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# Analysis of Farmers' Financial Participation for Reducing Environmental Effects of Agricultural Chemical Inputs (Case Study: Kashaf- Rood Basin in Mashhad)

**H. Aghasafari[1]*- M. Ghorbani[2]- A. Dourandish[3]**

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**Introduction:** Environmental pollution including water and soil pollution is one of the challenges in agriculture in recent decades. The indiscriminate use of pesticides and chemical fertilizers results in soil and water pollution and thus it is a threat to human health, water and soil health and food security. Thus, there is a need for better management in this field with farmers' participation. So, farmers' behavior for reducing the adverse environmental effects of pesticides and chemical fertilizers should be analyzed to determine the degree of success in reducing the adverse environmental effects. Thus, this study analyzes the farmers' financial participation to reduce the adverse environmental effects of agricultural chemical inputs.

**Materials and Methods:** To achieve the desired goal, the Contingent Valuation approach is used. This approach examines a persons' willingness to pay for keeping the present status quo, making positive changes in the environment or their willingness to accept to compensate for the loss of an environmental benefit or increase in an environmental loss. To separate the effects of variables, the Tobit model was used by using the Heckman's two-stage method which affected the farmers' decision about financial participation and the variables affecting the farmers' amount of financial participation. In this study, the simple random sampling method was used to achieve the desired sample according to the objective study and the Cochran's formula was used to determine the number of samples. A total of one-hundred questionnaires were collected from farmers of Kashaf-rood basin in the city of Mashhad in 2013.

**Results and Discussion:** The results showed that age, education, type of agricultural activity, index 2 (farmers agree with the adverse effects of overuse of chemical fertilizers and pesticides), index 5 (farmers agree with investments to protect the soil and water), sex, number of households employed in agriculture, experience in using soil and water conservation practices, index 4 (farmers agree with well-being of available soil and water) have a significant impact on the farmers' decision to financially participate in reducing the adverse environmental effects of the use of chemical fertilizers. And sex, experience in using soil and water conservation practices, total area under cultivation, index 3 (farmers agree with rural and urban sewage inflow into Kashaf-rood river), index 5 (farmers agree with investments to protect the soil and water), number of households employed in agriculture and land ownership status have a significant impact on the farmers' amount of financial participation for reducing the adverse environmental effects of chemical fertilizers. Also, variables of type of agricultural activity, land ownership status, total amount of annual consumption of chemical pesticides per year, sex, age, education, number of households employed in agriculture, index 1 (farmers agree with benefits of preventing soil washing) and index 4 (farmers agree with well-being of available soil and water) have a significant impact on the farmers' decision for financial participation to reduce the adverse environmental effects of chemical pesticides. And variables of land ownership status, total area under cultivation, index 4 (farmers agree with well-being of available soil and water), age, sex, education, main job, number of households employed in agriculture, type of agricultural activity, net savings from agriculture, experience in using soil and water conservation practices, total amount of annual consumption of fertilizer per year, total amount of annual consumption of chemical pesticides per year, index 1 (farmers agree with benefits of preventing soil washing), index 4 (farmers agree with well-being of available soil and water) and index 5 (farmers agree with investments to protect the soil and water) have a significant impact on the farmers' amount of financial participation for reducing the adverse environmental effects of chemical pesticides.

**Conclusion:** According to the results of the study, it is suggested that in order to maintain and improve soil and water conditions, motivational tools should be used. And an amount of moneyshould be collected as tax from the farmers who use more fertilizers and chemical pesticides. To determine the amount of this tax, the farmers' financial participation that was examined in this study is used. Also, since farmers have enough

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incentives to reduce the adverse environmental effects of pesticides and chemical fertilizers, using these two inputs on the one hand and promoting the production of organic products on the other handcan be planned especially in the field of education based on respect for limits recommended use of these two inputs on one side and promoted the production of organic products on the other side.

**Keywords:** Chemical Inputs, Contingent Valuation, Kashaf- rood Basin, Tobit Model

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# Estimating The Economic Value of Environmental Amenities of Isfahan Sofeh Highland Park (The Individual Revealed and Expressed Travel Cost Method)

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**Introduction**: Natural resources and the environment, such as mountains are considered public goods. The main features of these public goods are lack of market and price for exchange. This issue leads to a worthless impression about these goods, lack of effort for their conservation and preventing resource degradation. One of the major benefits of environmental resources, such as mountains, is their function as environmental amenities (for leisure and recreation). The estimation of their recreational worth is important as a part of the total value of such resources. In this context, the aim of this study is to estimate the economic value of environmental amenities of Sofeh Highland Park in Isfahan by individual travel cost method.

