumulative Sum of Forecast Error Method was used. Many functions type (linear, exponential, quadratic) tried and quadratic functions was judged to be appropriate for the studied product. According to the calculated coefficient of variation, yield risk is maximum for seed cotton (28.94%), at least for melon (10.17%), price risk is maximum for watermelon (26.63%), at least for soybean (13.37%) and gross income risk is maximum for sunflower (31.18%), the least for melon (20.97%) in Adana Province. All of the random variation coefficient was calculated lower than coefficient of variation. This case indicated that if farmers aware of technical and economic developments, they would taking rational decision and minimized yield and price risk. According to research results, the contracted production, futures markets, farmer organizations, collecting information about the input and output markets from a variety of sources and agricultural insurance as risk management tools could be advised to farmers.

Keywords: Yield and Price risk, Variation Measurements, Turkey

INTRODUCTION

Agricultural activities are carried out largely under the influence of natural conditions (Ceyhan, 2003). Farmers don't estimate their yield and income due to fluctuations in the factors they can not control such as rains, temperature, disease, frost, wind, flood and so on. As a result of input-output price change, there are income fluctuation and important differences in agriculture year after year. As a result of this, farmers are forced to take risky decisions (Hoag, 2009). It will be useful that analysis of the risks faced by farmers and their weight and determining of farmers' attitudes toward risk. Therefore when planning in crop and livestock production, it is quite necessary that analysis of risks involved in agricultural production and understanding farmers' risk behaviors (Ceyhan, 2003).

In 2013, Soybean, oilseed sunflowers, cotton, melon and watermelon, 66.15%, 7.30%, 9.42%, 6.96% and 19.94% of total production of Turkey was grown in Adana, respectively. In this study, coefficient of variation and random coefficient of variation is calculated and interpreted for seed cotton, oilseed sunflower, soybeans, melons and watermelons.

MATERIALS AND METHODS

Research data was obtained from Turkey Statistical Institution and Food, Agriculture and Livestock Ministry the Provincial Directorate of Adana. To eliminate the effect of inflation on the price of the series are expressed in 2013 prices by using the PPI (1994 = 100) (Anonim 2015). In order to attain the set objectives, coefficient of variation and random coefficient of variation are calculated and interpreted for seed cotton, sunflower, soybeans, melons and watermelons. In order to determine a suitable trend equation, Cumulative Sum of Forecast Error Method was used. Many functions type (linear, exponential, quadratic) tried and quadratic functions is judged to be appropriate for the studied product (Gündüz and Esengün, 2004; Çetin and Esengün, 2013; Kip, 1975).

RESULTS AND DISCUSSION

In order to see yield fluctuation of some important agricultural products, Coefficient of Variation and Random Coefficient of Variation (RCV) calculated and presented in table 1. Coefficient of variation calculated %28.94 for seeded cotton, %27.20 for oilseed sunflower, %20.85 for soybean, %17.41 for watermelon and %10.17 for melons. Coefficient of variation for seeded cotton is higher than other products. It is implies that the possibility of fluctuations in seeded cotton production is higher than other products. All of random coefficient of variation calculated lower than coefficient of variations. It is implies that if farmers aware of economic and technical development, they could take retional measures against fluctuations.

Table 1. Variation Measurement and Random Variation Measurement Related to Yield Series (1994 - 2013)

Product	Standard Deviation (σ)	Standard Deviation of Regression (σy)	Period Average (kg / da) ($\bar{Y}$)	Coefficient of Variation (CV) %	Random Coefficient of Variation (RCV) %
Seeded Cotton	116.92	107.72	404.05	28.94	26.66
Oilseed Sunflower	53.87	47.03	198.05	27.20	23.75
Soybean	70.99	61.71	340.40	20.85	18.13
Watermelon	840.77	806.04	4.828.59	17.41	16.69
Melons	408.78	213.86	4.020.30	10.17	5.32
Trend Equations					
Seeded Cotton	$Y = 204.955 + 20.379 * t - 0.104 * t^2$				
Oilseed Sunflower	$Y = 114.864 + 7.872 * t + 0.04 * t2$				
Soybean	$Y = 190.846 + 22.154 * t - 0.579 * t2$				
Watermelon	$Y = 3725.709 + 49.835 * t + 4.039 * t2$				
Melons	$Y = 3599.582 + 47.579 * t - 0.550 * t2$				

In order to see price fluctuation of some important agricultural products, coefficient of Variation and Random Coefficient of Variation (RCV) calculated and presented in table 2. Coefficient of variation calculated %23.66 for seeded cotton, %23.26 for Oilseed sunflower, %13.37 for soybean, 26.63% for watermelon and 22.83% for melons. Coefficient of variation for seeded cotton is higher than other products. It is implies that the possibility of fluctuations in seeded cotton production is higher than other products. All of random coefficient of variation calculated lower than coefficient of variations. It is implies that if farmers aware of economic and technical development, they could take retional measures against fluctuations.

