

PROCEEDINGS BOOK



**INTERNATIONAL CONFERENCE ON
ECONOMIC RESEARCH**

19-20th October 2018

Alanya, TURKEY

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**Harun Uçak (Ed.)
Alanya Alaaddin Keykubat University**

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Central Bank of the Republic of Turkey



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PREFACE

Economics is all about choices, under which conditions these choices are made and the circumstances of these choices. Economics can be defined a few different ways such as; it's the study of scarcity, the allocation of scarce resources among the choices and the study of decision making. Since economics involves topics like finance, recession, banking and wealth, there is a misconception that economics is being all about money and the stock market. However, economics is a much comprehensive discipline that helps us understand yesterday's trends, interpret today's matters and make a prediction for the future.

Economic conditions are constantly changing, and each generation looks at its own problems in its own way. Economic laws are a part of the material which Conscience and Common-sense have to turn to account in solving practical problems, and in laying down rules which may be a guide for the lifetime. While the laws of economics remain broadly the same, there is still space and need for new scientific developments in economics in order to evaluate and examine the current challenges. Even the smallest developments in the global economy have important effects on social and business life and that the studies in the field of economics have become more important than ever. In order to discuss recent developments on economic researches, we aimed to bring scientists, decision and policy makers, entrepreneurs, investors, and postgraduate students from all around of the world.

The 2nd International Conference on Economic research, ECONALANYA 2018, was held on 19-20th October 2018 in Alanya, Turkey and includes presentations on macro and micro level economics. The conference is organized by Alanya Alaaddin Keykubat University in order to bring together researchers from all over the world. Participants from 15 countries made the conference truly international in scope. While the topics presented at the conference varies, the key speeches topics of the conference were chosen as monetary policy and global trading system.

The conference keynote speakers shared their views and academic researches on these topics. Prof. Dr. Zbigniew Polański from National Bank of Poland, Prof. Dr. Marcelo Olarreaga from University of Geneva and Dr Roberta Piermartini from World Trade Organization (WTO) were the keynote speakers of the conference in the opening session. Prof. Dr. Zbigniew Polański stated that the importance of central banks have been increased in the world and especially in developed countries in his speech titled "Monetary Policy in the World after the Crisis". Moreover, he expressed that the monetary policies of central banks are not effective during the crisis and that maintaining the financial stability and price levels is more effective in dealing with the crisis. Prof. Dr. Marcelo Olarreaga and Dr. Roberta Piermartini also had a talk about the structure and operation of the WTO and the current commercial tariffs and practices between the member countries of the WTO. In addition, the effects of competition on world trade between the member countries and non-WTO members were mentioned. The other invited speakers from the University of Copenhagen Prof. Dr. Katarina Juselius and Prof. Dr. Søren Johansen gave lectures on Cointegration Theory and Applications.

It is my wish that this conference that allows scientists, practitioners and independent researchers outside universities to present their theoretical, analytical and experimental research will contribute to the scientific literature and policy-makers' decisions, and I would like to express my appreciation to all participants and keynote speakers for their significant contributions. Last but not least, I would like to send my gratitude to Dr. Yakup Arı, Mehmet Bayırlı, Saliha Çelik, Muahmmet Necati Çelik, Kemal Sür Bekir Çınar and Nazlı Türker for their valuable assistance and co-operation. I would also like to gratefully acknowledge the generous support from Rector of Alanya Alaaddin Keykubat University Professor Ahmet Pınarbaşı, and I would like to extend my thanks to the head of TÜRSAB Regional Executive Board of Alanya. Lastly, I would like to thank the Central Bank of the Republic of Turkey (CBRT) for their support and sponsorship.

Prof. Dr. Harun UÇAK
Chairman/Editor

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**THE DYNAMICS OF THE BUSINESS CYCLE AND THE ROLE OF FISCAL
POLICY; FURTHER EVIDENCE FROM JORDANIAN ECONOMY**

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Abstract

This study intends to determine in detail whether the state of the business cycle matter for the effects of fiscal policy shocks on output. This leads us to primary objectives in this paper: first, to define the economic cycle taking an alternative modelling approach that reconciling the small versus large output gaps generated by different methods. To be specific, we address the question of how best to model the output gap and potential output growth. Second, the study looks empirically at the fiscal policy stance over the phases of the business cycle bearing in mind the temporary time variation and smooth change between the cycle regimes, as well as asymmetry in the responses to inflationary and deflationary pressures, and thus capture the nonlinearity of the fiscal policy due to asymmetric preferences.

To tackle these objectives, we, first, adopt Unobserved Component Model with a Smoother Trend to measure the gap to avoid the criticisms of measures based on potentially contentious structural models and which can be used easily to generate gap measures for use in real-time decision making. Next and to ascertain the asymmetric response of the cycle state to the fiscal policy, we consider Logistic Smooth Transition Autoregressive (LSTAR hereafter) models that has the capability to model GDP growth rates series that exhibit changes in their dynamic properties over the economic cycle since it depends not only on the magnitude but also the sign of past realisation of GDP growth rates.

Keywords: Fiscal Policy, Business Cycles Asymmetry, STAR Model, Unobserved Components Model.

**PLAYING THE BLAME GAME: THE ROLE OF CORPORATE GOVERNANCE IN
INDIAN BANKS**

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Abstract

Since 2011, the Indian banking sector has faced problems with low asset quality, low profitability, and large-scale frauds, some of which involve misconduct by senior officials. In several cases, this has been blamed on the lack of adequate monitoring and oversight by the bank's board. This paper uses detailed board-level as well as balance sheet data on all listed public and private sector banks in India between 2006-2017 to investigate the link between corporate governance and bank performance. It exploits the unique set up of the Indian banking sector where there are a variety of exogenous rules imposed on a public bank's board, making identification less prone to reverse causality. The first question is whether the bank's stocks react to board turnover for either set of banks. Depending on the type of director, I find small but significant cumulative effects for public sector bank board turnover, but not for private sector banks. The second question is whether bank board incentives are designed in a way that ensures proper monitoring of bank performance and risk taking. Specifically, my preliminary results indicate that banks are less risky when they have: more foreign institutional investment; a risk sub-committee that meets regularly; board members with longer tenures, higher fixed salaries and sitting fees as a share of their total compensation; and more independent members, specially those who are less busy monitoring other banks.

Keywords: Corporate governance, Banking regulation, Indian banks.

THE DEVELOPMENT OF PROTECTED AREAS IN POLAND – BARRIERS AND OPPORTUNITIES

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Abstract

The area covered by protected areas in Poland amounts to 33,1%; the region with the highest percentage of areas covered by them is in the Swietokrzyskie Voivodeship – 62 %. These areas are usually landscape parks and protected landscape areas. The basic of development of protected areas should be based on the production of high quality food and food processing. This paper presents problem of barriers and opportunities of development of protected areas in Poland. The work continues to discuss theoretical issues of selected developmental factors with reference to Polish protected areas. Additionally, the role of inhabitants and institutions in development of protected areas has been analysed. The problem of instruments and institutions in the context of development has been raised in this paper. The research shows that barriers and opportunities of development.

The research was based on inhabitants' opinions concerning particular barriers of economic activity in protected areas of Poland, i.e. for: tourism, services, handicraft, industry, agriculture, food processing, and environmental protection.

They mentioned the following as main barriers for development in municipalities in protected areas: the lack of financial resources for development, the lack of economic instruments supporting development and the lack of infrastructure. They saw, however, opportunities for development in property tax allowances and exemptions, and in free legal and economic consultancy services.

Developmental possibilities for protected areas in Poland will result from the necessity of stricter environmental protection, which will enforce more and more pro-ecological economic activity. Tourism, handicraft and ecological agriculture as well as product innovations in this field should develop increasingly. Special attention is paid to the participation of the public institutions and the authorities in development of protected areas.

Keywords: Inhabitants, Local development, Rural areas, Protected areas, Poland.

COMPARATIVE ANALYSIS OF DEMAND FOR FROZEN AND FRESH FISH IN NIGER STATE, NIGERIA: THE CASE OF MACKEREL AND CATFISH

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Abstract

Despite government efforts at improving the consumption of locally produced goods (fish), many marketers still prefer the sale of imported fish. The study is aimed at conducting a comparative analysis of the determinants of frozen and fresh fish, the costs and returns and, the determinants of net income of the marketers in Niger State. The study employed multi-stage sampling technique while descriptive statistics, multiple regression and gross margin techniques were employed. Analysis of the determinants of demand for mackerel and catfish showed that price elasticity of demand was inelastic while the income elasticity of demand showed that fresh and frozen fish were normal goods. The cross elasticity of demand of fish for chicken and turkey revealed that fish and chicken were substitutes while fish and turkey were complements. The costs and returns analysis of catfish revealed that total variable cost (TVC) was 93.3% in which the cost of feed had the highest share of 70.2%. The total cost was ₦20653.10/month while the net income was ₦28589.80/month. Unlike catfish marketing, cost of labour had the highest TVC at 18.2% while the total revenue was ₦35162.9/month. The net income of ₦27994.70/month implied that catfish and mackerel marketing were profitable ventures in the area. The main determinants of net income of mackerel marketing included cost of transportation ($P < 0.10$), age ($P < 0.10$), capital input ($P < 0.05$) and utility ($P < 0.01$). Based on the results, given the total cost outlays of both mackerel and catfish marketing in the area, it is easier to start up frozen fish marketing than fresh fish marketing though there was no appreciable difference between the demand and elasticities of catfish and mackerel in the area.

Keywords: Demand, Elasticity, Income, Price.

1. Introduction

Nigeria is the largest fish market in sub-Saharan Africa with a population of more than 150 million people. In 2014, the contribution of Agriculture to GDP was 20.24% while fisheries contributed 0.48% to the Agriculture GDP (FCWC, 2016). Crop production accounted for about 85 percent of agricultural activities, with livestock and poultry accounting for 10 percent, and fisheries and forestry, 5 percent, with domestic food products such as corn, sorghum, tubers, and seafood (fish) being the traditional food stuffs consumed by the majority of the population (Rondon & Nzeka, 2010). Fish is an integral part of the diet of an average Nigerian because it is low in omega-6 fatty acids (commonly found in red meat) but high in omega-3 fatty acids. It supplies the body with protein needed for the growth and repair of worn out tissues as well as provision of essential nutrients required for the proper functioning of the body system. Moreover, it provides a range of health benefits due to the presence of the omega-3 fatty

acids. These benefits include the regulation of blood clotting and vessel constriction; prenatal and postnatal neurological development; reduction in tissue inflammation; alleviation of the symptoms of rheumatoid arthritis; reduction in depression, halting of mental decline in older people and, may play a beneficial role in cardiac arrhythmia (irregular heartbeat) (EDF, 2017). Of all the other sources of animal protein such as chevon, pork, mutton, beef and chicken, fish is unique in that it is more affordable and is void of cultural and religion barriers.

Catfishes of the family *Clariidae* comprise the most commonly cultivated fishes in Nigeria. It is eaten by most tribes, resistant to harsh environmental conditions, commands good price, tasty and can be kept alive for days during marketing. It is interesting to know that more than 80 percent of cultured fish in Nigeria is catfish, mainly *Clarias spp.*, *Heterobranchus spp.* and their hybrids. Unfortunately, the required quantity and quality of fish seed have never always been available. For instance, in 2013, the production output of *Clarias gariepinus* was over 253,898 MT per year and at a total value of US\$800 (Anetekhai, 2013; Adewumi, 2011). In addition, the total production and supply of fingerlings was 55 million which is far less than about 500 million fingerlings per annum needed to satisfy the immediate needs of the market (Atanda, 2007). Moreover, in 2014 the total fish demand for Nigeria was 3.32 million MT while the domestic fish production from Aquaculture, Artisanal and Industrial fisheries was 1.123 million MT (FCWC, 2016). Therefore, the fish demand-supply gap of over two million MT per annum necessitated the large volumes of frozen fish imports to meet local demand.

Frozen seafood is the cheapest form of animal protein in Nigeria and consumption has been increasing. The country is a potential market for approximately 2.5 million MT of fish valued about \$3 billion (Rondon & Nzeka, 2010). It was further reported that Atlantic mackerel, horse mackerel, herring and croakers are the major species imported into the country with Netherlands, China, Chile and U.S being the major suppliers of frozen seafood to Nigeria. The market for frozen fish, especially mackerel of the family of *Scombridae*, herring and croaker, is large and is mostly sourced from the EU, South America, and some African countries and, Nigeria is expected to continue to import these foods due to inadequate local food production in order to reliably provides an alternative supply of fish to meet the rising demand (Rondon & Nzeka, 2010).

Marketing of fish could be regarded as the performance of all business activities involved in the flow of fish from the point of production (fisherman or fish farmer) to the final consumer (Akanni & Akinleye, 2004; Olukosi, Isitor & Moses, 2007). Fish could be sold in various forms ranging from smoked, iced, fresh, canned, and dried fish. The demand for fish is rising seriously with the speedy increase in the population to about 150 millions and since catfish farming has been the major focus of recent investment into aquaculture production especially by the private investors and that some fish dealers and marketers also specialize in certain species of fish import especially, mackerel, it is pertinent therefore to conduct a comparative study on demand for mackerel and catfish so as to know the consumers' preferences and the factors that influence the choice of either or both of breeds taking into cognizance the diversity embedded in the marketing of each of them.

