

***Bijan ABADI*¹**

A REVIEW OF THE IMPACT OF THE TARGETING SUBSIDY PLAN ON THE INPUT USE BEHAVIOR OF FARMERS IN IRAN

SUMMARY

Subsidies in agriculture are delivered with different purposes, such as increasing monetary revenues, improving productivity, stabilizing prices, and conserving the environment. Witness testimonies indicate that agricultural subsidies are often ineffective in practice due to their negative consequences, like an increase in agricultural input use, degradation of natural resources, decrease in productivity, and addition in costs. The Iranian government has initiated the implementation of a new transformation scheme known as the targeting subsidy plan. In this regard, the study on the impact of such a scheme on farmers' input use behavior is still inadequate and research should be conducted to fill this knowledge gap. Therefore, this study investigates the impact of the targeting subsidy plan on farmers' input use behavior. Using archival and library resources, we reviewed recent papers on the impact of such a scheme on farmers' input use behavior. The reviewed papers include topics such as the definition of subsidy, types of subsidies, agricultural subsidies, the targeting subsidy plan, and the input use behavior of the farmers. Most of the research in this area concludes that the targeting subsidy plan—in the form of the either eliminating or targeting—has substantially influenced farmers' behavior and altered the way in which farmers use agricultural inputs. Although the social impacts of such a scheme are still ambiguous in the rural areas of Iran, the paper serves as a reference for researchers who would work in the field of subsidy.

Keywords: Targeted subsidy, Agricultural inputs, Farmers, Iran

INTRODUCTION

The agricultural sector is rigidly challenged by uncertainties of the ecological environment such as the mutability of climate and economic environments (e.g. the fluctuations of agricultural input price). In these circumstances, farmers struggle against risky conditions that may threaten their livelihood. Governments around the world implement new enterprises to alter the structure of the economy and improve market situations. For instance, the Iranian government has undertaken the targeting subsidy plan as a purposive initiative to subsidize payments. Regardless of the economic purpose, such schemes may only have environmental aims. In this respect, there are numerous policies that can be implemented for achieving efficient usage behaviors, such as price,

¹Bijan Abadi (corresponding author: abadi@maragheh.ac.ir), The University of Maragheh, AmirKabir Highway, Golshahr Town, IRAN.

Notes: The authors declare that they have no conflicts of interest. Authorship Form signed online.

taxing, reward incentives (Linden et al., 2006), feedback (Martiskainen, 2007), technology and equipment diffusion (Abrahamse et al., 2005), and information (Wood and Newborough, 2003). The targeting subsidy plan is essentially a price-based policy. However, the price interventions may not always be efficient in changing the input use behavior (Bakhshi et al., 2012). The subsidy reform has a number of social, economic, and environmental consequences (Jalalian et al., 2013; Bakhshi et al., 2012). Evidence indicates an increase in energy consumption with a decrease in energy price (i.e. if the energy price is subsidized). For instance, the subsidized power price has increased the Iranian domestic energy consumption over the past three decades, considering a fixed size of population (see Fig. 1, RFE/ RL, 2010). As a result, subsidies are often inefficacious, high-priced, socially disparate, and environmentally damaging (Cox, 2005).

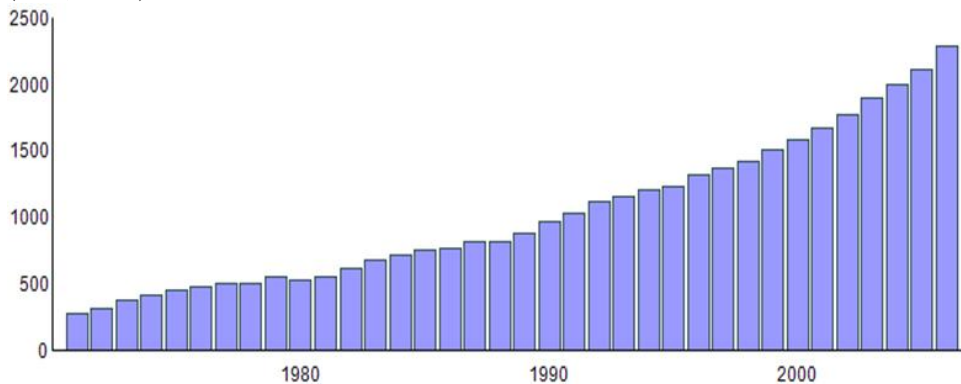


Figure 1: Electric power consumption (kWh per capita) (RFE/ RL, 2010)