**Materials and Methods:** Travel cost method is used for the evaluation of public goods or environmental non-market commodities. It is applied to a wide range of areas, including tourism values of lakes and wetlands, coral reefs, biodiversity and national parks, recreational fishing and mountaineering. The travel cost approach does not ask willingness to pay directly, but imputes it from the observed behavior of other visitors through an estimated demand function, which relates the number of observed trips to the incurred travel cost. Underpinning the travel cost method is for the estimation of the recreational demand function, from which consumer surplus estimates can be derived. Consumer surplus -the measure of non-market benefits to the visitors- is the difference between what the visitor would be (theoretically) willing to pay to go the intended recreational location, and what they are actually required to pay. In this research, the individual travel cost method was used. For this purpose, a 290 item questionnaire with simple random sampling was filled by travelers in the area in 2013. Then the demand function of environmental amenities (tourism demand) was estimated in two scenarios by using negative binomial regression for the revealed and the expressed travel costs and total travel costs.

**Results and Discussion**: Collected data shows that the average age of visitors is 31 years. Most of them are young, 66% of visitors are male and the rest are female. Most of the respondents chose the spring season for visiting Sofeh Park. Results of negative binomial regression estimation showed that age, income, distance and the revealed and total travel cost have a significant effect on the total number of visits in both scenarios. Age and income coefficients are positive. Thus, these variables have a direct effect on the number of visit in both scenarios. But distance and travel cost coefficients are negative. Therefore, these variables have a reverse effect on the total number of visits in both scenarios. These results confirm the demand law. The law of demand states that the quantity demanded and the price of a commodity are inversely related. Travel cost as commodity price for tourism demand function in the first scenario is only revealed -travel- cost of trip to location and in the second scenario is the revealed cost in addition to the opportunity cost of trip to the recreational location. Consumer surplus as the average value of environmental amenities is calculated by1/ , where is the coefficient related to travel cost variable in the tourism demand functions. Also, the average value of environmental amenities for anyone visit in the first and the second scenarios are 797 and 1145 thousand Rials, respectively. The obvious difference between recreational values in the two scenarios is due to opportunity cost. The total recreational value of the Sofeh Highland Park equals to the product of number of annual visits and average recreational value. Finally the total value of annual visits to the park, in the above scenarios is more than 11952 and 17174 billion Rials, respectively.

**Conclusion:** In this study**,** the value of environmental amenities of the Sofeh Highland Park were estimated. Notice that the above values are not the price of Sofeh Park that is a natural environment in the current study. In fact, these values are "minimum of recreational values" of any given environment. It is essential for the visitors to have knowledge of this value in order to conserve the environment and the regional facilities. Furthermore, it

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is essential for the authorities to have knowledge of this value, with the aim of making more efforts and overseeing improvements and conservation of this environment. Also, alongside the protection plans for Sofeh Highland Park, authorities can bring about an increase in the number of annual visits to this Park by reducing travel and opportunity costs through facilitating the conditions to access, such as improving public transportation to this park.

**Keywords:** Individual Travel Costs, Isfahan Sofeh Highland Park, Negative Binomial Regression, Value of Environmental Amenities, Tourism Demand Function

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# Evaluating The Effects of Climate Changes and Government Policies on Yield and Cultivation Area of Maize in Iran: Panel Data Method

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**Introduction:** The area under cultivation and yield of crops are affected by various factors, some of which are controllable and some others are uncontrollable. Controllable factors are divided into two types of price and non-price factors. Among the price factors, prices of agricultural products and inputs play an important role in expanding the cultivation area. Uncontrollable factors also have great effects on increasing the cultivation area of agricultural products. Two of the most important factors that affect yield are weather and climate conditions. The agricultural sector that is one of the sectors that is most vulnerable to climate changes has often been used for political debates and research projects. In the agricultural sector, cereal and especially maize, have a special place in the world both in production and in the area under cultivation. Therefore, given the importance of this product, investigating the effects of climate changes on cultivation area and yield of maize needs careful examination.