Table 2. Variation Measurement and Random Variation Measurement Related to Price Series (1994 - 2013)

Product	Standard Deviation (σ)	Standard Deviation of Regression (σy)	Period Average (kg / da) ($\bar{Y}$)	Coefficient of Variation (CV) %	Random Coefficient of Variation (RCV) %
Seeded Cotton	0.36	0.29	1.50	23.66	19.43
Oilseed Sunflower	0.32	0.16	1.37	23.26	11.78
Soybean	0.13	0.08	0.96	13.37	7.82
Watermelon	0.15	0.10	0.56	26.63	17.15
Melons	0.17	0.13	0.76	22.83	16.94
Trend Equations					
Seeded Cotton	$Y = 2.358 - 0.160 * t + 0.006 * t^2$				
Oilseed Sunflower	$Y = 0.897 + 0.117 * t - 0.006 * t2$				
Soybean	$Y = 1.162 - 0.053 * t + 0.002 * t2$				
Watermelon	$Y = 0.699 - 0.010 * t + 0.0001 * t2$				
Melons	$Y = 0.938 - 0.007 * t + 0.0000001 * t2$				

Gross income is a function of price and yield variables. Therefore it is more important fluctuations observed in gross income. In order to see gross income fluctuation of some important agricultural products, Coefficient of Variation and Random Coefficient of Variation (RCV) calculated and presented in table 1. Coefficient of variation calculated %24.77 for seeded cotton, %31.18 for Oilseed sunflower, %23.05 for soybean, %23.00 for watermelon and %20.97 for melons. Coefficient of variation for oilseed sunflower is higher than other products. It is implies that the possibility of fluctuations in oilseed sunflower production is higher than other products. All of random coefficient of variation calculated lower than coefficient of variations. It is implies that if farmers aware of economic and technical development, they could take retional measures against fluctuations.

Table 3. Variation Measurement and Random Variation Measurement Related to Gross Income Series (1994 - 2013)

Product	Standard Deviation (σ)	Standard Deviation of Regression (σy)	Period Average (kg / da) ($\bar{Y}$)	Coefficient of Variation (CV) %	Random Coefficient of Variation (RCV) %
Seeded Cotton	144.39	95.09	582.91	24.77	16.31
Oilseed Sunflower	83.24	45.44	266.96	31.18	17.02
Soybean	74.94	58.80	325.12	23.05	18.09
Watermelon	599.98	54.45	2.608.17	23.00	2.09
Melons	638.43	382.22	3.044.67	20.97	12.55
Trend Equations					
Seeded Cotton	$Y = 567.073 - 21.102 * t + 1.654 * t^2$				
Oilseed Sunflower	$Y = 136.870 + 23.441 * t - 0.809 * t2$				
Soybean	$Y = 245.117 - 3.519 * t + 0.300 * t2$				
Watermelon	$Y = 2.535.161 + 28.303 * t - 1.562 * t2$				
Melons	$Y = 3.318.917 + 37.151 * t - 4.630 * t2$				

CONCLUSION

In this paper, it is aimed to analyze the yield and price risk of commonly grown agricultural products in Adana province of Turkey, by using "Variation Measurement" and "Random Variation Measurement" methods. in this study, the yield and price (the price in the hands of farmers) series are used covering 1994 - 2013 period for cotton seed, sunflower, soybeans, melons and watermelons. According to the calculated coefficient of variation, yield risk is maximum for seed cotton (28.94%), at least for melon (10.17%), price risk is maximum for watermelon (26.63%), at least for soybean (13.37%) and gross income risk is maximum for sunflower (31.18%), the least for melon (20.97%) in Adana Province. All of the random variation coefficient was calculated lower than coefficient of variation. This case indicated that if farmers aware of technical and economic developments, they would taking rational decision and minimized yield and price risk. According to research results, the contracted production, futures markets, farmer organizations, collecting information about the input and output markets from a variety of sources and agricultural insurance as risk management tools could be advised to farmers.

REFERENCES

Anonim. 2014. www.tuik.gov.tr. (Erişim: 15 Ekim 2014).

Ceyhan, V. 2003. Tarım işletmelerinde risk analizi: Çorum İli Kızılırmak Havzası örneği, Ondokuz Mayıs Üniversitesi, Ziraat Fakültesi, Samsun.

Çetin, İ. and Esengün, K. 2013. Amasya İlinde yaygın olarak yetiştirilen ürünlerde verim ve fiyat riski. K.M.Ü. Sosyal ve Ekonomik Araştırmalar Dergisi. 15 (25), 57 - 65.

Gündüz, O. and Esengün, K. 2004. Türkiye yemeklik tane baklagiller üretiminde verim ve fiyat riski. G.O.Ü. Ziraat Fakültesi Dergisi. 21 (1), 33 - 41.

Hoag, D. 2009. Applied risk management in agriculture, United States: CRC Press; 1 edition.

Kip, E. 1975. Türkiye ve Kuzeydoğu Anadolu tarımında belirsizlik ve ekonomik etkileri istatistiksel bir yaklaşım. Atatürk Üniversitesi Yayınları No: 397, Atatürk Üniversitesi Basımevi, Erzurum.