The present study investigates the impact of the targeting subsidy plan on farmers' input use behavior. For this purpose, we reviewed the outlines, such as definition of subsidy, subsidy types, the targeting subsidy plan, farmers' input use behavior, and the impact of the targeting subsidy plan on farmers' input use behavior.

MATERIALS AND METHODS

This study used qualitative methods. Library and archival resources were used to examine the impact of the targeting subsidy plan on the input use behavior of farmers. Therefore, we reviewed the literature on empirical papers from 2010 to 2017.

The definition of subsidy

Subsidy is defined as the genuine estimated cash flow to and from the government over a loan life, which is discounted so far (US Government Publishing Office, 2014). Subsidy is also defined as any monetary amount that helps maintain the consumer price below the market prices and the producer price above the market prices. Therefore, the expenditures of the consumers and producers are reduced (Naji Meidani and Sotoodeh Niakarani, 2015; Jalalian et

al., 2013). The purpose of the subsidy is to allocate the resources optimally, fix the prices, balance both supply and demand, and redistribute the revenues. Therefore, subsidy is a part of the governments' support to improve economic affairs (Ismailnia and Vasfi Esfastani, 2015), prevent recession, raise the prices of the products, and encourage more labor-intensive employment (Bakhshi et al., 2012). Thus, any action that leads to a reduction in the prices a consumer has to pay and a reduction in the cost incurred by a producer of a commodity is perceived as subsidy (Naji Meidani and Sotoodeh Niakarani, 2015). For example, subsidy includes the supporting regulations, loans with lower interest, tax discounts, and rebates in the commercial tariffs. The subsidies may be granted to support the low-income people (Bakhshoodeh, 2010). Therefore, they improve income distribution in the form of cash or non-cash (Bakhshi et al., 2012). In general, the socio-economic objectives of delivering the subsidies include supporting the deprived people, reducing disparities, improving income distribution, increasing public welfare, and stabilizing the economy by fixing prices (Ismailnia and Vasfi Esfastani, 2015).

Types of subsidies

Economic subsidies are divided into five categories—consumer subsidies, producer subsidies, distribution subsidies, service subsidies, and export subsidies. The consumer subsidies include payments to consumers, intending to improve the distribution of income, adjusting the effects of market pressures, and encouraging the use of national stocks. The producer subsidies are paid to reduce production costs and support producers. The subsidies are also categorized into two other groups—visible and hidden. The former includes all subsidies that are available in the state budget and incorporates a set of direct and indirect subsidies. The latter deals with the subsidies delivered by the government to goods and services—such as fuel subsidies and credits (Jalalian et al., 2013). Furthermore, subsidies can again be split into three groups—open subsidies, per capita subsidies, and targeted subsidies (Ismailnia and Vasfi Esfastani, 2015; Jalalian et al., 2013). Open subsidies serve all buyers of goods. An example would be gasoline subsidies. In other words, the more one buys and consumes gasoline, the more he/she will receive such subsidies. The per capita subsidies are equally distributed among all the people in a community—for example, subsidizing the essential goods that improve the income distribution. A targeted subsidy is directed to the target groups—for example, the poor section of the society. The purpose of targeting is to identify the ones who need to be included in the assistance programs. As example of this type of subsidy would be the availability of commodities in the form of coupons.

RESULTS

Agricultural subsidies

Subsidies in agriculture are allocated to inputs such as fertilizers, seeds, seedlings, tractors, pesticides, funds, health and breeding services for the nomadic and rural livestock, and aviation services (Amini, 2009). Figure 2 and

Table 1 show that the production subsidies have increased from 2002 to 2006 but have decreased after 2006.

Table 1: Subsidies in Iran's agriculture from 2002 to 2006 (Amini, 2009).