**Material and Method:** Panel data in econometrics has many advantages over using cross-sectional data and time series. The Hausman test is used to determine the fixed and random effects in the panel data. Also panel data unit root tests will be necessary. In this study, several price and non-price factors are considered:

$C_{it} = f(W_{it}, RP_{it-1}, R_{it}, T_{it}, C_{it-1})$ (1)

where $C_{it}$: maize cultivation area in province *i* in year *t*

$W_{it}$ : wheat irrigated area and dry area in province *i* in year *t*

$RP_{it-1}$: relative imposed price of maize and wheat in *t-1*.

$R_{it}$ : rainfall in province *i* in year *t*

$T_{it}$ : temperature in province *i* in year *t*

$C_{it-1}$: maize cultivation area in province *i* in year *t-1*

$$C_{it} = \alpha_1 W_{it} + \alpha_2 RP_{it-1} + \alpha_3 R_{it} + \alpha_4 T_{it} + \alpha_5 C_{it-1} + u_{it} \quad (2)$$

In addition, in this study the Ricardian model was used to examine the impact of climate change on maize yield.

$$PR_{it} = F(T_{it}, T_{it}^2, R_{it}, R_{it}^2, ALT_i, ART_i) \quad (3)$$

where $PR_{it}$: Yield per hectare of maize in province *i* in year *t*

$T_{it}, T_{it}^2$: Temperature in province *i* in year *t*

$R_{it}, R_{it}^2$ : Rainfall in province *i* in year *t*

$ALT_{it}, ART_{it}$ : Latitude and height above sea level, respectively.

The data used in this study were for the provinces of Fars, Khuzestan, Kerman, Kermanshah and Elam for the period 1993-2011.

**Results and Discussion:** According to Table 1, all variables are significant at the one percent level of confidence. Therefore, all of the variables are stationary.

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**Table 1- Results of stationary test for variables**

| variables | Levin-Lin & chow stat. | Pesaran& Shin stat. | Stationary state |
|---|---|---|---|
| Cultivation area of maize | 2.51*** | ***1.13 | I(0) |
| Cultivation area of Irrigated wheat | 2.45*** | 2.89*** | I(0) |
| Cultivation area of Dry wheat | 5.02*** | 3.76*** | I(0) |
| rainfall | 8.74*** | 6.09*** | I(0) |
| Temperature | 5.78*** | 3.40*** | I(0) |
| Relative imposed price of maize to wheat | 2.74*** | 1.36*** | I(0) |

Source: Research calculations

Based on the results shown in Table 2, all variables are significant. The highest and the lowest estimated coefficient is for the relative imposed price of maize to wheat (6.68) and cultivation area of dry wheat (0.01).

**Table2- Results of the factors affecting the maize cultivation area in selected provinces**

| Variables | coefficient | Standard deviation | T-statistics |
|---|---|---|---|
| Constant | -2.49* | 1.23 | -2.03 |
| Imposed price ratio with a lag | 6.68*** | 1.32 | 5.06 |
| Cultivation area of Irrigated wheat | -0.42* | 0.22 | -1.88 |
| Cultivation area of Dry wheat | -0.01* | 0.006 | -1.98 |
| Cultivation area of maize with a lag | 0.66*** | 0.06 | 10.28 |
| Rainfall | 0.17*** | 0.06 | 2.86 |
| R-squared | 0.97 | Durbin-Watson stat | 1.84 |
| Adjusted R-squared | 0.96 | F-statistic | 184.5 |

Source: Research calculations

Table 3 indicates the results of the Ricardian model by using the panel data method. $R^2$ in this model is equal to 86 % and it shows that %86 of the variation of maize yield is explained by variables. According to the results,the rainfall altitude, the rainfall height above sea, the square of rainfall and latitude have significant effects on maize yield.

