Shahid Chamran
University of Ahvaz

Quarterly journal of
Quantitative Economics

Investigating and Predicting the Impact of Water Pricing on Structural Changes in Iran

Reyhaneh Arabpour *⊙, Sayyed Abdolmajid Jalaee,** Mehdi Nejati***

* Ph.D. in economics, Department of Economics, Faculty of Management and Economics, Shahid Bahonar University , Kerman, Iran. (Corresponding Author)
Email: *ryhn.arabpour@aem.uk.ac.ir*
⊙ 0000-0001-6650-4429
Postal address*: Pajoohesh Sq, Imam Khomeni Highway, Kerman,I.R Iran. Faculty of Management&Economics, Shahid Bahonar University, Kerman, Posta; code: 7616914111, Iran.*
** Professor of Economics, Department of Economics, Faculty of Management and Economics, Shahid Bahonar University , Kerman, Iran
Email*: jalaee@uk.ac.ir*
***Associate Professor of economics, Department of Economics, Faculty of Management and Economics, Shahid Bahonar University , Kerman, Iran
Email*: mnejati@uk.ac.ir*

EXTENDED ABSTRACT

INTRODUCTION

In the past decades, increasing population, urbanization and industrial development, have increased demand for water which has resulted into considerable decrease in annual renewable water resources per capita .One of the most important ways to solve the problem of water shortage is pricing. Based on the studies, there is a significant gap between the actual water price and the price paid by consumers. Therefore, design of water price structure is a crucial issue for water utilities and local communities to achieve an efficient allocation of the scarce water resources. In this study, the effect of water pricing on structural changes has been investigated. Structural changes can occur due to changes in total income and changes in relative prices. Structural changes can also occur through changes in input-output (partial) links, which have received less attention in the literature (Neuss 2019). The purpose of this study is to answer the question whether water pricing can cause structural changes in the Iranian economy in the horizon of 2032?

METHODOLOGY

In this study, dynamic general equilibrium models have been used. The data required to simulate the scenario proposed in this research is taken from the ninth version of GTAP-E. According to the research objectives, the regions are divided into Iran and rest of the world. Economic sectors include agriculture, coal, oil, gas, industry, petrochemicals, electricity, water and services. Factors of production include skilled labor, unskilled labor, land, natural resources, and capital. In this study, two scenarios are defined. In the first scenario, an impact of 30% on the price of water in the industrial sector

is considered. In the second scenario, an impact of 30% on the price of water in the agricultural sector is considered. In the third scenario, an impact of 30% on the price of water in both sector is considered.

FINDINGS

The results show that with increasing water prices in the industrial sector (first scenario), skilled and unskilled labor in the agricultural sector decreases. Therefore, it can be accepted that the labor move from the agricultural sector to other economic sectors. Rising prices have also led to an increasing in the employment of skilled and unskilled labor in the coal, oil, gas, petrochemical and electricity sectors. With the increase in water prices in the agricultural sector (second scenario), the increas skilled and unskilled labor in the industrial and service sectors has always increased during the forecast years. Therefore, it can be concluded that one of the important factors affecting the structural changes that have occur slowly over the past years can be the change in water prices in various economic sectors. Also, the reduction of capital in the agricultural sector is associated with the use of capital in the main energy sectors in Iran.

CONCLUSION

Structural changes are one of the causes and effects relationship in economic development. Structural changes is formed with the development process itself can also be a factor of development and prosperity. For structural change, generally a shocke in a part of the economy can be a reason for structural change. For this reason, in this study, water prices in economic sectors have been considered. The results show that increasing of water prices in the industrial and agricultural sectors,lead to the population growth of skilled and unskilled labor decreases, but consequently, in the coming years until 2032, skilled and unskilled labor in the industrial and service sectors will experience positive growth. Based on this, it can be concluded that realizing the price of water can help the process of structural change in Iran. Of course, along with the labor force, capital flows have also been affected, which is better reflected in key energy sectors. Therefore, realizing the price of water and taking a step in its direction can help the process of using the active population of the country in order to achieve stable and sustainable growth. Therefore, the policy proposal is that the gradual realization of water prices can gradually cause structural changes in the Iran economy over time, which in turn leads to stable and sustainable growth and, most importantly,

employment and the formation of sustainable capacities in industry and services.