Year	Fertilizer	Seed/ pesticide	Tractor/ combine	Vaccine	Profit/ Lending Facility	Insurance
2002	1594300	756100	672500	381000	200000	94008.3
2003	2038500	643500	672500	354600	885930	226097.12
2004	3997600	654400	711100	335000	904725	1025512
2005	7027000	654400	164100	609000	2000000	1100735
2006	6950000	763000	---	400000	1218370	1421152
Year	Insurance	Airplane service	Phosphate soil/ Phosphoric acid	Seedlings	Laboratory facilities	Total
2002	94008.3	---	---	---	---	3697908.3
2003	226097.12	--	259200	---	---	5062427.12
2004	1025512	10200	259200	---	---	7897737
2005	1100735	25000	280000	---	---	13452535
2006	1421152	25000	3325000	100000	50000	11252522

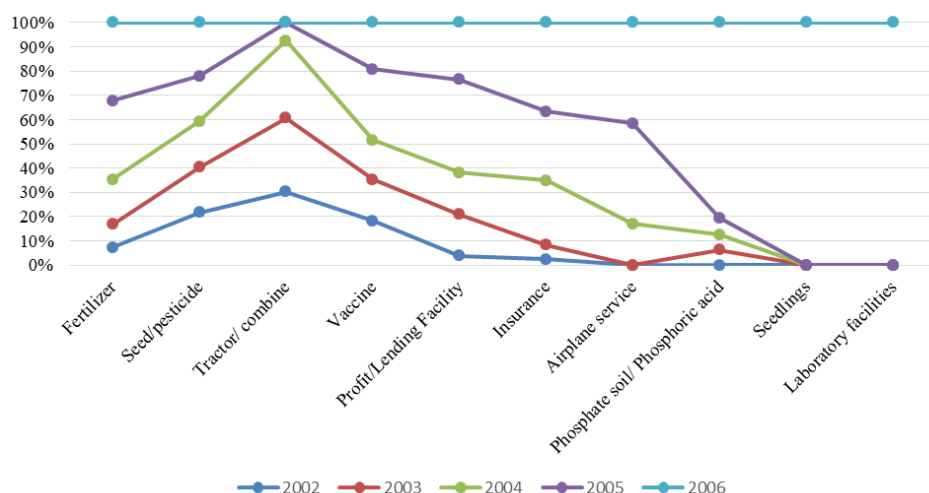


Figure 2: Iran's agricultural subsidies from 2002 to 2006 (Amini, 2009).

Of all the farming crops, wheat has received the highest amount of subsidy. Out of the total subsidies allotted for farming crops, the share of wheat subsidy was 56.14% in 1990–2010 (Ismailnia and Vasfi Esfastani, 2015). With regard to the optimal allocation of the agricultural subsidies to consumers and producers, Karimi and Zahedi Keyvan (2011) conclude that 86.56% of the total share of the subsidies should be allocated to agricultural producers, and the remaining 13.44% to consumers. Figure 3 shows a comparative study of fertilizer

usage—such as nitrogen, potash, and phosphate fertilizers—in Iran with five other countries—Egypt, United States, Pakistan, Turkey, and China (Roser, 2017). It indicates that the fertilizer usage in Iran's agricultural sector after 2009 has been lower than that of the five other countries. This might have been caused by the increased price of fertilizers.