**Table 3- Results of climatic factors on maize yield in selected provinces**

| Variables | coefficient | Standard deviation | T-statistics |
|---|---|---|---|
| Constant | 12.73*** | 2.55 | 4.99 |
| Temperature | -0.11 | 0.20 | -0.52 |
| Rainfall | 0.002*** | 0.0002 | 7.32 |
| Height above sea level | -0.0004*** | 0.0001 | -3.51 |
| Square of temperature | 0.001 | 0.005 | 0.17 |
| Square of rainfall | -2.62*** | 2.45 | -10.71 |
| Latitude | -0.07*** | 0.02 | -3.05 |
| R-squared | 0.86 | Durbin-Watson stat | 1.59 |
| Adjusted R-squared | 0.81 | F-statistic | 5.15 |

Source: Research calculations

**Conclusions:** In this study, the factors affecting maize cultivation area and yield as a plant that uses a lot of water in Fars, Khuzestan, Kerman, Kermanshah and Elam provinces were investigated. The results showed that non-price factors such as rainfall and temperature have a significant impact on the cultivation area of maize. Due to the emphasis placed on the policy of self-sufficiency in wheat, irrigated and dry cultivation area of wheat and imposed price of wheat, mentioned by Garshasbi et al., have a significant impact on the cultivation area of maize in the selected provinces. The results indicated that according to specific climatic conditions in these provinces, irrigated wheat can be a proper alternative product for maize. Due to Vaseghi and Esmaeili, climate changes could have adverse effects on maize yield and can lead to a reduction of maize cultivation area. Due to the inevitability of global warming, further investigation of this issue is very important.

**Keywords:** Maize, Rainfall, Temperature, Yield, Cultivation area, Ricardian model, Panel data method

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# Investigating The Effect of Switching the Iran Pistachios Market Structure on Consumers and Suppliers Welfare within the Framework of Spatial Equilibrium Model

**F. Kashiri Kolaei[1*]- S. A. Hosseini Yekani[2]- S. M. Mojaverian[3]**

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**Introduction:** Market power is an important factor affecting welfare. Existence of market power on the purchase side reduces supplier welfare. However, existence of market power on the sales side reduces supplier welfare. Some believe that the agricultural market structure is a monopoly. In fact, most of the agricultural products can be purchased by small firms and then delivered to consumers because they are perishable and need certain storage conditions. Thus, a monopoly condition is created in the market. In Iran, pistachios are amongst the agricultural products that can be important for investigating the market structure and for its effects on social welfare. This is due to the fact that the price of pistachios has fluctuated sharply because of many reasons such as the existence of major buyers such as the *Rafsanjan Pistachios Producers Cooperative*. Monopolistic firms determine the price that causes problems such as losing trade, creating extra profits for the seller and reducing consumer surplus. However, effective implementation of policies requires identification of market structure. In this context, in the present study for investigating the effects of Iran pistachios market structure on social welfare, the spatial equilibrium model was used which is based on maximizing *net social payoff* (NSP) and is able to consider the variety of market powers in suppliers and consumers.

**Materials and Methods**: One of the noteworthy features of the spatial equilibrium model is that it is able to examine the price equilibrium in each of the market power degrees. In this study, the conjectural variations parameter was used to consider the market power in the model. This index represents the reaction of firms to change the behavior of a particular firm. The final equations of Iran pistachios spatial equilibrium model can be seen in the following equations:

| | | | | | |
|---|---|---|---|---|---|
| Max NSP = $\sum_{j=1}^{j}\int_{0}^{q_j^d} p_j^d dq_j^d - \sum_{i=1}^{n}\int_{0}^{q_i^s} p_i^s dq_i^s + \sum_{j=1}^{j}\sum_{k=1}^{m} v_{j,k}^{f} x_{j,k}^{f} - \sum_{i=1}^{n}\sum_{j=1}^{j} e_{i,j} t_{i,j} - \sum_{i=1}^{n}\sum_{j=1}^{j} b_j (1 + r_{i,j}) \int tp_{i,j}$ | | | | | |
| s.t | $-q_i^s + \sum_{j=1}^{j} t_{ij} \le 0$ | $q_j^d + \sum_{k=1}^{m} x_{j,k}^{t} - \sum_{i=1}^{n} t_{i,j} \le 0$ | $\sum_{j=1}^{j} x_{j,k}^{f} - m_k \le 0$ | $\sum_{j=1}^{j} x_{j,k}^{f} \le s_j^f$ | $q_j^d, q_i^s, x_{j,k}^{f}, t_{i,j} \ge 0$ |