2. Methodology

2.1. Study Area

This study was carried out in Niger State, Nigeria with Latitude 8°22'N and 11°30'N and longitude 3°30'E and 7°20'E. It has the largest land mass of 74,244 square kilometres and shares an international boundary with the Republic of Benin and Zamfara to the North, Kebbi to the north-west, Kogi to the south, Kwara to the south-west, and Kaduna and FCT to the north-west. It has a projected population of 5,056,647 people in 2015 at 2.5% growth rate (NPC, 2006). The State has an annual seasonal variation of rainy season which occurs between April and October and, dry season between November and March. The average rainfall distribution is 1000mm-1500mm annually. In addition, it has a total of 25 Local Government Areas (LGAs) and is blessed with a fertile land which aided the growth of some major crops such as yam, maize, cowpea, rice and ground nut. Agriculture has been the major occupation of the people with few of them engaged in white collar jobs (GIS, 2013).

2.2. Sampling Techniques

A multi-stage sampling procedure was used to select the marketers in the study area. The first stage involved the random selection of three LGAs in the State. The second stage involved random selection of three markets from each of the selected LGAs, *that is*, Bosso LGA (Ultra-modern market, Tunga market and Mobil fish market), Bida LGA (Sokotako market, New market and Old market), Chanchaga LGA (Chanchaga market, Tungagoro market and Shango market). Finally, the third stage involved the selection of 5 fresh fish marketers and 7 frozen fish marketers from each of the markets making a total of one hundred and eight marketers in all. The unequal selection emanated from the fact that frozen fish has larger market than fresh fish market.

2.3. Method of Data Collection

Primary data were used for the study through well-structured questionnaire and interview schedule to elicit information on factors that influenced demand, input costs and value of output as well as factors that influenced the net income of the marketers.

2.4. Analytical Techniques

These were achieved using descriptive statistics such as frequencies, percentages, multiple regression and gross margin analytical techniques. Ordinary Least Square technique (OLS) regression was employed in estimating the determinants of frozen and fresh fish demand and net income from frozen/fresh fish marketing in the area.

The multiple regression model for the determinants of demand was implicitly stated as:

$$Y = f(X_1, X_2, X_3, X_4, X_5, \mu_i) \quad (1)$$

Where,

Y = Quantity of frozen (Mackerel)/fresh fish (Catfish) demanded (kg),

X₁ = Retail price of fish (₦)

X₂ = Monthly disposable income (₦)

X₃ = Retail price of chicken (₦)

X₄ = Retail price of turkey (₦)

X₅ = Retail price for egg (Crate)

μ_i = Error term

The model for the determinants of net income of the marketers was depicted in equation 2 as:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \mu_i \quad (2)$$

Where,

Y = Net income from fish marketing (₦)

X₁ = Cost of purchase (₦/kg)

X₂ = Cost of transportation (₦/kg)

X₃ = Cost of labour (₦/kg)

X₄ = Depreciation of capital input (₦)

X₅ = Utility (Electricity bill and taxes) (₦)

X₆ = Level of education (Year)

X₇ = Age (Year)

X₈ = Household size (No.)

μ_i = Error term

The above model was estimated using four different functional forms namely, linear, power, semi-log and exponential.

The Budgetary technique and profitability ratios were used to determine the profitability embedded in the marketing of frozen and fresh fish in the study area.

This was computed as follows:

$$\text{Gross Margin (GM)} = GI - TVC \quad (3)$$

Where:

TVC = Total Variable Cost.

Therefore,

$$\text{Net Income (NI)} = \text{GM} - \text{TFC} \quad (4)$$

Where:

NI = Net Income,

TFC = Total Fixed Cost

3. Results and Discussions

3.1. Determinants of Demand for Fish in the Study Area

In the analysis of the determinants of demand for fish in the area (see Table 1), four functional forms namely, linear, power, semi-log and exponential functions were used. Semi-log function was chosen as the 'lead' equation because it had the highest number of significant variables and R^2 .

The power functional form of the ordinary least square regression model revealed that catfish had coefficient of determination (R^2) value of 0.73 which means that 73% of the variations in the demand for catfish marketing was explained by the included explanatory variables. The F-ratio of 19.99 showed that the whole model was significant at $P < 0.01$. Retail price (X_1) was negative but significant at $P < 0.01$ which showed that a 1 percent increase in retail price led to a 3.33 percent decrease in the quantity of fresh fish demanded and vice versa, whereas the disposable income (X_2) of positive with $P < 0.01$ implied that a 1 percent increase in the disposable income of the consumers led to 0.44 percent increase in the quantity of fresh fish demanded in the area.

Table 1. Determinants of Demand for Catfish in the Study Area

Variables	Coefficient	t-value	Elasticity
Retail price (X_1)	-3.331	-7.91***	-1.33
Disposable Income (X_2)	0.439	4.16***	0.44
Retail price of chicken (X_3)	0.075	0.11 ^{NS}	
Retail price of turkey (X_4)	-0.490	-0.85 ^{NS}	
Retail price of egg (X_5)	1.164	0.33 ^{NS}	
R^2	0.73		
F- Ratio	19.19***		

Source: Field Survey, 2017.

The elasticity analysis showed that the price elasticity of demand of -1.33 implied that the demand for catfish was inelastic in the area. This showed that a one percent change in price led to a less than one percent change in quantity demanded of catfish fish, *ceteris paribus*. This agreed with the *a priori* expectation that most agricultural commodities are inelastic in nature. This have great implications on the total revenue of the marketers, *that is*, marketers of catfish in the area would enjoy increase in their total revenues which could improve the scope of their business and eventual improvement in their living standard. Moreover, the income elasticity of demand was 0.44 which showed that a percentage change in income led to less than proportionate change in quantity of catfish demanded. This implied that catfish was a necessity in the area. Income elasticity of demand is useful in assisting the marketers to make better investment decisions, especially the type of income earners to be targeted as well as an indicator of future consumption pattern of the consumers.

The result of determinants of demand for mackerel (see Table 2) in the area was not appreciably different from that of catfish. For instance, semi log functional form was chosen as the lead equation with R^2 of 0.43, which showed that 43% of the quantity demanded of mackerel was explained by the included explanatory variables. The F-ratio of 8.95 showed that the whole model was significant at $P < 0.01$. Retail price of mackerel (X_1) and retail price of turkey (X_4) were negative but significant at $P < 0.01$ and $P < 0.05$, respectively which showed that a 1 percent increase in retail price of both mackerel and turkey led to a 4.21 and 2.85 units decrease in the quantity of mackerel demanded and vice versa, whereas the disposable income (X_2) and retail price of chicken (X_3) of positive with $P < 0.05$ implied

that a 1 percent increase in the disposable income of the consumers and retail price of chicken led to 0.76 and 6.20 units increase in the quantity of fresh fish demanded in the area. This finding agrees with Dauda, Ojoko and Fawole (2016) in a study conducted on the economic analysis of frozen fish demand in Katsina Metropolis, Katsina State, Nigeria who reported that price of fish, consumer's income, household size, educational status and species of fish were important factors influencing demand for frozen fish in Katsina State. The analysis also showed that the price elasticity of demand of -1.893 was inelastic demand while the income elasticity of 0.342 showed that mackerel was also a necessity in the area. The cross elasticity of demand of mackerel for chicken and turkey of 2.791 and -1.284, respectively, revealed that mackerel and chicken were substitutes while mackerel and turkey were complements. Mackerel and turkey could be complementary commodities during festive periods and special celebrations such as naming, wedding, burial, graduation and birthday ceremonies as well as religious festivities such as Easter, Christmas and *Eid el-kabir*. The finding is also in agreement with Dauda *et al.* (2016) who reported that the own price elasticity of 0.78, indicated that demand for frozen fish was inelastic while the income elasticity of 0.11 implied that frozen fish is a necessity in the area. The report further showed that the cross price elasticities for chicken and beef of -0.076 and -0.63, respectively implied that frozen fish and chicken and beef were complimentary goods in the area.

Table 2. Determinants of Demand for Mackerel in the Study Area

Variables	Coef. Frozen	t-value	Elasticity
Retail price (X ₁)	-420.717	-3.81***	-1.893
Disposable Income (X ₂)	76.027	2.44**	0.342
Retail price of chicken (X ₃)	620.445	2.21**	2.791
Retail price of turkey (X ₄)	-285.426	-2.04**	-1.284
Retail price of egg (X ₅)	-92.111	-0.12 ^{NS}	
R ²	0.43		
F- Ratio	8.95***		

Source: Field Survey, 2017.

The overall results (Pooled) also with semilog functional form as the lead equation (Table 2) showed the coefficient of determination, R² of 0.406 and F-ratio of 13.93, respectively. The analysis also showed that the price elasticity of demand was -2.240. This was an indication that fish demand in the area was inelastic while the income elasticity of 0.390 showed that fish was a necessity in the area. The cross elasticity of demand of fish for chicken and turkey of 1.436 and -1.349, respectively still confirmed the earlier result that fish and chicken were close substitutes while fish and turkey were complements.

3.2. Profitability of Fish Marketing

Result in Table 3 showed the costs and returns analysis of catfish and mackerel marketing in the study area. The analysis of the catfish marketing revealed that total variable cost (TVC) was 93.3% (*that is*, ₦19281.40/month) of the total cost. Cost of feed had the highest share of the TVC of 70.2% (₦14496.00/month) which was followed by cost of labour (9.2%) and cost of transportation (3.8%) at ₦1893.00/month and ₦789.30/month, respectively. The least TVC was the cost of charcoal/firewood at ₦46.40/month. This was only needed for the processing of fish for better storability. The total cost was ₦20653.10/month while the total revenue was ₦49242.90/month. The net income of ₦28589.80/month showed that catfish marketing was a profitable enterprise in the study area. The result is in consonance with that of Adebayo and Daramola (2013) in a study on economic analysis of catfish production in Ibadan metropolis and reported that catfish was profitable in the area. In another development, Osarenren and Ojor (2014) in a study on marketing analysis of smoke-dried fish in Etsako East Local Government Area of Edo State, Nigeria reported that smoke fish marketing was a profitable venture with a net profit ₦19,800 per marketer in the study area.

Table 3. Determinants of Demand for Clarias and Mackerel (Pooled) in the Study Area

Variables	Coefficient (Pooled)	t-value	Elasticity
Retail price (X ₁)	-386.19	-5.48***	-2.240
Disposable Income (X ₂)	67.16	3.62***	0.390
Retail price of chicken (X ₃)	247.58	1.70*	1.436
Retail price of turkey (X ₄)	-232.52	-2.51**	-1.349
Retail price of egg (X ₅)	-130.23	-0.26	
R ²	0.41		
F- Ratio	13.39***		

Source: Field Survey, 2017.

Table 4 further revealed the result of analysis of mackerel marketing in the area. Unlike catfish marketing, cost of feed was zero because the fish sold were lifeless. Therefore, the highest variable cost was that of labour at ₦1307.00/month (18.2%) which was followed closely by cost of transportation and electricity at ₦688.00/month and ₦463.00/month, respectively. Water was only needed for cleaning and therefore was the least cost at 0.1%. The TVC was just about half of the TC as compared with fresh fish of 93.3%. The total revenue was ₦35162.9/month, gross margin was ₦31646.20/month while the net income was ₦27994.70/month which implied that mackerel marketing was equally a profitable venture in the area.

Table 4. Costs and Returns Analysis of Fish Marketing in the Study Area

Items	Clarias (₦/Month)	%	Mackerel (₦/Month)	%	Pooled (₦/Month)	%
Variable Items						
Newspaper	0.00	0	223	3.1	223	0.8
Leather Bag	249.00	1.2	271	3.8	520	1.9
Feed	14496.00	70.2	0	0	14496	52.1
Water (keg)	433.20	2.1	6.5	0.1	439.6	1.6
Charcoal/firewood	46.40	0.2	130	1.8	176.4	0.6
electricity/generator	719.00	3.5	463	6.5	1182	4.2
Cost of storage	648.00	3.1	426.9	6	1074.9	3.9
Transportation	789.30	3.8	688	9.6	1477.3	5.3
Cost of labor	1893.00	9.2	1307	18.2	3200	11.5
Total variable cost	19273.90	93.4	3515.4	49.1	22789.2	81.9
Fixed Items						
Tax	40	0.2	150.7	2.1	190.7	0.7
Depreciation (Freezer, coolers, table, chair, bowls, oven)	1330.5	6.4	3510.9	49	4841.4	17.5
Total fixed cost	1370.5	6.6	3661.6	51.1	5032.1	18.2
Total cost	20644.40	100.00	7177.00	100.20	27821.30	100.10
Total revenue	49242.9		35162.9		84405.9	
Gross margin	29961.5		31646.2		61616.6	
Net income	28589.8		27994.7		56584.6	

Source: Field Survey, 2017.