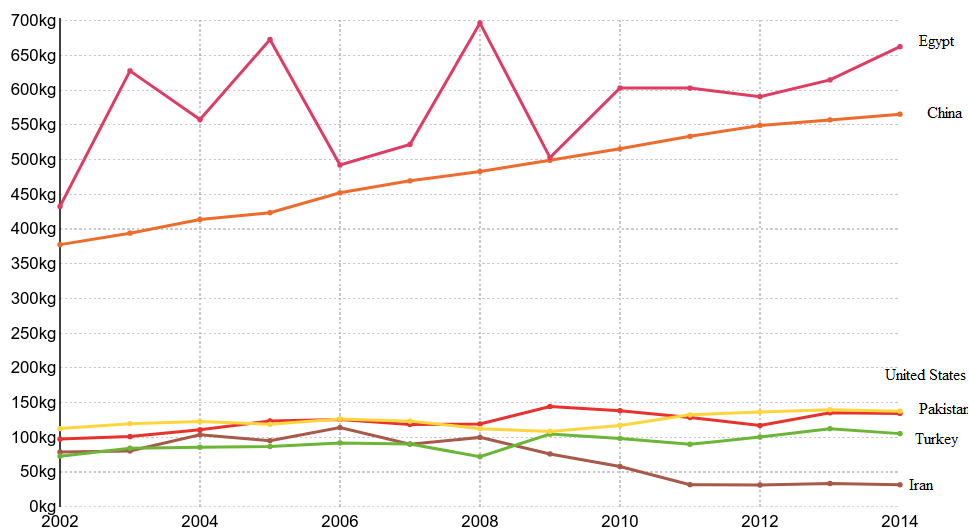


Figure 3: Fertilizer use in kg per hectare of arable land (Roser, 2017).

Figure 4 also reveals the amount of pesticide used in Iran's agriculture from 1996 to 2012. According to this figure, the highest amount of pesticide has been used in the form of herbicides in 2006 (SCI, 2013). After 2009—which coincided with the beginning of implementing the targeting subsidy plan—the amount of pesticide use decreased.

The targeting subsidy plan

The supply of the subsidy may cause problems like input overuse, environmental degradation, budget deficits, cost rise, wastage of resources, and the occurrence of economic losses. These problems have forced the decision-makers to approve and pursue the policy of targeting the subsidies in 2010 (Ismailnia and Vasfi Esfastani, 2015). The scheme has affected the Iranian agricultural sector (Maghsoudi and Tohid Ardahaey, 2012; Shamizadeh et al., 2012; Ismailnia, and Vasfi Esfastani, 2015). Subsidies have often been inefficient, expensive, socially unequal, and environmentally destructive, and have imposed a heavy burden on government budgets (Cox, 2005). With government subsidies, farmers are encouraged to use intensive agricultural practices, such as using chemical fertilizers and pesticides, adopt the irrigation technologies, and producing hybrid agricultural products (Ge et al., 1999). Although these practices increase the yield and reduce costs, they destroy lands and pollute water. Therefore, the elimination of all price supports is an effective way to reform the subsidies (Pye-Smith, 2002). For this reason, most societies

are directed to undertake a more sustainable route by eliminating or modifying the input subsidy and combining rational tax structures (United Nations Environment Program, 2008). When the subsidies are eliminated in agriculture, it becomes necessary to deliver the payment of the subsidies directly to farmers, especially those who are poor (Bakhshi et al., 2012).

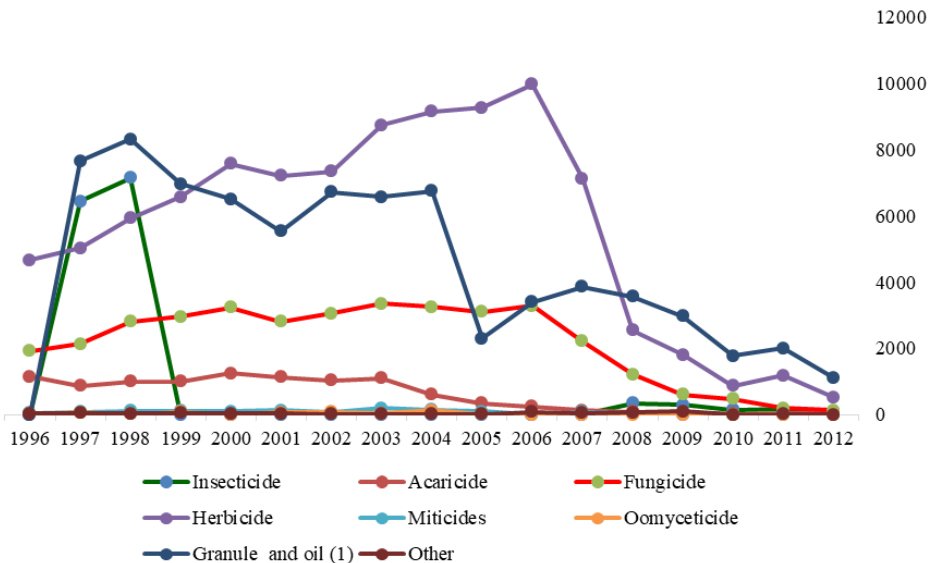


Figure 4: Pesticide use in Iran's agriculture from 1996 to 2012 (SCI, 2013)