Where NSP is the net social payoff, i and j respectively represent the pistachios supplier and consumer provinces and f represents the method of export of pistachios including by road, sea, air or railway. $V_{jk}^{f}$ is the yield per Kg of pistachios exports in different ways from the j-th province to the k-th country, $S_j^f$ is the pistachios exports capacity of the various ways from the j-th province, $X_{jk}^{f}$ represents the pistachios exports from the j-th province using the f-th way to the k-th country and $m_k$ is the imported pistachios of each country from Iran. Moreover, $r_{ij}$ represents conjectural variation, $q_j^d$ and $q_i^s$ respectively represent pistachios supply and demand in the provinces j and i, $t_{i,j}$ and $tp_{i,j}$ represent the total shipped pistachios from the i-th province to the j-th province and shipped pistachios for domestic consumption of j-th province, respectively. $p_j^d$ and $p_i^s$ respectively represent the demand and supply curve equations according to $q_j^d$ and $q_i^s$. It should be noted that in the perfect competition market $r_{ij}$ is equal to -1 while in a monopoly market it is equal to 0. In this study, the 2010 data were used for the calculation of the parameters. Also, for welfare investigating, the surplus of consumers and suppliers were calculated by the following equations:

| | |
|---|---|
| Consumer surplus : $CS_j = \int_0^{q_j^d} p_j^d dq_j^d - p_j^d q_j^d$ | Producer surplus: $PS_i = \sum_j p_j^d . tp_{ij} + \sum_j \sum_k v^f{}_{ijk} . x_{ijk}^f - \int_0^{q_i^s} p_i^s dq_i^s$ |

**Results and Discussion:** According to the results of this study, pistachios market structure is far from perfect competition in Iran and creating the perfect competition conditions leads to nearly a double increase in consumers' welfare and a reduction in the suppliers' welfare about 0.13%. In general, switching the Iran

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pistachios market structure has significant effects on domestic consumers but pistachios suppliers are less affected because they export more pistachios to foreign countries. Most of the changes in consumers' welfare are made in the provinces that are mostly consumers of pistachios and have low or no pistachios production (such as Golestan, Hamedan, Ardebil, Chaharmahal and Bakhtiari, Kordestan and Markazi). In contrast, the lowest welfare changes are associated with the major pistachios supplier (such as Kerman, Yazd, Hormozgan and Sistan and Baluchestan).

**Conclusion:** Since pistachios are mainly exported and in fact the price of pistachios in the domestic market is higher than the price of Iranian pistachios in foreign markets, a significant increase in the price of pistachios has negative effects on domestic sales and consumers welfare. Since one of the main reasons for the high price of pistachios in Iran is related to market power and the existing monopoly, it is essential to establish certain policies to combat this monopoly. Pistachios exchange can be noted among the policies that are effective in changing the market structure. Also, creating conditions for the entry of new firms into the pistachios market is effective in reducing monopoly in it.

**Keywords:** Market Structure, Welfare, Spatial Equilibrium Model, Pistachios

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# Examining the Effect of World Price Transfer to Domestic Markets for Sensitive and Certain Agricultural Products in Iran

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**Introduction:** Agriculture as one of old sectors of economy has been important role in the supply food for peoples and raw materials. Globalization causes rapid growth of world trade and reduces information and communications costs. Globalization and rapid growth of trade increases the potential benefits of trade for agriculture from various aspects. The potential benefits of trade for agriculture increases from three aspects. Direct increase in the domain of agricultural sector activities for competition in the global market results in the benefits of access to global markets. This is especially true in cases where there is comparative advantage and the indirect effects of increased global trade on non-agricultural sectors that cause the domestic demand for food change from qualitative and quantitative aspects, are the benefits of this event. However, during the process of globalization, how to influence prices in different markets, including the impact of world prices on domestic prices is an important issue in trade policy analysis. During this process domestic prices are directly related to world prices. With this approach, the main objective of this study is to examine the effect of world price transfers to domestic markets for sensitive and certain agricultural products in Iran during 1360-91.

**Materials and Methods:** To achieve this goal in this study, the Armington and the foreign currency elasticity of ten selected agricultural products in Iran including wheat, barley, rice, corn, soybean meal, vegetable oil (soybean and sunflower), sugar, eggs, poultry and beef, have been estimated and examined using Autoregressive Distribution lag Model (ARDL). In order to investigate speed of adjustment or in other words the speed of movement towards equilibrium, typically the error correction model (ECM) is used. Existence of cointegration or in other words, long term relationship between a set of economic variables provide the basis for the use of error correction model. In fact, error correction model links the short term fluctuations of the variables to their long term equilibrium values and shows adjustment speed and long term movement towards equilibrium.