The overall analysis revealed that given the total cost outlays of both mackerel and catfish marketing in the area, it is easier to start up frozen fish marketing than fresh fish marketing. The pooled result

showed that the total variable cost was ₦22789.2/month (81.9%) while the TC was ₦27821.30/month with net income of ₦56584.60/month. This result is consistent with the findings of Ashaolu (2006) who observed that fish farming was a profitable business in the area. In addition, Runfu, Adepuju, Salau and Adebisi (2009) in a study on the determinants of yield performance in small scale fish farming in Alimosho Local Government Area of Lagos State reported that fish farming in the study area was profitable.

3.3. Determinants of Net Income of Marketers

Table 5 showed the result of the analysis of the determinants of the net income of the fish marketers in the study area. Based on *a priori* economic and statistical criteria for selecting the 'lead' equation, linear equations were chosen for both mackerel and pooled data, respectively. Since the F-ratio for all the functional forms for the determinants of catfish marketing was insignificant, the regression result was not discussed. Therefore, analysis of the determinants of net income of mackerel marketers revealed that the coefficient of variation (R^2) of 0.51 implied that 51% of the variations in the income of the marketers were explained by the included explanatory variables. More so, the F-value (7.30) was significant at $P < 0.01$ and implied that the whole model was significant. The Table (see table 5) further revealed that cost of transportation (X_2), age (X_7) and capital input (Depreciation) (X_4) were negative but significant at $P < 0.10$, $P < 0.10$ and $P < 0.05$. This implied that an increase in any of these variables reduced the income of the marketers, *that is*, the higher the cost, the lower the net income of the marketers. As marketers grow in age, their efficiency reduces thereby reducing the net income of the marketers. However, utility (X_5) was positive and significant at $P < 0.01$ which implied that the more the utility, the more the net income of the marketers. This could occur when marketers relied more on electricity as the main power source for frozen fish (mackerel) preservation rather than generator as alternative power supply which is extremely expensive to maintain. Furthermore, the Table showed that the pooled result indicated an R^2 of 0.33 which implied that 33% of the variations in the net income of the marketers were explained by the included explanatory variables while the F-ratio was 5.98 and significant at $P < 0.01$, which implied that the whole model was significant.

Table 5. Determinants of Net Income of Fish Marketers in the Study Area

Variables	Frozen fish	T-value	Pooled	T-value
Purchase cost (X_1)	0.43189	0.06	1.5748	0.51
Transportation(X_2)	-24.88338	-1.96*	-9.4995	-1.35
Labour cost(X_3)	16.36316	1.41	10.7073	1.47
Capital input (X_4)	-19.81375	-2.28**	-18.1182	-2.58**
Utility (X_5)	47.38579	4.32***	25.9544	3.99***
Education(X_6)	5914.652	0.94	5359.111	1.06
Age(X_7)	-4897.565	-1.75*	-6063.104	-2.68***
Household Size(X_8)	15225.70	1.50	20514.08	2.52**
R^2	0.51		0.33	
F Ratio	7.30***		5.98***	

$\leq 1.00 = 1\%$, $1.01-5.00 = 5\%$, $5.01-10.00 = 10\%$.

***= significant at 1% probability, **= significant at 5% probability, *= significant at 10% probability, NS= not significant

Source: Data Analysis (2016).

In addition, it was discovered that four out of the eight included explanatory variables were significant, *that is*, capital input (Depreciation) (X_4) and age (X_7) were negative but significant at $P < 0.05$ and $P < 0.01$, respectively. However, utility (X_5) and household size (X_8) were positive and significant at $P < 0.01$ and $P < 0.05$, respectively. This revealed that the more the utility and household size, the more the net income of the marketers in the area. As has been pointed out earlier, this could occur when marketers rely more on electricity as the main power source than generator. In the same vein, the more educated a marketer is the more the innovation and skills put into his/her marketing activities. Also, high household size could minimize the cost embedded in marketing thereby increasing

the revenue and net income of the marketers through the abundant availability of family labour to perform the various marketing activities. Babalola, Bajimi, and Isitor (2015) carried out a research on economic potentials of fish marketing and women empowerment in Ogun State and found out that value of sale per week, volume of trade per week, level of education, participation in cooperative marketing and cost of fish purchased were the determinants of marketing margin of the fish marketers in the area. Oluwasola and Ige (2015) conducted a research on factors determining the profitability of catfish production in Ibadan, Oyo State, Nigeria and found out that fish farming experience, labour and feed were the main determinants of net income of the farmers.

4. Conclusion and Recommendations

The paper carried out a comparative study of the demand for fresh fish (catfish) and frozen (mackerel) marketing in Niger State, Nigeria. The results of the determinants of demand for catfish showed that retail price of catfish and disposable income of the consumers had significant influence on the quantity of catfish demanded. Conversely, the result of determinants of demand for mackerel showed that retail price of mackerel, disposable income, retail price of turkey and retail price of chicken had considerable effect on quantity of mackerel demanded. The result of the elasticity of both catfish and mackerel revealed that the demand was inelastic while the income elasticity of demand showed that fish was a 'necessity'. The cross elasticity of demand of mackerel for chicken and turkey revealed that mackerel and chicken were substitutes while mackerel and turkey were complements. The costs and returns analysis showed that given the total cost outlays of both mackerel and catfish marketing, it is easier to start up frozen fish marketing than fresh fish marketing. The result of the analysis of the determinants of the net income of mackerel marketers revealed cost of transportation, age and capital input and utility.

4.1. Recommendations

Based on the findings, it is therefore recommended that:

1. Consumers of both breeds should diversify their income sources for increased consumption of fish since it is a necessity.
2. Since utility significantly affected the net income of mackerel marketers, they should source for alternative power supply such as solar energy to make up for short fall in electric power supply at any time.
3. Government in collaboration with non-governmental organizations should create enabling environment for catfish marketing so as to boost the morale of the producers thereby encouraging increased local production and sale.
4. Extension agents and non-governmental organisations should ensure training of marketers on preservation, processing and handling of fish and fish products to minimise losses.

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THE WATER SCARCITY PARADOX AND THE ADOPTION OF WATER- CONSERVATION TECHNOLOGY IN SOUTH AFRICA

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Abstract

This paper proposes a framework that studies the conditions under which households adopt grey water treatment technologies in South Africa. The main purpose of grey water technology adoption is to extend the water usage lifecycle within households and reduce investment that is allocated to centralized wastewater treatment plants. The microeconomic framework proposed in Foster and Rosenzweig (2010) is adapted to household characteristics to study the relationships between socio-economic features and adoption of water-conservation measures that aim at reducing the volume of water treated in centralized wastewater treatment plants. The theoretical model is tested in using choice experiment that presents households with various choice sets to induce them reveal their preferences over targeted technologies with particular attributes. Our methodology highlights the household-specific features as well as current institutional factors that affect adoption of wastewater treatment technologies. Both Multinomial Logit (MNL) and Scaled MNL models are applied to newly collected data from 300 households in the city of Mpumalanga. Our preliminary results show that easiness of use, externalities (smell), and costs remain important attributes for households' choice of wastewater treatment technologies. Our results show also that households are willing to invest in more costly grey water treatment technologies to reduce their likelihood of facing severe water scarcity. Additionally, factors such as years of schooling, geographical location and income are influential factors that drive willingness to pay. Our analysis provides important insights to understanding the timing and behavioural attitudes that surround adoption of water-conservation technologies in water stressed cities in the developing world.

Keywords: Technology adoption, Water conservation, Public policy, South Africa.

AN EMPIRICAL ANALYSIS OF THE DETERMINANTS OF TUNISIAN SEAFOOD TRADE

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Abstract

Fisheries sector is playing an increasingly important role in the Tunisia's national economy, influencing the level of economic growth, employment, the balance payments and foreign exchange. Several trade policy reforms and agreements have been established to promote the export sector. The analysis of seafood exports is of key importance for different economic agents who are interested in improving the competitiveness and performance of this sector. This study aims at identifying the plausible factors affecting export flows between Tunisia and its trading partners, a question that has not been previously answered. To do so, a gravity model is applied to the Tunisian aggregated seafood exports. Negative binomial regression has been used to deal with the presence of zero trade flows and heteroscedasticity issues. The panel data set used was for the period 2007 to 2015. Consistent with previous research as well as the theoretical expectations of gravity model, our empirical findings identify importer's GDP, official common language, contiguity, population, membership of the world trade organization and trade with Mediterranean countries that are more relevant in explaining seafood trade and have a positive and statistically significant effect on Tunisia's exports. On the other hand, distance between Tunisia and its trading partners had a negative effect on export flows.

Keywords: Trade, Gravity model, Negative binomial, Fish sector, Tunisia.

EFFECT OF ADOPTION OF IMPROVED TECHNOLOGIES ON POULTRY PRODUCTION IN OYO STATE, NIGERIA

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Abstract

The study examined the effect of adoption of improved technology on poultry production in Oyo State, Nigeria. Data used for the study were obtained from primary source using a multi-stage sampling technique with structured questionnaires administered to 100 randomly selected poultry farmers from two Local Government Areas of the State. Descriptive statistics, and multiple regression model were used to analyze the data. The results from the study revealed that hybrid birds, improved feeding, use of battery cages, improved feeders and drinkers, improved vaccinations and medications were the highly adopted improved technologies in the study area. Adoption of gas brooders and automated cages were the least adopted of the improved technologies with mean adoption rate of 0.10 and 0.22 respectively. The regression results from the study indicated that the adoption of improved technology, feed consumed, labour and farm size were positively and statistically significant at 5%, 5%, 10% and 1% probability levels respectively implying that increased in adoption of the improved technologies and usage of the factors stated led to an increase in poultry output, while water consumed (litres) and cost of vaccinations were negatively significant at 5% and 1% respectively. The study also showed that the non-availability of technology, access to credit, cost of technology and low income of the farmer were the most limiting factors affecting the adoption of improved technologies in the study area. In view of the above findings, it is therefore recommended that there should be enhanced research, extension delivery and farm advisory services that will increase the awareness of farmers on the benefits of adopting improved technologies that can lead to increase in the output of poultry farmers in the study area. Also, farmers should be encouraged to form cooperative societies in order to improve their access to finance that can be used to procure the improved technologies in the study area.

Keywords: Improved technologies, Adoption, Poultry.

1. Introduction

Poultry has become one of the most effective sources of protein for human consumption. Poultry meat and eggs have become very important means of bridging the protein supply gap in Nigeria (Ojo *et al.*, 2013). They are widely accepted all over the world with little or no cultural or religious belief hindering its proliferation. Poultry production is an important part of farming in Nigeria agriculture. According to Sonaiya and Swan, (2004), keeping poultry makes a substantial contribution to household food security throughout the developing world. It helps in diversifying incomes and provides quality food, energy, fertilizer and a renewable asset in over 80 percent of rural households. People depend on poultry for food and it serves as an additional occupation to supplement the income of small and marginal farm families. According to Chukwuji *et al.*, (2006), poultry production is attractive because birds are able to adapt easily, have high economic value, rapid generation time and high rate of

productivity that result in production of meat within eight weeks and first egg within 18 weeks of first chick being hatched. He further stressed that poultry is an important source of animal protein, income, employment, industrial raw materials, manure, financial security etc. The poultry sector has developed such that large scale production is being practiced and a lot derive their means of livelihood from poultry and its associated industries (Ezeibe *et al.*, 2013). Oluyemi and Roberts (2000) stressed the importance of poultry industry in Nigeria in providing eggs and meat to meet up with the protein demand of the populace. It occupies an essential position because of its vast potential to bring about rapid economic growth especially to the weaker section (Ezeibe *et al.*, 2013)

New agricultural technologies and improved practices play a crucial role in increasing agricultural production (particularly in poultry production) in developing countries. Where successful, adoption of improved agricultural technologies could stimulate overall economic growth through inter-sectoral linkages while conserving resources (Sanchez *et al.*, 2009). The adoption of improved technologies in poultry production has been found to have positively affected households' food security in Africa, (Setotaw *et al.*, 2003). The need for improved technologies in poultry production is necessitated by population growth, changing climate, markets and needs. The identified improved technologies in poultry production are innovations and skills in selection of strains, brooding techniques, vaccination, handling, feed and feed techniques (Ezeibe *et al.*, 2014). Small-scale producers are however constrained by poor access to markets, goods and services; they have weak institutions and lack skills, knowledge and appropriate technologies. The result is that both production and productivity remain well below potential and losses and wastage can be high. However, adapted breeds, local feed resources and appropriate vaccines are available, along with proven technologies that can substantially improve productivity and income generation

Several researches have been carried on the effect of adoption of improved technologies on production of farmers. However, there is little information available on the effects of such decisions in the study area. This phenomenon has created a wide knowledge gap and requires that researches be carried out to ascertain the effects of improved technology adoption on poultry production and the factors hindering the adoption of improved technologies in Oyo State, Nigeria.

2. Methodology

2.1 Study Areas

The study was conducted in Oyo State, Nigeria. Oyo State covers approximately an area of 28,454 square kilometers, it is bounded in the south by Ogun State, in the north by Kwara State, in the west it is partly bounded by Ogun State and partly by the Republic of Benin, while in the East by Osun State. The Climate is equatorial, notably with dry and wet seasons with relatively high humidity. The dry season lasts from November to March while the wet season starts from April and ends in October. Average daily temperature ranges between 25 °C (77.0 °F) and 35 °C (95.0 °F), almost throughout the year. The vegetation pattern of Oyo State is that of rain forest in the south and guinea savannah in the north. Thick forest in the south gives way to grassland interspersed with trees in the north. The climate in the State favours the cultivation of crops like maize, yam, cassava, millet, rice, plantain, cocoa tree, palm tree and cashew.