Input use and input use behavior

Agricultural inputs include fertilizers, seeds, pesticides, water, fossil fuels, extension service, and so on. We observed a difference between agricultural input use and farmers' input use behavior. The former includes any amount of the agricultural inputs used by the farm appliances. The latter encompasses the farmers' internal characteristics that influence and determine the amount of agricultural input use. Indeed, a farmer's psychological properties form basis of the input use behavior. Therefore, it is established that the conservation of the environment cannot be accomplished only by applying modified innovations and technologies; changes in human behavior are also required (Bourdeau, 2004; Oikonomou et al., 2009).

DISCUSSION

The targeted subsidy and input use behavior

In this section, we review the empirical witnesses on the impacts of the targeting subsidy plan on agricultural input use and discuss the results. The targeting subsidy plan has exerted numerous influences on farmers' behavior, such as input use, input purchasing, product building, and so on. Furthermore, the subsidy reform has led to a more equitable distribution of the revenues (Tracey and Anne, 2008). At the same time, the elimination of the subsidies has forced

poor farmers feel vulnerable (Bakhshi et al., 2012). The experience of eliminating subsidies in Russia led to economic development, effective allocation of the resources and incomes, and dissemination of clean technologies (Golub and Strukova, 1999). In New Zealand, the removal of subsidies gave rise to unpleasant conditions for farmers. However, such troubles were diminished by reducing production costs (OECD, 2010).

Owing to the elimination of subsidies, an increase in the input price results in an efficient use of agricultural inputs by farmers. Therefore, an increase in the price of inputs—such as chemical fertilizer—reduces the demand for and consumption of the inputs (Jalalian et al., 2013; Manos et al., 2007; Onchan; 2004). However, this may lead to an increase in farmers' adoption of more sustainable inputs as a way to increase the yield. In a research that examines the short-term impacts of the targeting subsidy plan on rural farming conditions, Jalalian et al. (2013) indicated that the costs of agricultural inputs, like fuel and machinery, have increased after implementing the targeting subsidies. Consequently, the index of usage of the inputs and machinery was in a desirable situation, which caused an accrued and efficient use of these inputs.

Amirnejad et al. (2015) indicated that after targeting the subsidies, the crop pattern of the irrigational products was directed to the products themselves—such as cotton and rice—whereas, the crop pattern of the rain-fed products was replaced with rapeseed. Farmers may show a series of behaviors based on the conditions laid by the targeting subsidy plan. For example, a study in New Zealand (OECD, 2009) shows that under the conditions of the subsidy reform, farmers pursue the organic farming activities along with off-farm activities in order to earn. Under these special circumstances, farmers often would not use the inputs in the same way as used previously. This is done to cope with the increased prices of inputs in conventional agriculture (Sutherland et al., 2012).

With the targeting subsidy plan and reducing subsidies of agricultural inputs, the cost of non-trade inputs has changed (Amirnejad et al. 2015). For example, an increase of 200% in the price of fertilizer is needed to reduce the consumption to an optimal level, which doubles the cost of the fertilizer. This consequently brings net economic losses for farmers and changes the crop pattern (Bakhshi et al., 2010). Therefore, farmers may use the modern technologies to improve the efficiency of input use—such as, fertilizers and pesticides (Picazo-Tadeo and Reig-Martínez, 2007). Bakhshi et al. (2010) have studied the impacts of subsidy elimination of the chemical fertilizer on cropping patterns and consumption of the inputs in Sabzevar city, Iran. They conclude that the complete elimination of the subsidy has reduced the use of chemical fertilizers. Therefore, subsidy reform can create conditions under which environmental improvement and neutral effects are achieved (La Vina et al., 2007).