**Results and Discussion:** The results of the present study show transfer of the world price fluctuations to the domestic market in the long run is more than in the short run. Moreover, if the products face a gap in domestic demand, and the local production is so limited that it cannot limit the import of that product, the products would be more affected by fluctuations in world prices. The results of ECM model reveal that the speed of adjustment towards long run equilibrium for most products is low such that if the shock enters the market of each product a long time is required for correcting the short-run and long-run imbalance equilibrium and bring it back to the first equilibrium.

**Conclusion:** The results showed that most of the crops under review (e.g. corn) face with the low gap of demand and the ability of domestic production in limiting the imports is low. Therefore, a significant portion of these products are imported from abroad. Given that the country is faced with a crisis of drought and water shortage problems, the price policies cannot eliminate this problem and help stabilize the market by encouraging increased production Thus, they lead to increased demand for imports. Under such circumstances, the only way to increase production in the country is enhancement of productivity in the agricultural sector. Of course, this is only possible in the long run. For products such as rice and meat the elasticity of substitution of domestic production with imports is small. In other words, if a policy is adopted that results in an increase in the price of these products, the share of these products of the total imports does not increase that much in comparison with other products. To support these products, policies can be used such as import tariffs in the short run. Since in the ECM model for the majority of products, the adjustment speed or the speed to move to the long-run equilibrium is slow, it is necessary to consider the harmful effects and consequences of shocks in the economy. Because if a shock is entered into the model, to correct the imbalance between short-run and long-run equilibrium and come back to long-run equilibrium needs a long time.

**Keywords:** Armington Elasticity, Autoregressive Distribution lags Model (ARDL), Currency Elasticity, Price Transfer

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# Economic Analysis of the Effects of Climate Change Induced by Greenhouse Gas Emissions on Agricultural Productions and Available Water Resources (Case Study: Down Lands of the Taleghan Dam)

**M.M. Mozaffari[1]- A. Parhizkari[2*]- M. Hoseini Khodadadi[3]- R. Parhizkari[4]**

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**Introduction:** Greenhouse gases absorb the radiation reflected from the earth surface which would otherwise be sent back into space. The composition and mixture of these gases make life on earth possible. In recent years, human activity has affected both the composition and mixture of the atmosphere, modifying the climate. When climate changes, crop production is affected. There are many studies that consider the type and amount of production changes for particular crops, places and scenarios. Others attempt to expand knowledge about production changes and their impacts on economy and regional welfare. Climate change affects agriculture through direct and indirect affects i.e. temperature, and precipitation changes in the biological and physical environment. Restriction in water availability is one of the most dramatic consequences of climate change for the agricultural sector. Water availability is expected to be even more limited in the future. Scarcity of water is due to potential evapotranspiration increase. It is related to increase in air and earth surface temperatures. This phenomenon is important in low-precipitation seasons, and is even more severe in dry areas. The number of regions with loss of soil moisture is expected to increase, resulting in direct economic consequences on the production capacity. Considering the above decisions, the main objective of this paper is to integrate climate change into agricultural decision-making by using an Economic Modeling System to identify the impacts of climate change induced by greenhouse gas emissions on agricultural sector productions and available water resources in the down lands of the Taleghan Dam.

**Materials and Methods**: In this study, the effects of greenhouse gases on climate variables of temperature and precipitation under emission scenarios $A_1B$, $A_2$ and $B_1$ were evaluated using time series data from 1981-2008 and General Circulation Models (GCM). Then Ordinary Least Squares (OLS) was used to survey the impacts of climate variables on the selected products yield. Changes in agricultural production, farmer's gross profit and economic value of irrigation water were analyzed and compared with the base year by the regression analysis results in the Positive Mathematical Programming (PMP) model. This methodology that was developed by Howitt (1995) to calibrate agricultural supply models has been used to link biophysical and economic information in an integrated biophysical and economic modeling framework and to assess the impacts of agricultural policies and scenarios. These models are also accepted for analyzing the impact of climate change and water resources management policies and scenarios. The PMP model used in this paper is a three-step procedure in which a non-linear cost function is calibrated to observe values of inputs usage in agricultural production. In the basic formulation, the first step is a linear program providing marginal values that are used in the second step to estimate the parameters for a non-linear cost function and a production function. In the third step, the calibrated production and cost functions are used in a non-linear optimization program. The solution to this non-linear program calibrates to observed values of production inputs and output. The required data in this paper were collected from meteorological stations and the relevant agencies in the Qazvin province. Regression functions estimated in Eviews software package and the PMP model were solved in GAMS (General Algebraic Modeling System) software.