References

Aizenman, J., Lee,M., & Park, D. (2012). The relationship between structural change and inequality: A conceptual overview with special reference to developing Asia. *ADBI Working Paper*. No. 396. doi: 10.2139/ssrn.2175383

Arabpour, R., Jalaee, A., & nejati, M. (2021). Investigating the effect of productivity shock on structural changes and water transfer potential between Iran and neighboring countries. *Quarterly Journal of Quantitative Economics (JQE)*. doi: 10.22055/jqe.2021.34201.2260 [In Persian]

Amiri, M., Jahangard, E., Ghasemi Sheshdeh, M., & Omidvar, S. (2023). Structural change, fundamentals, and Typology of economic growth patterns in Iran: An ARDL Approach. *Quarterly Journal of Quantitative Economics*, (*JQE*),. doi: 10.22055/jqe.2023.42746.2537[In Persian]

Asadi, h., Soltani, g., & Torkamaani, j. (2007). Irrigation water pricing in iran (a case study on land downstream of taleghan dam). *Eqtesad-e keshavarzi va towse'e*, 15(58) special edition agricultural policies, 61-90. https://sid.ir/en/journal/viewpaper.aspx?id=111764 [In Persian]

Bates, B., Kundzewicz, Z., & Wu, S. (2008). Climate change and water. Intergovernmental Panel on Climate Change Secretariat: Geneva, Switzerland. http://taccire.sua.ac.tz/handle/123456789/552

Beheshti, M., Mohammadzadeh, P., & Ghasemloo, K. (2019). Structural Changes and Competitive Advantages in Iran's Provinces: A Dynamic Spatial Shift-Share Analysis. *Journal Of Economic Research And Policies*, 26(88), 71-106. https://sid.ir/en/journal/ViewPaper.aspx?id=764827 [In Persian]

Berbel, J., & Gómez-Limón, J. A. (2000). The impact of water-pricing policy in Spain: an analysis of three irrigated areas. *Agricultural Water Management*. 43(2), 219-238. doi: 10.1016/S0378-3774(99)00056-6

Berck, P., Robinson, S., & Goldman, G. (1991). The use of computable general equilibrium models to assess water policies. *In The economics and management of water and drainage in agriculture (pp. 489-509). Springer, Boston, MA*. doi: 10.1007/978-1-4615-4028-1_25

Brooks, D.B. (2006). An operational definition of water demand management. *International Journal of Water Resources Development*. 22(4). 521-528. doi: 10.1080/07900620600779699

Burniaux, J. M., & Truong, T. P. (2002). GTAP-E: an energy-environmental version of the GTAP model. *GTAP Technical Papers*, 18. URL: https://docs.lib.purdue.edu/gtaptp/18/

Buera, F. J., & Kaboski, J. P. (2012). Scale and the origins of structural change. *Journal of Economic Theory*. 147(2), 684-712. doi: 10.1016/j.jet.2010.11.007

Cardenete, M. A., & Hewings, G. J. (2011). Water price and water sectoral reallocation in Andalusia. A computable general equilibrium approach. *Environmental economics*. (2, Iss. 1), 17-27. doi: 10.22004/ag.econ.188124

Clark, C. (1940). *The Conditions of Economic Progress*, McMillan.

Connolly, E., & Lewis, C. (2010). Structural Change in the Australian Economy Bulletin–September Quarter 2010. *Bulletin*, (September). URL: https://rba.gov.au/publications/bulletin/2010/sep/1.html

Dinar, A., Rosegrant, M. W., & Meinzen-Dick, R. S. (1997). *Water allocation mechanisms: principles and examples* (No. 1779). World Bank Publications.

Easter, K. W. (1987). Inadequate Management and Declining Infrastructure: The Critical Recurring Cost Problem Facing Irrigation in Asia. *Economic Reports*, (6923). doi: 10.22004/ag.econ.6923

Esmaeili Moakhar Fordoei, M., Ebrahimi, K., Araghinejad, S., Fazlolahi, H. (2018). Economic Value Determination of the Agricultural Water based on Crop-Type in Markazi Province, IRAN. *Water and Irrigation Management*. 8(1), 149-163. doi: 10.22059/jwim.2018.254828.602 [In Persian]

Fisher, A. G. (1939). Production, primary, secondary and tertiary. *Economic record*. 15(1), 24-38. doi: 10.1111/j.1475-4932.1939.tb01015.x

Fotros, M., Rasooli, M. (2004). Calculating the index of structural changes in the economic in Iran. *Economics Journal*. 14(7,8). pp5-16. URL: http://ejip.ir/article-1-694-fa.html [In Persian]

Gohin, A., & Hertel, T. (2003). A note on the CES functional form and its use in the GTAP model. *Center for Global Trade Analysis, Purdue University*, 1-14.