2.2 Sampling Technique

The data mainly from primary sources were collected using a multi-stage sampling technique. The first stage involved the random selection of two Local Government Areas (LGAs) (Afijio and Atiba LGAs) in the State. The second stage involved the random selection of 43 and 57 poultry farmers in Afijio and Atiba LGAs respectively. This makes a total of 100 poultry farmers selected for this study. The variation in number of farmers selected in the two selected LGAs was based on the proportion of registered poultry farmers at the State Agricultural Development Programme (ADP).

2.3 Method of Data Collection

The primary data for study were collected with the use of a structured questionnaire designed in line with the objectives of the study with the assistance of trained enumerators in the State’s Agricultural Development Project (ADP). The data collected include inputs and output information in poultry production, improved technologies adopted by the farmers and the challenges faced in adopting the improved technologies.

2.4. Method of Data Analysis

The tools used in the analysis of the data collected include descriptive statistics (frequency distribution table, mean and percentages) and ordinary least square regression analysis. The ranking of improved technology adoption level was estimated using 3 point likert scale measure (high = 3 points, low = 2points, None = 1point and mean = 2). Multiple regression analysis was used to determine the relationship between poultry production and the adoption of improved technologies. The regression model is expressed as follows:

$$Output = b_0 + b_1 feed + b_2 labour + b_3 fsize + b_4 medic + b_5 water + b_6 Techad + e_i$$

Where:

Output = Poultry output (₦)

Feed= Feed consumed (kg)

Labour= Labour (man days)

F size= Farm size (no. of birds)

Medic = Cost of medication and vaccinations (₦)

Water = Water consumed (litres)

Adoption= Adoption of improved technology (Number of technologies adopted)

3. Results and Discussion

3.1. Improved Technologies Adopted by Poultry Farmers in the Study Area

The result of the improved technologies adopted by poultry farmers in the study area is shown in Table 1. The result in Table 1 revealsthat hybrid birds, improved feeding and use of battery cages are the top 3 adopted improved technologies in the study area with the mean adoption of 2.88, 2.78 and 2.71 respectively. This may be due to the possible increase in poultry outputs which is associated with the use of improved production technologies as reported by Olaniyi et al., (2008).

Table 1. Improved Technologies Adopted by Poultry Farmers in the Study Area

Technology	High	Low	None	Mean	Ranking
Hybrid birds	94(94.9)	1(1.0)	3(3.0)	2.88	1 st
Improved feeding	79(79.8)	19(19.2)	1(1)	2.78	2 nd
Battery cages	86(86.9)	5(5.1)	8(8.1)	2.71	3 rd
Improved feeders and drinkers	77(77.8)	16(16.2)	5(5.1)	2.67	4 th
Improved vaccination and medications	66(66.7)	26(26.3)	1(1.0)	2.59	5 th
Foot dip	6(6.1)	14(14.1)	56(56.6)	0.70	6 th
Kerosene brooders	9(9.1)	1(1.0)	64(64.6)	0.64	7 th
Automated cages	6(6.1)	2(2.0)	91(91.9)	0.22	8 th
Gas brooders	2(2.0)	1(1.0)	94(94.4)	0.10	9 th

Note: Values in parentheses are percentages

Source: Field survey, 2015

The result revealed that six improved technologies had mean adoption score above general mean score of 2 which implies that these six improved technologies (hybrid birds, improved feeding, use of

battery cages, improved feeders and drinkers, improved vaccinations and medications) were the highly adopted ones in the study area. The high adoption level of these improved technologies is not unconnected with the farmers' high level of awareness of their positive effects on the poultry output (Oyeyinka et al., 2011). Adoption of gas brooders and automated cages are the least adopted of the improved technologies with mean adoption rate of 0.10 and 0.22 respectively.

The low adoption level of gas brooders and automated cages may be due to low level of awareness and high cost of procuring these items and their gross unavailability in the study area. Olaniyiet al., (2008) indicated that adoption of a particular technology cannot be separated from its awareness. This calls for enhanced research, extension delivery and farm advisory services that will increase the awareness of farmers on the benefits of adopting improved technologies that can lead to increase in the output of poultry farmers in the study area.

3.2 Effect of Adoption of Improved Technologies on Poultry Production in the Study Area

The results of the regression analysis showing the effect of adoption of improved technologies in the study area is presented in Table 2. The estimated regression result shown in Table 2 revealed the exponential function as the lead equation with a coefficient of multiple determination (R^2) of 69.79%. This implies that the independent variables included in the regression model explained 69.79% variation in the poultry output in the study area. The estimated F ratio of 25.98, which is significant at 1% probability value, indicates that the whole regression model is significant at 1% probability level.

Table 2: Regression Results on Effects of Adoption of Improved Technologies on Production

Variable	Linear	Semi-log	Exponential	Double-log
Constant	1.8736 (1.05)	2.2323 (0.46)	12.9917 (24.92)	6.1561 (4.64)
Feed consumed	0.0441 (0.55)	0.6431 (2.92)***	0.4908 (2.36)**	-0.0476 (-0.37)
Labour	0.4829 (0.85)	0.6262 (1.56)	0.2832 (1.70)*	-0.0530 (-0.56)
Farm size	0.3724 (5.41)***	0.9499 (1.23)	0.5486 (2.73)***	0.7190 (3.93)***
Vaccination cost	0.7443 (8.87)***	0.6547 (2.69)***	-0.8106 (-3.16)***	0.6488 (0.08)
Water consumed	5.7623 (2.18)**	0.9640 (1.46)	-0.5406 (-1.97)**	0.3959 (2.80)***
Adoption	-0.1001 (-1.30)	-0.4502 (1.46)	0.5518 (2.47)**	-0.1045 (-0.47)
R squared	0.5825	0.5875	0.6979	0.5526
Adj R squared	0.5809	0.5487	0.6710	0.5482
F-ratio	0.0000	0.0000	0.0000	0.0000

Note: *** = Statistically significant at 1% level of probability, ** = statistically significant at 5% level of probability, * = Statistically significant at 10% level of probability

Figures in parenthesis are t-values

Source: Computed from Survey Data, 2015

The result revealed that six improved technologies had mean adoption score above general mean score of 2 which implies that these six improved technologies (hybrid birds, improved feeding, use of battery cages, improved feeders and drinkers, improved vaccinations and medications) were the highly adopted ones in the study area. The high adoption level of these improved technologies is not unconnected with the farmers' high level of awareness of their positive effects on the poultry output (Oyeyinka et al., 2011). Adoption of gas brooders and automated cages are the least adopted of the improved technologies with mean adoption rate of 0.10 and 0.22 respectively.

The result in Table 2 shows that the prime variable (adoption) measuring the effect of adoption on production was positively and statistically significant at 5% probability level indicating that an increase in the adoption of improved technologies resulted in a significant increase in output. Other variables that were found to be significant include farm size and vaccination at 1% probability level, water consumed and feed consumed at 5% probability level and labor at 10% probability level. This finding agrees with Wu *et al.*, (2010); Washington *et al.*, (2012); Sanchez *et al.*, (2009); Adekambi *et al.*, (2009); Kassie *et al.*, (2010). They all stated that the adoption of improved technologies had a positive and statistically significant relationship with farm outputs.

3.3 Factors Hindering Adoption of Improved Technologies in the Study Area

Table 3 shows the factors identified to be restricting adoption of improved technologies in the study area. From these factors, availability of the technology was identified to be the most limiting factor followed by the cost of technology and then the access to credit. This result agrees with the findings of Ogada *et al.*, (2014) and Obisesan, (2014) who stated that access to credit, level of education, expected income variant and availability of technology are the factors influencing the adoption of improved agricultural technologies in Nigeria. Also, it was also observed that the socio economic characteristics vis a vis the household size, income, farming experience, level of education and age ranked next as factors influencing the adoption decision made by farmers. The institutional factor; membership of cooperative societies was also not important, as there were relevant institutions in the study area. The marketing factors were least limiting in the study area. This may be because the farmers had enough market and were confident of the returns.

Table 3. Factors Hindering Adoption of Improved Technologies in the study Area

Factor	Low influence	Moderate influence	High influence	Mean	Ranking
Availability of technology	-	15(15.2)	80(80.8)	2.73	1 st
Lack of access to credit	3(3.0)	18(18.2)	75(75.8)	2.67	2 nd
High Cost of technology	2(2.0)	21(21.2)	73(73.7)	2.66	3 rd
Low income of farmer	41(41.4)	35(35.4)	14(14.1)	2.24	4 th
Low Household size	37(37.4)	35(35.4)	11(11.1)	1.98	5 th
Farming experience	24(24.2)	47(47.5)	22(22.2)	1.89	6 th
Level of education	41(41.4)	35(35.4)	14(14.1)	1.55	7 th
Membership of cooperative society	21(21.2)	47(47.5)	27(27.3)	1.41	8 th
Marketing difference	38(38.4)	16(16.2)	10(10.1)	1.01	9 th
Age	54(54.5)	14(14.1)	6(6.1)	1.01	9 th
Expected income variant	17(17.2)	23(23.2)	9(9.1)	0.91	11 th

Note: Values in parentheses are percentages.

Source: Field Survey, 2015.

4. Conclusion and Recommendations

The study analyzed the effect of adoption of improved technologies on the production of poultry farmers in Oyo State, Nigeria. The result from the study revealed that hybrid birds, improved feeding, use of battery cages, improved feeders and drinkers, improved vaccinations and medications were the highly adopted improved technologies in the study area. Adoption of gas brooders and automated cages are the least adopted of the improved technologies with mean adoption rate of 0.10 and 0.22 respectively. The regression results from the study indicated that the adoption of improved technology, feed

consumed, labour and farm size were positively and statistically significant at 5%, 5%, 10% and 1% probability levels respectively implying that increased in adoption of the improved technologies and usage of the factors stated led to an increase in poultry output, while water consumed (litres) and cost of vaccinations were negatively significant at 5% and 1% respectively. The study also showed that the availability of technology, access to credit, cost of technology and income of the farmer were the most limiting factors affecting the adoption of improved technologies in the study area. In view of the above findings, it therefore recommended that there should be enhanced research, extension delivery and farm advisory services that will increase the awareness of farmers on the benefits of adopting improved technologies that can lead to increase in the output of poultry farmers in the study area. Also, farmers should be encouraged to form cooperative societies in order to improve their access to finance that can be used to procure the improved technologies in the study area.

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MEASURING TECHNICAL AND ENVIRONMENTAL EFFICIENCY OF TUNISIAN CEREAL FARMS

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Abstract

Several harmful impacts on humans, animals and the environment driven from intensive agricultural practices lead to raise social and political concerns with respect to agriculture related negative externalities. Negative effects of current farming systems result in loss of biodiversity, pollution of air and underground/surface water, human health, overuse of natural resources. At the political level, agricultural policies reforms have continuously focused on environmental considerations. Intensive efforts have been made to promote alternative farming systems that minimize pollution and to encourage farmers to apply safer and more environmentally friendly methods by using less chemical inputs.

Family farming has received substantial attention given its significant potential to meet specific social, economic and environmental objectives. The 2014 International Year of Family Farming aimed at repositioning this farming type at the heart of agricultural, environmental and social policies in the national agendas. Many efforts at the national, regional and global levels have been made to support family farmers and achieve sustainable development. It is important to develop tools to enhance monitoring farm performance and to assist in better targeting policy measures. This study aims to assess technical and environmental efficiency achieved by Tunisian farms specialized in cereals production. Specifically, we apply the methodology recently developed by Serra et al. (2014) that accounts for the stochastic conditions under which production takes place as proposed by Chambers and Quiggin (2000). Empirical findings suggest that technical efficiency of family farms is slightly lower in bad (59%) than in good (64%) growing conditions while environmental efficiency can be improved more under good (65%) than bad (70%) growing conditions.

Keywords: Technical and environmental efficiency, Uncertainty modelling, State-contingent methods, Family farming, Tunisia.

**TOWARDS REDEFINING AND MAKING RELEVANT THE CONCEPT OF
ENTREPRENEURSHIP TO SMALLHOLDER AGRICULTURE: EVIDENCE FROM
KWAZULU-NATAL, SOUTH AFRICA**

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Abstract

The role of entrepreneurship in smallholder agriculture will remain limited if its applicability is not examined in the context features of smallholders. To what extent is the mainstream conceptualization and definition contextually relevant to smallholder realities in South Africa and beyond? Does it still remain relevant and applicable when it is interrogated in the light of the essential features of smallholder farming: heterogeneity, risk aversion, satisficing behaviour, lack of record keeping, mixing household and farm operations, the importance of family labour and indigenous knowledge? If not, how should it be redefined and what needs to be done with respect to policies and strategies to make the concept contextually relevant and help transform the sector? This paper examines these questions with empirical evidence from a recent survey data from South Africa. The evidence shows that smallholders and their context do not conform to the neoclassical principles underpinning the mainstream concept of entrepreneurship. This, however, does not mean they are not entrepreneurial but it highlights the need to redefine the concept to be relevant in their context. In the end, the paper proposes a new definition for on-farm entrepreneurship using the concept of psychological capital and drawing from behavioural economics.