**Results and Discussion**: The results obtained in this paper showed that with emissions of greenhouse gases under the studied scenarios ($A_1B$, $A_2$ and $B_1$), the average annual climate variables of temperature and precipitation changes from 1.64 to 2.28 °C and from20.92 to 1.1 mm, respectively. With these change, the yield of the most selected products decreases in the down lands of Taleghan Dam. Moreover, the obtained results showed that with emissions of greenhouse gases under the scenarios $A_1B$, $A_2$ and $B_1$, the total acreage of the selected products changes from 2.18 to 4.09 percent. Total used water also decreases from 1.67 to 5.18 percent.

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Moreover, with emissions of greenhouse gas under the above scenarios total farmer's gross profit decreases from 1.93 to 3.72 percent. However, the economic value of water increases from 4.27 to 13.6 percent in comparison with the base year.

**Conclusion**: In this study finally, in order to reduce greenhouse gas emissions in the vicinity of the down lands of the Taleghan Dam, it is recommended that the government should use punitive tools (green complications) for polluting units and serve the private sectors in forestry projects in the vicinity of the industrial towns.

**Keywords:** Agricultural productions, Climate change, Greenhouse Gases, Positive Mathematical Programming, Taleghan Dam

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# The Impact of Some Economic Factors Affecting Groundwater Pollution in Both Developed and Developing Countries

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**Introduction**: The role of economic factors in pollution and environmental degradation is one of the major Issues in economic and environmental studies that many researchers have addressed in their studies. One of the issues in the field of environment to which less attention has been paid is the effect of economic factors such as the openness of the economy on water resource pollution. In this paper we investigate the relation between water pollution and economic factors such as economic size, capital to labor ratio and economic openness in two groups of developed and developing countries with paned data method. In fact we investigate the two hypothesis of Environmental Kuznets curve and pollution havens in two groups of countries. To prevent the pollution of groundwater resources in the process of economic growth, policies must be coordinated by responsible organizations. Changing crop patterns and moving toward the production of organic products to reduce the use of polluting substances in the production of agricultural products is one of these solutions.

**Materials and Methods:** In the present study, using panel data methods, the correlation between some independent economic factors such as per capita GDP, Squared per capita GDP that both indicate Scale effect and capital to labor index with Squared capital to labor index both indicating comparative advantage effect and openness of trade and some composite indices on dependent variables, groundwater pollution, in the two groups of countries both developed and developing countries has been investigated. For this purpose, using the biological oxygen demand index (BOD) as an indicator of pollution of groundwater resources and sum of exports and imports divided by GDP as an indicator of economic openness and GDP per capita as an indicator of the economy in the period of 1995 to 2006, the Environmental Kuznets curve and pollution havens hypothesis have been tested.

**Results and Discussion**: The issue of water pollution is important in the present century. Increasing population and increasing water demand in different sectors of agriculture, industry, drinking water and sanitation have caused great pressures on groundwater resources. The increasing demand for water and water pollution exacerbate water shortages in many parts of the world, including Iran. The results shows that in the group of developed countries, an increase in per capita income will reduce water pollution and further increases in per capita income have led to increasing pressure on water resources, and thus there will be more pollution. Also in developing countries, an increase in per capita income has increased pressure on water resources and water pollution, but in a subsequent step, the increase in per capita income can even lead to a reduction in pollution. In other words, the relationship between GDP per capita, and water pollution in developed countries has a U-shaped curve and in developing countries it has an inverted U-shaped curve. Therefore, the environmental Kuznets hypothesis has been confirmed in developing countries. Other the results showed that with increasing openness of the economy, pollution of water resources in developed countries remains unaffected, while in developing countries, water pollution will increase. Thus, the pollution haven hypothesis is also confirmed in developing countries. Other factors also have different effect in two groups of countries. Policies to avoid additional pressure on water resources in the process of economic growth and restrictive regulations for accumulation of pollutants in the industry along with the economic liberalization can find ways to prevent further contamination of water resources in developing countries, including Iran.