In general, the effects of the targeting subsidy plan in the agriculture sector can be identified in terms of the time scale—short-term, medium-term, and long-term (Jalalian et al., 2013). In the short term, which ranges from one to two years, an increase in the price of agricultural inputs, like energies and fertilizers, will

increase the cost of agricultural production. Therefore, those agricultural activities that require an enormous amount of energy are affected. However, increasing the price cannot be an effective way as it may result in loss of the sales market. Therefore, changing the crop pattern and volume of activities, as well as managing the inputs, can be done in the medium term, which ranges from two to five years. In the long-term scale of more than five years, raising the level of productivity is an effective strategy under conditions of the targeted subsidies.

CONCLUSION

This study qualitatively investigated the impact of the targeting subsidy plan on farmers' input use behavior. The empirical studies indicated that such a scheme had a substantial impact on the input use behavior of farmers in Iran. As the price of the inputs increases under the targeting subsidy plan conditions, farmers inevitably make more efficient decisions in using agricultural resources. Consequently, increasing the input price is an efficient strategy for ameliorating the farmers' input use behavior. The empirical evidence also corroborates this. By reviewing the literature, it became clear that the eliminated and targeted subsidy have substantially influenced the input use. A question that should be addressed by future research is whether other input use change strategies should be paid attention to, together with price interventions, or not. Although this intervention improved the agricultural input use behavior, policymakers need to consider other impacts of such plans on farmers' livelihood, especially for those who are more vulnerable. We recommend future studies to investigate all aspects of the targeting subsidy plan. Therefore, the social, economic, and environmental dimensions should be given attention by policy-makers when subsidizing the agricultural input price. In particular, support should be lent to the farmers who are poor.

REFERENCES

- Abrahamse, W., Steg, L., Vlek, C., Rothengatter, T. (2005). A review of intervention studies aimed at household energy conservation. *Journal of Environmental Psychology*, 25, 273–291.
- Anonymous, (2008). *Agricultural Biology Study of Organic Agriculture in Iran Part 6*.
- Amini, R. (2009). The analysis of the planned subsidies program in agriculture sector. *Daam-va-Kesht-va-Sanaat*, 118, 13-14.
- Amirnejad, H., Ataei, K., Habibi Tirtashi, F. (2016). Investigating the effects of targeted subsidy plan on changes in cropping pattern in Mazandaran province. *7(28)*, 39-59.
- Azarbaijani, K., Sharifi, A., Masoudi, A. (2011). The impact of targeted subsidies of electricity in the Iranian manufacturing. *International Journal of Contemporary Research in Business*, 3(8), 1078-1091.
- Bakhshi, B., Shahrokh, L., Alikhani, N. (2012). Content analysis of reflection of subsidy in Media. *Media studies*, 6(15), 111-123.
- Bakhshi, M.R. Peykani, G.R., Hosseini, S.S., Saleh. I. (2010). Evaluating effects of removing fertilizer subsidy and direct payment policies on cropping pattern and inputs use (Sabzevar). *Iranian Journal of Agricultural Economics*. 4(2), 185-207.