Keywords: Redefining entrepreneurship, Smallholder agriculture, Psychological capital, Behavioral economics, South Africa.

THE EFFECTS OF REAL EFFECTIVE EXCHANGE RATE AND REAL EFFECTIVE EXCHANGE RATE VOLATILITY OF TURKEY'S EXPORTS TO THE OECD COUNTRIES

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Abstract

In the present study, the effects of real effective exchange rate and the real effective exchange rate volatility on Turkey's exports to OECD countries were examined the quarterly data for the period between first quarter of 2003 and second quarter of 2018 within the scope of bound test and causality analysis. The effects of real effective exchange rate and the real effective exchange rate volatility on the exports were analyzed by using the data of total exports to OECD countries constituting an important exports location for Turkey. The share of OECD countries from the total exports of Turkey was 52.7% for 2017 and it increased by 6.9% when compared to the previous year. This suggests that the OECD countries have an important share in Turkey's exports and their share increases. In econometric analysis section of the study started with the calculation of real effective exchange rate volatility and the GARCH (1,1) method was used in calculating the volatility. While selecting the appropriate GARCH model, the Schwarz information criteria were utilized. Then, the stationarity tests were performed and ADF and PP tests were used for stationarity analyses. At the end of unit root tests, the series were determined as LNEXP I(1), LNREER I(1), LNGDP I(1), and VOL I(0). For the cointegration analysis, the bound test used in analyzing the cointegration relationship between the series being at various levels of stationarity was employed. F-statistics value calculated in accordance with bound test approach was found to be higher than the upper critical value at 10% significance level. It was determined that there was cointegration relationship between the variables. For the long-term, the coefficients of real effective exchange rate and real effective exchange rate volatility were found to be statistically insignificant and coefficient of GDP to be statistically significant. After determining the cointegration relationship between the variables, Hacker and Hatemi-J causality test was used in order to determine the direction of relationship. According to the results, no causality relationship from the real effective exchange rate and real effective exchange rate volatility to the exports could be found.

Keywords: Real effective exchange rate, Volatility, Bound test, Symmetric causality.

REEL EFEKTİF DÖVİZ KURU VE REEL EFEKTİF DÖVİZ KURU OYNAKLIĞININ TÜRKİYE'NİN OECD ÜLKELERİNE YAPTIĞI İHRACAT ÜZERİNE ETKİSİ

Özet

Bu çalışmada reel efektif döviz kuru ve reel efektif döviz kuru oynaklığının Türkiye'nin OECD ülkelerine yaptığı ihracat üzerine etkisi sınır testi ve nedensellik analizi çerçevesinde 2003 yılının ilk çeyreği ve 2018 yılının ikinci çeyreğini kapsayan dönem için üçer aylık veriler kullanılarak incelenmiştir. Reel efektif döviz kurunun ve reel efektif döviz kuru oynaklığının ihracat üzerine etkisi Türkiye'nin önemli ihracat lokasyonu olan OECD ülkelerinin toplam ihracat verisi kullanılarak incelenmiştir. OECD ülkelerinin Türkiye'nin toplam ihracatındaki payı 2017 yılında %52,7'dir ve bir önceki yıla göre %6,9 artış göstermiştir. Bu durum OECD ülkelerinin Türkiye'nin ihracatında önemli

bir paya sahip olduğunu ve bu payın arttığını göstermektedir. Çalışmanın ekonometrik analiz bölümüne reel efektif döviz kuru oynaklığının hesaplanması ile başlanmış ve oynaklık hesaplaması için GARCH (1,1) yöntemi kullanılmıştır. Uygun GARCH modeli seçilirken Schwarz bilgi kriterinden yararlanılmıştır. Daha sonra durağanlık testleri ile devam edilmiş vedurağanlık analizi için ADF ve PP testleri kullanılmıştır. Birim kök testleri sonucunda seriler LNEXP I(I), LNREER I(I), LNGDP I(I) ve VOL I(0) olarak tespit edilmiştir. Eşbütünleşme analizi için farklı seviyelerde durağan seriler arasında eşbütünleşme ilişkisini incelemeye yarayan sınır testi kullanılmıştır. Sınır testi yaklaşımına göre hesaplanan test istatistiği değeri %10 anlamlık düzeyinde tablo üst kritik değerinden büyük bulunmuştur. Bu durum değişkenler arasında eşbütünleşme ilişkisinin var olduğunu göstermiştir. Uzun dönemde reel efektif döviz kuru ve reel efektif döviz kuru oynaklığının katsayıları istatistiki açıdan anlamsız, GSYİH değişkeninin katsayısı ise anlamlı bulunmuştur. Değişkenler arasında eşbütünleşme ilişkisi tespit edildikten sonra ilişkinin yönünü tespit etmek için Hacker ve Hatemi-J nedensellik testi uygulanmış ve test sonuçlarına göre reel efektif döviz kuru ve reel efektif döviz kuru oynaklığından ihracata doğru bir nedensellik ilişkisi tespit edilememiştir.

Anahtar Kelimeler: Reel efektif döviz kuru, Oynaklık, Sınır testi, Simetrik nedensellik.

1. Giriş

1980’li yıllarla başlayan küreselleşme hareketliliğiyle birlikte gelişmekte olan ülkelerin mal ve sermaye hareketliliğindeki artış, kurların ekonomi üzerindeki etkisini artırmıştır. Bretton Woods sisteminin terk edilmesiyle birlikte yeni ekonomik yapı içerisinde dalgalı kur rejiminin döviz kurlarındaki değişimi artırdığına yönelik çalışmalar neticesinde döviz kurlarının ve döviz kurları oynaklığının dış ticaret hacmi, ihracat, ithalat ve dış ticaret dengesi üzerine etkilerini inceleyen birçok çalışma yapılmıştır. Reel döviz kurundaki değişimler gelişmekte olan ülkelerin rekabet gücünü etkilemekte ve dış ticaret hareketliliği üzerinde etkili olmaktadır (Acaravcı & Öztürk, 2002; Yılmaz & Kaya, 2007).

Türkiye ekonomisinde dönemler itibariyle farklı döviz kuru rejimleri uygulanmıştır. 1980 yılına kadar sabit kur rejimi, 1981-1988 yılları arasında esnek kur rejimi, 1989-2000 yılları arasında ise sürünen çapa uygulanmıştır. Kasım 2000 ve Şubat 2001 krizlerinden sonrası Türkiye’de uygulanan sabit döviz kuru rejimi yerine dalgalı döviz kuru rejimine geçilmiştir (Acaravcı & Öztürk, 2002; Tapşın & Karabulut, 2013).

Döviz kurunun ve döviz kuru oynaklığının Türkiye’nin dış ticaret hacmi ve dengesi, ihracatı ve ithalatı üzerine etkilerini inceleyen bir çok çalışma yapılmıştır. Bu çalışmaların bazıları döviz kurunun ve oynaklığının dış ticaret değişkenleri üzerinde etkisinin olduğunu tespit ederken kimisi bu etkinin varlığının olmadığını tespit etmişlerdir. Aşağıda Türkiye üzerine yapılan bazı çalışmalara yer verilmiştir.

Terzi ve Zengin (1999), Sivri ve Usta (2001), Aktaş (2012), Yılmaz ve Kaya (2007), Kızıltan ve Çiğirlioğlu (2008), döviz kurunun dış ticaret dengesi üzerine etkisini inceledikleri çalışmalarında döviz kurunun dış ticaret dengesini sağlamada aktif bir araç olarak kullanılamayacağı sonucuna varmışlardır.

Zengin ve Çaycuma (2001) döviz kurlarından, ithalat fiyat endeksine doğru direkt bir etki söz konusuysen aynı etkinin ihracat fiyat endeksi için geçerli olmadığını tespit etmişlerdir. Karagöz ve Doğan (2005) reel döviz kurundan dış ticaret değişkenlerine doğru nedensel bir ilişki tespit etmemişlerdir. Yıldırım ve Kesikoglu (2012) döviz kuru ile ithalat ve ihracat arasındaki nedensellik ilişkilerine yönelik tahminlerin tamamında bir nedensellik ilişkisine rastlamamışlardır. Gül ve Ekinci (2006) reel döviz kuru ile ihracat ve ithalat arasında bir eşbütünleşme ilişkisinin varlığını tespit etmelerine rağmen nedensellik ilişkisinin tek yönlü olarak ihracat ve ithalattan reel döviz kuruna doğru olduğunu tespit etmişlerdir.

Barışık ve Demircioğlu (2012) döviz kuru rejimi ve ihracat-ithalat arasında kuvvetli olmayan bir ilişkinin varlığını ortaya koymuşlardır. Karaçor ve Gerçeker (2012) reel döviz kurlarından dış ticaret hacmine yönelik hem kısa hem de uzun dönemde bir nedensellik ilişkisi tespit etmişlerdir. Saatçioğlu ve Karaca (2011) Türkiye’de döviz kuru belirsizliğinin ihracat üzerinde olumsuz etkisinin olduğu sonucuna ulaşmışlardır.

OECD ülkelerinin Türkiye’nin toplam ihracatındaki payı 2017 yılında %52,7’dir ve bir önceki yıla göre %6,9 artış göstermiştir (TÜİK). Literatürde reel efektif döviz kuru ve reel efektif döviz kuru oynaklığının farklı ihracat fasılları, farklı ülke ve ülke gruplarına olan ihracatı üzerine etkisini inceleyen

birçok çalışma yer almasına rağmen etki konusunda birliktelik bulunmamaktadır. Bu çalışmada reel efektif döviz kuru ve oynaklığının Türkiye'nin OECD ülkelerine olan ihracatı üzerindeki etkisi eşbütünleşme ve nedensellik testleri ile incelenmiştir.

2. Yöntem ve Veri Seti

Analizlerde 2003 yılının ilk çeyreği ve 2018 yılının ikinci çeyreğini kapsayan üçer aylık veriler kullanılmıştır. Çalışmada kullanılan değişkenler Census-X13 yöntemi kullanılarak mevsimsellikten arındırılmış ve logaritması alınarak kullanılmıştır. Çalışmada reel efektif döviz kuru oynaklığı GARCH (1,1) yöntemiyle hesaplanmıştır. Değişkenlere ilişkin bilgiler Tablo 1'de verilmiştir.

Tablo 1. Çalışmada Kullanılan Değişkenler

Kısaltma	Tanım	Dönem	Kaynak
LNEXP	OECD ülkelerine olan ihracat	2003Q1-2018Q2	TÜİK
VOL	Oynaklık	2003Q1-2018Q2	GARCH(1.1)
LNREER	Reel efektif döviz kuru	2003Q1-2018Q2	Merkez Bankası Veri Tabanı
LNGDP	OECD ülkeleri toplam GSYİH	2003Q1-2018Q2	OECD ve The Global Economy Veri Tabanı

Çalışmada ilk önce serilerin durağanlık analizleri ADF ve PP testleri kullanılarak incelenmiştir. Durağanlık analizi sonrasında LNEXP ve LNREER, VOL, LNGDP arasındaki eşbütünleşme ilişkisini incelemek için Pesaran, Shin ve Smith (2001) tarafından geliştirilen sınır testi kullanılmıştır. Değişkenler arasında eşbütünleşme ilişkisi tespit edildikten sonra uzun dönem ilişkiyi incelemek için ARDL (Autoregressive Distribution Lag) modeli, kısa dönemli ilişkinin araştırılması için ARDL yaklaşımına dayalı hata düzeltme modeli kurulmuştur. Değişkenler arasındaki nedensellik ilişkisi ise Toda ve Yamamoto (1995) granger nedensellik testine dayalı Hacker ve Hatemi J (2006) nedensellik testi ile incelenmiştir. Hacker ve Hatemi-J (2006) nedensellik analizinin tablo kritik değerleri hataların normal dağılmama olasılığına karşın bootstrap monte carlo simülasyonu ile daha etkin bir şekilde elde edilmektedir.

3. Ampirik Sonuçlar

3.1. Birim Kök Testi

Çalışmada serilerin birim kök içerip içermedikleri Augmented Dickey-Fuller (ADF) ve Phillips-Perron (PP) testleri kullanılarak incelenmiştir. ADF ve PP testlerinin sonuçları aşağıda Tablo 2'de gösterilmiştir.