**Conclusion**: Due to the positive correlation between economic openness and contamination of underground water resources in developing countries including Iran on the one hand and requirements for joining the World Trade Organization (WTO) on the other hand, the government should set policies for controlling pollution on groundwater resources with relevant rules such as pollution tax on polluting agents in the process of globalization and trade openness. To prevent the pollution of groundwater resources in the process of economic growth, policies must be coordinated by responsible organizations. Changing crop patterns and moving toward

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the production of organic products to reduce the use of polluting substances is one of these solutions. Due to confirming pollution Haven Hypothesis in Developing countries such as Iran, It recommended that policies such as Increasing Tariffs on Pollutant Industries adopted by policy Makers in this countries.

**Keywords**: Per Capita Income, Economic Openness, Water Pollution, Environmental Kuznets Curve, Pollution Haven Hypothesis

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# Analysis of Options Contract, Option Pricing in Agricultural Products

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**Introduction**: Risk is an essential component in the production and sale of agricultural products. Due to the nature of agricultural products, the people who act in this area including farmers and businesspersons encounter unpredictable fluctuations of prices. On the other hand, the firms that process agricultural products also face fluctuation of price of agricultural inputs. Given that the Canola is considered as one of the inputs of product processing factories, control of unpredictable fluctuations of the price of this product would increase the possibility of correct decision making for farmers and managers of food processing industries. The best available tool for control and management of the price risk is the use of future markets and options. It is evident that the pricing is the main pillar in every trade. Therefore, offering a fair price for the options will be very important. In fact, options trading in the options market create cost insurance stopped. In this way, which can reduce the risks of deflation created in the future, if the person entitled to the benefits of the price increase occurs in the future. Unlike the futures, market where the seller had to deliver the product on time, in the options market, there is no such compulsion. In addition, this is one of the strengths of this option contract, because if there is not enough product for delivery to the futures market as result of chilling, in due course, the farmers suffer, but in the options market there will be a loss. In this study, the setup options of rape, as a product, as well as inputs has been paid for industry.

**Materials and Methods:** In this section. The selection criteria of the disposal of asset base for valuation of European put options and call option is been introduced. That for obtain this purpose, some characteristics of the goods must considered:

1-Unpredictable fluctuations price of underlying asset
2 -large underlying asset cash market
3- The possibility of standardizing the underlying asset
4- Impossibility of creating cross supply of the underlying asset

In addition, after the introduction of the model parameters, we offers method calculating of the volatility (standard deviation) price with using historical data (time series). Parameters of Blk- Scholes model are introduced and option contract of selected product will pricing. After effect of the rise and fall agreement prices (in the form of 9-defined scenario) on the price of put option and sales option are studied.

In this study, after forming the hypothetical option market for the Canola, option pricing is done. In this section, the criteria for selecting an appropriate asset base is expressed for option contract. The Black–Scholes model is introduced for the valuation of call option and European put option contract. After introducing the model parameters, the calculation of volatility (standard deviation) of price using historical data (time series) is presented .To achieve this aim, the Black – Scholes model was used under 9 strike price scenario of 5, 10, 15, 20 percent above; 5, 10, 15, and 20 percent lower and finally equal to current prices. This model was run in Excel 2010 and Derivea gem 1.5.

**Results and Discussion:** The results showed 43% price volatility for canola that reflects uncertainty in its price. In the next stage of pricing, the purchase and sale of the selected product was done under the nine price scenarios. The results showed that the highest authority to purchase option was for scenario K1 and the highest buy option was for the K9 scenario. The least expensive buy option is K9 and the least expensive sell option is K1.

**Conclusion**: The results show that the increase of strike price under these scenarios leads to a decrease of call option price and decrease of put option price. In addition, the farmers, businesspersons and agricultural products transforming factories with a different degree of risk disclosure can participate in these markets proportional to their needs for covering the risk

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Farmers with various degrees of risk involved in this market Thus , people with a higher risk, are seeking the to pay less right of option and in turn, receive less coverage. Similarly, farmers with less risk-averse, demand pay to higher right of options for themselves cover against the risk of price in future.

**Keywords**: Option Market, Call Options, Put Options, Canola