- Bakhshoodeh, M. (2012). Identifying beneficiary households for cash payments in Iran based on proxy means test. *Agricultural Economics: Iranian Journal of Agricultural Economics*, 6(1), 93-108.
- Bourdeau, P., (2004). The man-nature relationship and environmental ethics, *Journal of Environmental Radioactivity*, 72, 9-15.
- Ismailnia, A.A., Vasfi Esfastani, S. (2015). Analysis of energy price reform effects on production and price in the agricultural sector. *Journal of Management System*, 9(32), 45-63.
- Ge, C., Gao, S., Wang, J., Yang, J., Cao, D. (1999). Subsidy Policy and the Environment in China. In OECD (Eds). *Environmental taxes: Recent Developments in China and OECD Countries*. OECD Publications. 330 pp.
- Golub, A., and Strukova, E., (1999). Reform of subsidies to the energy sector: the experience of Russia. In OECD (Eds). *Environmental taxes: Recent Developments in China and OECD Countries*. OECD Publications. 330 Pp.
- Jalalian, H., Hashemi, S., Yaghobi, J. (2013). Study of short-time effects of the targeting subsidies on rural farming status in Neiriz township (Case study: Abadeh TASHK district). *Journal of Regional Planning*, 3(10), 45-59.
- Karimi, F., Zahedi Keyvan, M. (2011). Optimal pattern for allocation of subsidies to agricultural sector, consumers and producers: application of interval analytic hierarchy process. *Journal of Agricultural Economics Research*, 2(4), 99-120.
- La Vina, A., Fransen, L., Faeth, P., Kurauchi, Y. (2007). Agricultural subsidies, poverty and the environment: supporting a domestic reform agenda in developing countries. WRI Policy Note, 1.
- Linden, A, L., Carlsson-Kanyama, A., Eriksson, B. (2006). Efficient and inefficient aspects of residential energy behaviour: What are the policy instruments for change? *Energy Policy*, 34, 1918-1927.
- Maghsoudi, N., Tohid Ardahaey, F. (2012). Targeting subsidies considering the applied models in Iran. *International Journal of Business and Social Science*, 3(7), 162-166.
- Manos, B., Begum, M. A. A., Kamruzzaman, M., Nakou, I., & Papathanasiou, J. (2007). Fertilizer price policy, the environment and farms behavior. *Journal of Policy Modeling*, 29(1), 87-97.
- Martiskainen, M. (2007). Affecting consumer behaviour on energy demand. Sussex: SPRU-Science and Technology Policy Research, 81.
- Naji Meidani, A.A., Sotoodeh Niakarani, S. (2015). The effect of eliminating energy subsidies on industry cost structure in Iran. *Economic Modeling*, 8(4), 45-62.
- OECD, (2010). Making reform happen lessons from OECD countries: Lessons from OECD Countries. OECD Publishing, 296 pp.
- OECD, (2009). The role of agriculture and farm household diversification in the rural economy of New Zealand. [Online]. <<http://www.oecd.org/agriculture/agriculturalpoliciesandsupport/43245582.pdf>> [Sep 10 2006].
- Oikonomou, V., Becchis, F., Steg, L., Russolillo, D. (2009). Energy saving and energy efficiency concepts for policy making. *Energy policy*, 37(11), 4787-4796.
- Onchan, T. (2004). The financial crisis and agricultural productivity in Asia and the Pacific. Report of the APO Study Meeting on Effects of Financial Crisis on Productivity of Agriculture (STM-12-00). [Online]. <http://www.apo-tokyo.org/00e-books/AG-06_FinancialCrisis/AG_06_FinancialCrisis.pdf#page=186> [Aug 22 2011].

- Picazo-Tadeo, A. J., Reig-Martínez, E., (2007). Farmers' costs of environmental regulation: Reducing the consumption of nitrogen in citrus farming, *Economic Modelling* 24, 312–328.
- Pye-Smith, C., (2002). *The Subsidy Scandal: How Your Government Wastes Your Money to Wreck Your Environment*. Earthscan, 250 pp.
- RFE/RL/Payvand.com: Sanctions and Iran's Achilles Heel. Retrieved June 11, 2010.
- Roser, M. (2017). Fertilizer and Pesticides. Published online at OurWorldInData.org. Retrieved from: <https://ourworldindata.org/fertilizer-and-pesticides/> [Online Resource].
- SCI, (Statistics Center of Iran). Agricultural Support Services and Joint Stock Company. Office of Budget and Design. <https://www.amar.org.ir/>
- Tracey, S., Anne, B., (2008). OECD insights sustainable development linking economy, society, environment: Linking economy, society, environment. OECD Publishing, 142 pages.
- United Nations Environment Programme, (2008). *Reforming Energy Subsidies: Opportunities to Contribute to the Climate Change Agenda*. [Online]. <http://www.unep.org/pdf/pressreleases/reforming_energy_subsidies.pdf> [May 25 2005].
- US Government Publishing Office. (2014). *Fiscal Year 2015: Historical Tables, Budget of the US Government*, Washington, DC 49 Page 78.
- Wood, G., and Newborough, M. (2003). Dynamic energy-consumption indicators for domestic appliances: environment, behaviour and design. *Energy and Buildings*, 35, 821–841.