Tablo 2. Birim Kök Testleri Sonuçları

Değişkenler	ADF				PP				
	Düzye		Birinci Fark		Düzye		Birinci Fark		
	t -istatistiği	p değeri	t -istatistiği	p değeri	t -istatistiği	p değeri	t -istatistiği	p değeri	
LNEXP	Sabit	-2.304	0.174	-4.957	0.000	-2.304	0.174	-8.159	0.000
LNGDP		-0.840	0.800	-3.207	0.024	-0.721	0.833	-3.354	0.017
LNREER		-1.626	0.463	-7.619	0.000	-1.778	0.388	-8.061	0.000
VOL		-3.832	0.004	-7.872	0.000	-3.901	0.004	-12.061	0.000
LNEXP	Sabit Trend	-3.653	0.034	-5.036	0.001	-3.093	0.117	-8.222	0.000
LNGDP		-3.095	0.117	-3.180	0.099	-2.067	0.553	-3.331	0.071
LNREER		-3.439	0.056	-7.735	0.000	-3.439	0.056	-10.075	0.000
VOL		-3.914	0.017	-8.087	0.000	-3.939	0.016	-12.915	0.000

ADF ve PP birim kök testi sonuçlarına göre değişkenler farklı seviyelerde durağan ve hiçbiri ikinci seviyede durağan değildir. Test sonuçlarına göre değişkenlerin durağanlık seviyeleri %5 anlamlılık düzeyinde LNEXP I(1), LNGDP I(1), LNREER I(1) ve VOL I(0) olarak tespit edilmiştir.

3.2. ARDL Sınır Testi

Çalışmada değişkenlerin farklı seviyelerde durağan olduğu tespit edildiği için literatürde farklı seviyelerde durağan değişkenler arasında eşbütünleşme ilişkisini incelemeye olanak verecek sınır testi kullanılmıştır. Sınır testi sonuçları Tablo 3'te verilmiştir.

Tablo 3. Sınır Testi Sonuçları

F-Sınır Testi	H0: Eşbütünleşme İlişkisi Yok			
Test Statistic	Test Değeri	Anlamlılık Düzeyi	I(0)	I(1)
F-İstatistiği	4,064	% 10	2,873	3,970
k	3	%5	3,470	4,693
ARDL (1,0,0,0)				
Değişken	Katsayı	Std. Hata	t-İstatistiği	Prob.*
LNEXP(-1)	0,593	0,084	7,046	0,000
LNREER	0,265	0,149	1,778	0,081
VOL	-0,193	2,478	-0,078	0,938
LNGDP	1,507	0,368	4,099	0,000
C	-18,228	5,188	-3,513	0,001
Diagnostik Testlerin Sonuçları				
X_{BG}^2	9,155 [0,057]			
X_{NORM}^2	4,575 [0,032]			
X_{WHITE}^2	5,444 [0,063]			
X_{RAMSEY}^2	0,347 [0,555]			

X_{BG}^2 , X_{NORM}^2 , X_{WHITE}^2 , X_{RAMSEY}^2 sırasıyla otokorelasyon, normallik, değişen varyans ve model kurma hatası sınaması istatistikleridir.

Çalışmada hesaplanan F-statistic 4,064 değeri % 10 anlamlılık düzeyinde tablo üst kritik değerinden büyük bulunmuştur. Bu durum değişkenler arasında eşbütünleşme ilişkisinin tespit edildiğini göstermektedir. Eşbütünleşme ilişkisi değişkenler arasında tespit edildikten sonra modele ilişkin uzun ve kısa dönem katsayıları hesaplanmıştır.

ARDL (1,0,0,0) modeli üzerinden hesaplanan uzun dönem katsayıları ile ARDL yaklaşımına dayalı hata düzeltme modeliyle hesaplanan kısa dönem katsayıları Tablo 4'te gösterilmiştir.

Tablo 4. Kısa ve Uzun Dönem Katsayıları

	Değişken	Katsayı	Std. Hata	t-İstatistiği	Prob.
Kısa Dönem	dLNREER	0,273	0,183	1,492	0,142
	dVOL	-0,006	2,673	-0,002	0,998
	dLNGDP	1,678	0,402	4,171	0,000*
	CointEq(-1)	-0,407	0,071	-5,732	0,000*
Uzun Dönem	LNREER	0,584	0,396	1,472	0,147
	VOL	-0,013	5,704	-0,002	0,998
	LNGDP	3,580	0,525	6,815	0,000
	C	-42,301	10,770	-3,927	0,000

*%1 anlamlılık düzeyi, **%5 anlamlılık düzeyi ve *** %10 anlamlılık düzeyi

ARDL modeli sonuçlarına göre uzun dönemde reel efektif döviz kuru ve reel efektif döviz kuru oynaklığının katsayıları istatistiki açıdan anlamsızdır. Bunun anlamı uzun dönemde reel efektif döviz kuru ve reel efektif döviz kuru oynaklığının ihracat üzerinde istatistiki açıdan anlamlı bir etkisi yoktur.

Hata düzeltme katsayısı incelendiğinde, katsayının değeri istenildiği gibi negatif işaretli ve istatistiki açıdan anlamlıdır. Bu durum hata düzeltme mekanizmasının çalıştığını göstermektedir. Bu katsayının tahmin değeri -0.407'dir. Yani kısa dönemde meydana gelen şokların ardından uzun dönem dengesinden meydana gelecek sapmaların 1 dönem sonrasında %40.7'sinin giderilebildiğini göstermektedir.

3.3. Hacker ve Hatemi J Nedensellik

Çalışmada değişkenler arasındaki nedensellik ilişkisi Hacker ve Hatemi-J (2006) nedensellik testi ile incelenmiştir. Hacker ve Hatemi-J nedensellik testi sonuçları Tablo 5'te verilmiştir.

Tablo 5. Hacker ve Hatemi-J Nedensellik

Nedenselliğin Yönü	Test İstatistiği	Kritik Değerler		
		% 1	% 5	% 10
VOL->LNEXP	2.136	7.084	3.964	2.746
LNREER->LNEXP	0.599	7.335	4.170	2.869
LNGDP->LNEXP	6.674	10.424	6.615	5.050

Hacker ve Hatemi-J nedensellik testi sonuçlarına göre LNGDP'den LNEXP'e doğru hesaplanan test istatistiği %5 anlamlılık düzeyinde bootstrap kritik değerinden büyüktür. Bunun anlamı LNGDP'den LNEXP'e doğru nedensellik ilişkisi vardır. Fakat VOL'den ve LNREER'den LNEXP'e doğru nedensellik testi sonuçlarına göre hesaplanan test istatistikleri bootstrap kritik değerlerinden daha düşüktür. Bunun anlamı VOL ve LNREER'den LNEXP'e doğru nedensellik ilişkisi tespit edilememiştir.

4. Sonuç

Bu çalışmada reel efektif döviz kuru ve reel efektif döviz kuru oynaklığı arasındaki ilişki 2003Q1-2018Q2 dönemi için eşbütünleşme ve nedensellik analiz teknikleri kullanılarak araştırılmıştır. Seriler arasında uzun dönemli bir ilişkinin tespiti sınır testi yöntemiyle yapılmış ve sınır testi sonuçlarına göre seriler arasında eşbütünleşme ilişkisi tespit edilmiştir. Elde edilen uzun dönem katsayılarından reel efektif döviz kuru ve reel efektif döviz kuru oynaklığının katsayıları istatistiki açıdan anlamsız bulunurken tek anlamlı uzun dönem katsayısı GSYİH'yi temsil eden LNGDP olmuştur. LNGDP ile LNEXP arasında pozitif yönlü bir ilişki tespit edilmiştir. Daha sonra Hacker ve Hatemi-J tarafından geliştirilen nedensellik testiyle seriler arasındaki ilişkinin yönü tespit edilmeye çalışılmıştır. Nedensellik testi sonucunda LNGDP'den LNEXP'ye doğru nedensellik ilişkisi tespit edilmiştir. Reel efektif döviz kurundan ve reel efektif döviz kuru oynaklığından ihracat serisine doğru bir nedensellik ilişkisi tespit edilmemiştir.

Türkiye'nin OECD ülkelerine olan ihracatı göz önünde bulundurulduğunda çalışmanın ampirik bulguları sonucunda kur politikalarının ihracat artırıcı bir etkisinin bulunmadığı ve bu durumda Türkiye'nin uzun yıllardır sorunu olan dış ticaret açığını gidermekte önemli bir yol olan ihracatı artırma hamlesinin gerçekleşmesinin kur üzerinden gerçekleştirilemeyeceği söylenebilir.

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ARE BITCOIN BUBBLES PREDICTABLE?

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Abstract

Financial bubble is defined as trading of any financial asset outside of its basic value in the market. It is of great importance for investors to determine the financial bubbles that are created by the influence of speculative factors. The initial value of bitcoin, which was developed after the global financial crisis and marketed in 2010, was \$ 0.07, while in 2018 it reached \$ 6400. This increase in bitcoin price attracted the interest of investors on bitcoin and reached a transaction volume of approximately 133 million dollars as of 2018. However, in this period, bitcoin prices increased to \$ 20.000 in 2017 and then decreased rapidly. This situation raised the debate about the fact that bitcoin is a speculative investment instrument. In this study, it is aimed to determine whether bitcoin is a speculative investment instrument. The GSADF method was adopted as an econometric method and daily data was used. It was revealed that bubbles were formed at bitcoin prices at different dates between 2012 and 2018 periods.

Keywords: Bitcoin, Financial Bubbles, GSADF.

BITCOİN BALONLARI ÖNGÖRÜLEBİLİR Mİ?

Özet

Herhangi bir finansal varlığının temel değerinin dışında piyasada işlem görmesi finansal balon olarak tanımlanmaktadır. Spekülatif faktörlerin etkisiyle ortaya çıkan finansal balonların tespit edilmesi yatırımcılar açısından büyük önem taşımaktadır. Küresel finansal krizin ardından geliştirilen ve 2010 yılında piyasaya sürülen bitcoin sanal para biriminin başlangıç değeri 0.07 dolar iken 2018 yılında ise 6400 dolar seviyesine ulaşmıştır. Bitcoin fiyatında yaşanan bu yükseliş yatırımcıların ilgisini bitcoin üzerine çekmiş ve 2018 yılı itibariyle yaklaşık 133 milyon dolarlık bir işlem hacmine ulaşmıştır. Bununla birlikte, yaşanan bu süreçte bitcoin fiyatlarının 2017 yılında 20000 dolar seviyelerine çıktığı ve ardından hızlı bir düşüş sergilediği tespit edilmektedir. Bu durum bitcoinin spekülatif bir yatırım aracı olduğu noktasındaki tartışmaları gündeme getirmiştir. Bu bağlamda hazırlanan bu çalışmada ise bitcoin spekülatif bir yatırım aracı olup olmadığını belirlemek amaçlanmıştır. GSADF yönteminin ekonometrik yöntem olarak benimsendiği ve günlük verilerin kullanıldığı çalışmada 2012 ile 2018 dönemleri arasındaki farklı tarihlerde bitcoin fiyatlarında balon oluştuğu ortaya konulmuştur.

Anahtar Kelimeler: Bitcoin, Finansal Balon, Genelleştirilmiş ADF.

TURKEY AND INDUSTRY 4.0

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Abstract

After the three major industrial revolutions that radically changed understanding of production today, digitalization in production has begun with the fourth industrial revolution, with the great change effect of technology on production systems. Fourth industrial revolution or Industry 4.0 referring to literature, is aimed to integrate products, machines and production systems. This integration will be provided with the use of the Internet and new information technologies in production, and also with the implementation of Cyber Physical Systems (CPS), Internet of Things (IoT), Smart Factories and other Industry 4.0 components. For Industry 4.0, where developed countries started, it appears that government and industry collaborators have quickly prepared road maps and are beginning to apply some of the leading companies in their sector. If it is considered that strategic issues such as technological infrastructure, human resource policies, production digitization, technology levels of production systems, it can be said that implementing Industry 4.0 in our industry may be difficult by this time. However, the problems need to be resolved quickly and the manufacturing industry's Industry 4.0 pilot applications must begin. In this context, within the scope of the study, answers to the following questions will be taken in the questionnaire study conducted by our country's manufacturing companies; "Are your current capabilities and resources sufficient for Industry 4.0? (production, information systems, organizational structure, etc.)", "Do you think Industrial 4.0 and similar technological approaches will be a contribution to your company?", "Do you think SMEs need to move to Industry 4.0?" and "Can SMEs meet Industry 4.0 requirements?". The results will be interpreted as whether the country's manufacturing industry is ready for transition to Industry 4.0.

Keywords: Industry 4.0, Internet of things, Cyber physical system.