Golub, A. (2013). Analysis of climate policies with GDyn-E *(No. 1236-2019-173)*. *Center for Global Trade Analysis, Department of Agricultural Economics*, Purdue University. doi: 10.22004/ag.econ.283431

Grafton, R. Q., Chu, L., & Wyrwoll, P. (2020). Dynamic Water Pricing. *Oxford Encyclopedia of Water, Sanitation, and Global Health*, 35. doi: 10.1093/acrefore/9780190632366.013.245

Grafton, R. Q., Chu, L., & Wyrwoll, P. (2020). The paradox of water pricing: dichotomies, dilemmas, and decisions. *Oxford Review of Economic Policy*, *36*(1), 86-107. doi: 10.1093/oxrep/grz030

Hertel, T., & Liu, J. (2019). Implications of water scarcity for economic growth. In *Economy-wide modeling of water at regional and global scales* (pp. 11-35). Springer, Singapore. doi: 10.1007/978-981-13-6101-2_2

Hosseinzadeh, R., Dadras Moghadam, A., & gharanjik, M. (2021). The effect of structural changes on regional economic growth: spatial panel approach. *Quarterly Journal of Quantitative Economics*, 18(1), 51-62. doi: 10.22055/JQE.2020.31664.2175 [In Persian]

Johansson, R. C., Tsur, Y., Roe, T. L., Doukkali, R., & Dinar, A. (2002). Pricing irrigation water: a review of theory and practice. *Water policy*, *4*(2), 173-199. doi: 10.1016/S1366-7017(02)00026-0

Jun, X., Qun, D., & Yangbo, S. (2010). Integrated water and CGE model of the impacts of water policy on the Beijing's economy and output. *Chinese Journal of Population Resources and Environment*, *8*(2), 61-67. doi: 10.1080/10042857.2010.10684978

Kuznets, S. (1973). Modern economic growth: findings and reflections. *The American economic review, 63(3), 247-258.* https://www.jstor.org/stable/1914358

Martens, A., & Decaluwé, B. (1988). CGE modeling and developing economies: A concise empirical survey of 73 applications to 26

countries. *Journal of Policy Modeling*, *10*(4), 529-568. doi: 10.1016/0161-8938(88)90019-1

Mohayidin, G., Attari, J., Sadeghi, A., & Hussein, M. A. (2009). Review of water pricing theories and related models. *African Journal of Agricultural Research*, *4*(11), 1536-1544. URL: https://academicjournals.org/journal/AJAR/article-abstract/5DC465232296

Nasrollahi, Z., & opera jounaghani, E. (2024). Prioritization of the economic sectors of Isfahan Province from the perspective of the importance of water resources and considering the three goals of social, environmental and economic sustainable development. *Quarterly Journal of Quantitative Economics (JQE)*, *21*(1), 107-137. doi: 10.22055/jqe.2023.42445.2528

Ren, Y., Wei, S., Cheng, K. & Fu, Q. (2018). Valuation and pricing of agricultural irrigation water based on macro and micro scales. *Water*. 10(8), 1044. doi: 10.3390/w10081044

Syrquin, M. (1988). Patterns of structural change. *Handbook of development economics*, *1*, 203-273. doi: 10.1016/S1573-4471(88)01010-1

Tahami pour zarandi, M. (2017). Economic Value Approach to Industrial Water Demand Management, A Case Study of Chemical Plants. *Journal of Water and Wastewater; Ab va Fazilab (in persian)*, 28(1), 74-83. doi: 10.22093/wwj.2017.39476

Tahami Pour Zarandi, M., Khazaei, A., Kolivand, F. (2020). Analyzing the Tariff System and Economic Value of Water in Iran's Industry Sector. *Journal of Water and Sustainable Development*, 6(3), 19-30. doi: 10.22067/jwsd.v6i3.76788 [In Persian]

Van Neuss, L. (2019). The drivers of structural change. *Journal of Economic Surveys*, 33(1), 309-349. doi: 10.1111/joes.12266