TÜRKİYE VE ENDÜSTRİ 4.0

Özet

Üretim anlayışlarını kökten değiştiren üç büyük endüstri devrimi sonrası günümüzde teknolojinin üretim sistemlerine olan büyük değişim etkisiyle beraber üretimde dijitalleşme, dördüncü endüstri devrimi başlamıştır. Literatürde Endüstri 4.0 olarak adlandırılan bu endüstriyel devrimde, ürünler, makineler ve üretim sistemlerinin birbirine entegre edilmesi hedeflenmektedir. Bu entegrasyon üretimde başta internet ve yeni bilişim teknolojilerinin kullanımıyla birlikte siber fiziksel sistemler (CPS), nesnelerin interneti (IoT), akıllı fabrikalar ve diğer Endüstri 4.0 bileşenlerinin uygulanmasıyla sağlanacaktır. Gelişmiş sanayi ülkelerinin başlatmış olduğu Endüstri 4.0 için devletler ve sanayi işbirliğinde hızlı şekilde yol haritaları hazırladıkları ve sektörlerindeki lider firmalarda kısmen uygulamalara başladıkları görülmektedir. Teknolojik altyapı, insan kaynakları politikaları, üretimde dijitalleşme, üretim sistemleri teknoloji seviyeleri gibi stratejik konular düşünüldüğünde ülkemizde Endüstri 4.0 uygulamalarına başlamak için erken olduğu söylenebilir. Fakat, engel teşkil eden konuların hızlı şekilde çözülüp üretim endüstrimizin Endüstri 4.0 pilot uygulamalarına başlaması gerekmektedir. Bu bağlamda, çalışma kapsamında ülkemiz sanayi kuruluşlarıyla yapılan anket çalışmasında; "Mevcut kabiliyetleriniz ve kaynaklarınız Endüstri 4.0 için yeterli mi? (üretim, bilgi sistemleri, organizasyonel yapı vb.)", "Endüstri 4.0 ve benzeri teknolojik yaklaşımların firmanıza

katkısı olacağını düşünüyor musunuz?”, “KOBİ'lerin Endüstri 4.0'a geçişin gerekli görüyor musunuz?” ve “KOBİ'ler Endüstri 4.0 gerekliliklerini sağlayabilirler mi?” sorularına cevaplar toplanacak, sonucunda ülke üretim endüstrisinin Endüstri 4.0'a geçişe hazır olup olmadığı yorumlanacaktır.

Anahtar Kelimeler: Endüstri 4.0, nesnelere interneti, siber fiziksel sistemler.

1. Giriş

Günümüzde geleneksel üretim sistemlerinin teknolojik gelişmelerle paralel hızla değiştiği görülmektedir. Değişim üretim anlayışının ve müşterilere bakış açılarının ciddi anlamda değişmesine sebep olmaktadır. Dördüncü endüstri devrimi ya da Endüstri 4.0 olarak adlandırılan yeni sanayi devriminde geleneksel üretim sistemlerine göre ciddi anlamda farklılıklar oluşmaktadır. Öncesinde gerçekleşen üç endüstriyel devrimde de görüldüğü üzere üretim anlayışının veya teknolojisinin değişimi endüstriyel devrimleri tetiklemiştir. Son yıllarda bu değişim ise internet öncülüğünde üretim teknolojilerinin değişmesiyle gerçekleşmektedir. Teknolojik gelişmeler üretimde stratejik değişimlere yol açmaktadır. Bu değişimlere karşı uyumlu olmak ve Endüstri 4.0'a entegrasyonu sağlamak için işletmelerin ilgili devlet birimleriyle koordineli olması ve yeni teknolojilere karşı kendilerini eğitim ve bilgi birikimi konularında hazırlamaları gerekmektedir.

Endüstri 4.0'a uygun üretim sistemlerini geleneksel üretim sistemlerinden ayıran farklı özellikler bulunmaktadır. Uluslararası otomasyonun sağlanması, ölçek ekonomisi, tecrübeye dayalı bilgi sistemlerinin kurulması gibi konular geleneksel üretim sistemlerinin önemli konularındandır. Fakat geleneksel üretim sistemlerinde önemli olan bu konular Endüstri 4.0 bakış açısında önemini kaybetmektedir. Müşteri taleplerinin kişiselleşmesi bu durumu açıklamaktadır. Son yıllarda işletmeler müşterilerinin kişiselleşen ürün taleplerini önemsemekte, müşterilerin de bu durum karşısında kişisel ürün talepleri giderek artmaktadır. Kişiselleşen müşteri taleplerini karşılamak için işletmelerin geleneksel üretim sistemlerine ek olarak yeni üretim teknolojilerini sistemlerine eklemeleri gerekmektedir (Bartodziej, 2017).

Endüstri 4.0 öncesi gerçekleşen üç endüstriyel devrimin gerçekleşmesini tetikleyen teknolojik gelişmeler olmuştur. Su ve buhar gücüyle çalışan makinelerin keşfi ve üretimde kullanılması, seri üretim ve iş bölümlerinin oluşması, yazılımla birlikte PLC'nin (programlanabilir mantıkla kontrol) üretimde kullanılması ilk üç sanayi devrimini oluşturan başlıca etmenlerdir. Günümüzde ise yeni endüstri devrimini tetikleyen en önemli unsur internettir. İnternet sayesinde insan, makine sistemleri arasında entegrasyon gerçekleştirilmektedir (Brettelvd, 2014).

Yeni teknolojilerin üretim sistemlerine entegre edilmesiyle üretim endüstrisinin genel görünümü değişmektedir. Akıllı fabrikalar, akıllı makineler ve sistemler kavramları Endüstri 4.0 oluşumu sağlamıştır. Endüstri 4.0, fiziksel ve sanal dünyayı üretim sistemlerinde entegre eden, üretim proseslerini değiştiren ve düzenleyen, akıllı ürünlerin üretilmesi sağlayan bir üretim sistemidir. Üretim sistemlerinin değişmesine ek olarak, akıllı ürünlerin piyasaya sunulmasıyla müşterilerin de ürün talepleri değişmekte, ek özellikleri ve genel kapsamı daha fazla olan ürünler müşteriler tarafından istenmeye başlanmıştır (Nunesvd, 2017).

Endüstri 4.0'ın oluşum nedenleri sadece teknolojik gelişmeler ve internetin üretim sistemlerinde yaygın kullanımı değildir. Son yıllarda endüstriyi güçlü geliştirmiş ülkelerin üretim pazar paylarını geliştirmekte olan ülkelere karşı kaybetmesi, nüfuslarının giderek yaşlanması, işçilik maliyetlerinin artması gibi sebepler de üretim stratejisinde geliştirmiş ülkelerin yeni bir arayış içine girmelerine yol açmıştır. Almanya ve Amerika'nın öncüsü olduğu dördüncü endüstriyel devrimde, pazar kaybını önlemek için üretimde verimliliği artırmak gerektiği, insan gücünün kullanımı yerine akıllı fabrikaların kurulması gerektiği düşünülmektedir. Akıllı fabrikaların kurulumu ve etkin kullanımıyla birlikte geliştirmiş ülkeler kaybettikleri pazar paylarını geri alabileceklerdir (Yazıcı ve Düzka, 2016).

Çalışma kapsamında Türkiye üretim endüstrisinde anket çalışması uygulanmıştır. Google form üzerinden çeşitli sektör ve işletmelere anket soruları gönderilmiş, bu anketlere verilen cevaplar üzerinden Türkiye'de genel anlamda sanayinin Endüstri 4.0'a hangi seviyede hazır olduğu yorumlanmıştır.

2. Literatür

Tarihte süre gelen dört sanayi devrimi de teknolojik gelişmeler, keşifler, icatlar sayesinde meydana gelmiştir. İlk sanayi devrimine bakacak olursak başlangıç yeri İngiltere'dir. Sanayi devrimlerinin başlamasıyla birlikte ülkeler gelişmişlik ve refah seviyeleri sanayilerinin gücü ve büyüklüğüyle orantılanmaya başlamıştır (Aksoy, 2017).

Birinci Sanayi Devrimi (1760-1830): İlk sanayi devrimi, İngiltere'de su ve buhar enerjisiyle çalışan makinelerin keşfi ve sanayide kullanılmasıyla başlamıştır. İngiltere'den hemen sonra diğer gelişmiş Avrupa ve dünya ülkelerinin su ve buhar enerjisiyle çalışan makineleri kullanmasıyla üretimde insan gücü yerine makine gücü kullanılmış, fabrikalar açılmaya başlamıştır (Gabaçlı ve Uzunöz, 2017). İnsan gücünün yerine makinelerin alması doğal olarak üretimde verimlilik artışı sağlamıştır.

İkinci Sanayi Devrimi (1840-1973): İkinci sanayi devriminde, su ve buhar enerjisiyle çalışan makinelerin yerini elektrik enerjisiyle çalışan makineler almıştır. Enerji kullanımında farklı olarak ise kömür yerine ham petrol kullanılmaya başlanmıştır. Elektriğin keşfiyle birlikte, Ford'un geliştirdiği seri üretim mantığı ve Taylor'un geliştirdiği üretim teknikleri sayesinde üretimde verimliliğin artışı sağlamıştır. Verimlilik artışına paralel toplumda gelir ve refah seviyeside artmıştır (Kabaklarlı, 2016).

Üçüncü Sanayi Devrimi (1974-2011): Fordist seri üretim mantığıyla ürün çeşitliliği sınırlı kalmaktadır. 20. Yüzyılın ortalarından itibaren müşteri kişisel ürün taleplerinin artmaya başlamasıyla seri üretimle kişisel ürün talepleri karşılanamamaya başlanmıştır (Gabaçlı ve Uzunöz, 2017). Gelişen teknolojiyle birlikte, sanayide farklılaşan müşteri ürün taleplerini karşılama isteği üçüncü endüstri devrimini doğurmuştur. Yazılım ve otomasyon sistemleri bu süreci desteklemiştir.

Dördüncü Sanayi Devrimi (2011- ...): Son yıllarda teknolojide sağlanan büyük gelişmeler, üretimde internetin etkin kullanımı ile birleşince üretim sistemlerinde Siber Fiziksel Sistemler ve Nesnelerin İnterneti kavramlarını ortaya çıkarmıştır. Literatürde Endüstri 4.0 olarak adlandırılmakta olan dördüncü endüstri devrimi, üretimde internetin etkin kullanımını ve bu sayede üretimlerin işgörenler olmadan, makine ve makine sistemlerinde otomatik gerçekleştirilmesini sağlamaktadır (Gabaçlı ve Uzunöz, 2017).

İlk olarak 2011'de Almanya Hannover Fuarı'nda bahsedilen yeni endüstri devrimi olan Endüstri 4.0, günümüze kadar popülerliği hızlı artmış, sanayi temsilcileri, bilim dünyası temsilcileri, politikacılar adından sıkça bahsetmişlerdir. Kagermann (2013), Endüstri 4.0 tanımlamasını; üretim sistemlerinde yazılım, otomasyon sistemleri ve sistemler arası veri transferlerinin yapılması olarak yapmıştır. Siber fiziksel sistemler (CyberPhysicalSystems - CPS), nesnelerin interneti (The Internet of Things – IoT), bulut (cloud) sistemleri ve akıllı fabrikalar (smartfactory) kavramları Endüstri 4.0 ile birlikte kurgulanan sistemlerdir. Endüstri 4.0 sisteminin işleyişi şu şekildedir; üretim sistemlerin akıllı fabrikalara dönüştürülmesiyle birlikte siber fiziksel sistemlerin uygulanmasıyla fiziksel nesnelerin dijital kopyası oluşturulur. Nesnelerin interneti ile birlikte de akıllı ürünlerin işgörenlerle iletişimi ve koordinasyonu sağlanır. Kurulmuş olan sistemle internetin üretimde etkin kullanımıyla üretim ve süreçlerin takibi ve kontrolü gerçekleştirilmiş olur (Sung, 2017).

"Teknolojinin vardığı son noktadanereydeyse bütün bilgisayarlar birbirine bağlanıp bilgi paylaşımı yapabiliyorken, neden fabrikalarda makineler, makine sistemleri ve üretilen ürünler birbirine entegre edilmesin, bilgi paylaşımı yapılamasın?" sorusu verilecek cevap Endüstri 4.0'ın genel işleyişini anlatmaktadır. Endüstri 4.0 ile üretilen akıllı ürünlerin aktif internet bağlantısı olacağından konumları anlık görülebilecek, çevreyle ilgili bilgilere ulaşılabilir, ürün özellikleri ve kapasitesine göre çevreye karşı tepkide bulunabilecek ve diğer ürünler ve sistemlerle iletişim kurabilecektir (Kağnıcıoğlu ve Özdemir, 2017). Üretimde internet olarak tanımlanabilen Endüstri 4.0, üretimdeki her makinenin bilgi ve üretim sistemlerine ulaşabilir ve birbirine entegre (Tupavd, 2017). Endüstri 4.0'ın diğer endüstri devrimleriyle kıyaslandığında daha kapsamlı olduğu görülmektedir. Üretim sistemlerindeki etkisinin yanı sıra ekonomi, sosyal, çevresel konularda da değişimleri ve verimlilik artışlarını tetiklemektedir (Garbie, 2016).

Üretim teknolojilerinin Endüstri 4.0 ile gelişmesi, üretimde çalışan profilini değiştirmektedir. Yeni teknolojilere uyumlu olarak düşük profilli çalışanlar yerine yüksek profilli, eğitim seviyesi yüksek çalışanlar tercih edilmeye başlanmıştır. Bu değişim işletmelerin insan kaynakları politikalarını hızla değiştirmektedir. Vasıflı çalışanların işletmelere kazandırılması için işletmelerin kendi iş eğitimlerinin yanı sıra, üniversitelerin yeni üretim sistemlerine uygunluk sağlamak için ders içeriklerinin değişmesi,

yeni teknolojilerin öğretilmesine yönelik çalışmaların yapılması gerekmektedir. İşletmelerin üniversitelerle bu hususlarda daha çok işbirliği içinde olmaları, çalışanların eğitimleri konusunda ortak hareket etmeleri Endüstri 4.0'a geçiş sürecinde önemlidir (Yazıcı ve Düzkaya, 2016). Endüstri 4.0'ın mevcut istihdamın artışına ya da azalışına etkisini söylemek için erken görünse de, yeni üretim sistemine adaptasyon için mevcut çalışanların bilgi, birikim, donanım seviyelerini artırmaları gerektiği gayet açıktır.

Türkiye üretim endüstrisinin mevcut durumu teknolojik olarak incelenirse, üretimde ağırlıklı olarak orta ve düşük seviyeli teknoloji kullanıldığı görülmektedir. Bu duruma paralel olarak, ekonomi için büyük önem arz eden yüksek katma değerli ürünlerin üretim oranı da oldukça düşmektedir (Yazıcı ve Düzkaya, 2016). Türkiye'nin ihracat içinde yüksek katma değerli ürünlerin payı %3 olarak görülmektedir. Gelişmiş ülkelerde ise bu oran ülkemize kıyasla oldukça yüksektir (Kabaklarlı, 2016). Gelişmiş ülkelerin ihracatlarında yüksek katma değerli ürünlerin payı %15-45 oranlarında değişim göstermektedir (Yazıcı ve Düzkaya, 2016).

Her ne kadar Endüstri 4.0 ülkemizde güncel anlamda araştırılıyor, konuşulup tartışılıyor olsa da, teknolojik altyapı ve endüstri uygulamaları düşünüldüğünde, Türkiye üretim endüstrisinin Endüstri 4.0'a henüz hazır olmadığı görülmektedir. Ülke endüstrisi olarak üçüncü endüstri devrimine henüz tam entegre olunamadığı, endüstri devrimlerinde ikinci ve üçüncü endüstri devrimin arasında bulunduğu görülmektedir. Bu yüzden, Endüstri 4.0'a geçişte ciddi problemlerle karşılaşılması olasılığı yüksektir (Öztürk ve Koç, 2017).

3. Türkiye Üretim Endüstrisinde Endüstri 4.0 Araştırması

Çalışma kapsamında Endüstri 4.0'a Türkiye üretim endüstrisinin ne derece hazır olduğunu anlamak için anket çalışması yapılmıştır. Anket kapsamında çeşitli sektörlerden katılımcılara 4 soru sorulmuştur:

1. Mevcut kabiliyetleriniz ve kaynaklarınız Endüstri 4.0 için yeterli mi? (üretim, bilgi sistemleri, organizasyonel yapı vb.)
2. Endüstri 4.0 ve benzeri teknolojik yaklaşımların firmanıza katkısı olacağını düşünüyor musunuz?
3. KOBİ'lerin Endüstri 4.0'a geçişin gerekli görüyor musunuz?
4. KOBİ'ler Endüstri 4.0 gerekliliklerini sağlayabilirler mi?

Anket soruları Google form üzerinden düzenlenerek üretim sektöründe çalışan üst düzey yöneticilere ve üretim, üretim planlama, kalite, ar-ge, pazarlama departmanlarında çalışanlara ve yöneticilerine gönderilmiştir. Sorulara 5'li Likert ölçeğine göre cevaplar istenmiştir. Toplamda 153 kişiden geri dönüş alınmıştır. Ayrıca, katılımcılara cevapladıkları 4 anket sorusu haricinde "Endüstri 4.0'a geçişte KOBİ'lerin karşılaşacakları en büyük 3 sorun nedir?" sorusu yöneltilmiştir. Cevap olarak Endüstri 4.0 için çalışma için belirlenen 7 büyük sorundan 3 tanesini seçmeleri istenmiştir. Sonuçta; sermaye, fiziksel ve teknolojik altyapı, bilgi, firma kültürü, belirsizlik, nitelikli işgücü, eğitim, danışmanlık, iş birliği, destek yetersizlikleri sorunları içinden katılımcılar 3 büyük sorunu seçmiştir.

Anket katılımcılarına göre Endüstri 4.0'a geçişte KOBİ'lerin karşılaşacakları en büyük sorunlar yüzdesel olarak şu şekilde sıralanmıştır:

1. Sermaye (% 58,8).
2. Nitelikli işgücü (% 52,9).
3. Bilgi (% 45,8).
4. Fiziksel ve teknolojik altyapı (% 45,1).
5. Eğitim, danışmanlık, iş birliği, destek yetersizlikleri (%41,8).
6. Belirsizlik (%28,1).
7. Firma kültürü (26,8).

3.1. Ankete Katılanlara İlişkin Bulgular

Anket kapsamında alınan cevaplara ilişkin katılımcıların sektörel ve firma çalışan sayısına göre bilgileri tablodaki gibidir:

Tablo 1. Araştırmaya Katılanlara Ait Bulgular

Sektör	Yüzde (%)	Çalışan Sayısı	Yüzde (%)
Gıda	22,82	1-9	0
Üretim	18,79	10-49	14,38
Metal	12,75	50-249	44,44
Otomotiv	10,74	250+	41,18
Plastik	8,05		
Cam sanayi	5,37		
Yapı inşaat	4,70		
Mobilya	4,03		
Tekstil	3,36		
Savunma Sanayi	2,68		
Kimya	2,68		
Tarım	2,01		
Diğer	2,01		

Katılımcılar incelendiğinde 15 farklı sektörde faaliyet gösterdikleri görülmektedir. Az katılım içeren dijital baskılı zemin kaplama, lojistik ve teknoloji sektörleri diğer grubu olarak tabloda gösterilmektedir. Araştırmaya katılanların çoğunluğu gıda, üretim, metal ve otomotiv sektörlerinde yer almaktadır.

Katılımcılar firmalarının çalışan sayılarına göre kıyaslandığında,araştırmaya KOBİ'ler ve büyük ölçekli firmalardan dengeli bir katılım olmaktadır. KOBİ kapsamında çalışanların oranı toplamda % 58,82, büyük ölçekli firmalarda çalışanların oranı ise % 41,18 olarak görülmektedir.

Türkiye üretim endüstrisinde Endüstri 4.0 etkisini ölçmek için oluşturulan ankette katılımcılar 5'li likert ölçeğine göre cevaplar vermiştir. 1. soru için sınırlı (1) ve Endüstri 4.0 için hazırız (5) ölçeklerine göre cevaplar verilmiştir. 2. soru için beklenen kazanımları sağlamayacaktır (1) ve tüm beklentileri karşılayacaktır (5) ölçeklerine göre cevaplar verilmiştir. 3. soru için hiç gerek yok(1) ve çok gerekli (5) ölçeklerine göre cevaplar verilmiştir. 4. soru için ise kesinlikle sağlayamaz(1) ve kesinlikle sağlar (5) ölçeklerine göre cevaplar verilmiştir.

Tablo 2. Türkiye Üretim Endüstrisinde Endüstri 4.0'ın İncelenmesi

Türkiye ve Endüstri 4.0	Aldığı Ortalama Puan	Etki Derecesi
1. Mevcut kabiliyetleriniz ve kaynaklarınız Endüstri 4.0 için yeterli mi? (üretim, bilgi sistemleri, organizasyonel yapı vb.)	2,69	Orta
2. Endüstri 4.0 ve benzeri teknolojik yaklaşımların firmanıza katkısı olacağını düşünüyor musunuz?	3,18	İyi
3. KOBİ'lerin Endüstri 4.0'a geçişin gerekli görüyor musunuz?	3,55	İyi
4. KOBİ'ler Endüstri 4.0 gerekliliklerini sağlayabilirler mi?	2,59	Orta

Araştırmaya katılanlar cevaplarında en yüksek ortalama (3,55) KOBİ'lerin Endüstri 4.0'a geçişini gerekli görmüştür. Yine yüksek ortalama cevaplarla (3,18) Endüstri 4.0 ve benzeri teknolojik yaklaşımların firmalarına katkısı olacağı konusunda beklentilerin karşılanacağı düşünülmüştür. Verilen cevaplara göre daha düşük ortalamalarla mevcut kabiliyet ve kaynakların Endüstri 4.0 için yeterli olup olmadığı daha sınırlı (2,69) ve KOBİ'lerin Endüstri 4.0 gerekliliklerini sağlayabileceği yüksek ihtimal sağlayamaz (2,59) şeklinde görülmüştür. Çalışmada katılımcılar KOBİ'ler ve büyük ölçekli firmalar (250'den fazla çalışanı olan) olarak sınıflandırılmıştır. Bu kapsamda, KOBİ'lerin Endüstri 4.0'a geçişinin gerekliliğini ve uyum sağlayıp sağlamayacağı KOBİ'lerin ve büyük ölçekli firmaların cevaplarına göre kendi içerisinde değerlendirilebilir. KOBİ'lerin Endüstri 4.0 geçişinin gerekli olup olması sorusuna genel toplamda 3,55 ortalama cevabı alınmışken, KOBİ'ler bu soruya 3,42, büyük ölçekli firmalar ise 3,74 ortalama cevap vermiştir. KOBİ'lerin Endüstri 4.0 gerekliliklerini sağlayabilmesi sorusuna genel olarak ortalama 2,59 cevap alınmışken, KOBİ'ler 2,5, büyük ölçekli firmalar 2,73 ortalama cevaplamıştır. Büyük ölçekli

firmalarda çalışanların KOBİ'leri Endüstri 4.0'a daha hazır gördüğü anket sorularına göre söylenebilmektedir.

3.2. Hipotezler

Çalışmada kapsamında, katılımcılar sektörler göre ve firma çalışan sayılarına göre sınıflandırılmıştır. Otomotiv ve gıda sektörlerinin belirleyici olacağı ve birbirinden farklı sonuçları oluşturacağı düşünüldüğünden bir sınıflandırma da iki sektör arasında yapılmıştır. Bu sınıflandırmalar doğrultusunda anket sorularına verilen cevaplar arasında farklılıklar incelenmiştir. Amaçlara paralel kurulan hipotezler şu şekildedir:

H₁: Otomotiv ve gıda sektörleri arasında mevcut kabiliyet ve kaynakları Endüstri 4.0 için yeterli görmeleri arasında fark vardır.

H₂: Otomotiv ve gıda sektörleri arasında Endüstri 4.0 ve benzeri teknolojik yaklaşımların firmalara katkısında fark vardır.

H₃: Otomotiv ve gıda sektörleri arasında KOBİ'lerin Endüstri 4.0'a geçişi gerekli görüp görmemesi hususunda fark vardır.

H₄: Otomotiv ve gıda sektörleri arasında KOBİ'lerin Endüstri 4.0 gerekliliklerini sağlayıp sağlamaması hususunda fark vardır.

H₅: KOBİ'ler ve büyük ölçekli firmalar arasında mevcut kabiliyet ve kaynakları Endüstri 4.0 için yeterli görmeleri arasında fark vardır.

H₆: KOBİ'ler ve büyük ölçekli firmalar arasında Endüstri 4.0 ve benzeri teknolojik yaklaşımların firmalara katkısında fark vardır.

H₇: KOBİ'ler ve büyük ölçekli firmalar arasında KOBİ'lerin Endüstri 4.0'a geçişi gerekli görüp görmemesi hususunda fark vardır.

H₈: KOBİ'ler ve büyük ölçekli firmalar arasında KOBİ'lerin Endüstri 4.0 gerekliliklerini sağlayıp sağlamaması hususunda fark vardır.

H₉: Sektörler arasında mevcut kabiliyet ve kaynakları Endüstri 4.0 için yeterli görmeleri arasında fark vardır.

H₁₀: Sektörler arasında Endüstri 4.0 ve benzeri teknolojik yaklaşımların firmalara katkısında fark vardır.

H₁₁: Sektörler arasında KOBİ'lerin Endüstri 4.0'a geçişi gerekli görüp görmemesi hususunda fark vardır.

H₁₂: Sektörler arasında KOBİ'lerin Endüstri 4.0 gerekliliklerini sağlayıp sağlamaması hususunda fark vardır.

3.3. Analiz Sonuçları

Katılımcıların sektörlerine ve firma çalışan sayısına göre sınıflandırılmasıyla oluşturulan hipotezler SPSS 22.0 programıyla analiz edilmiştir. Araştırmanın hipotezlerinin test edilmesiyle oluşan sonuçlar aşağıdaki gibidir:

H₁: Otomotiv ve gıda sektörleri arasında mevcut kabiliyet ve kaynakları Endüstri 4.0 için yeterli görmeleri arasında fark vardır.

H₁ hipotezini test etmek için, otomotiv ve gıda sektörü olmak üzere 2 grup firma incelenmiştir. Bu hipotez bağımsız gruplar t testi ile analiz edilmiştir. T testi sonucunda yüzde 95 güven aralığında bulunan değerler Tablo 3'da gösterilmiştir. Yapılan t testi sonucunda yüzde 95 güven aralığında sig.2 değeri 0,001 olup bu değer 0,05'den küçük olduğu için H₁ kabul edilir. Gıda sektöründe çalışanların mevcut kabiliyet ve kaynakların Endüstri 4.0 için yeterliliği sorusuna cevaplarının ortalaması 2,41, otomotiv sektörü çalışanlarının cevapları ortalaması ise 3,25 çıkmıştır.

Tablo 3. Otomotiv ve Gıda Sektörleri Arasında Mevcut Kabiliyet ve Kaynakları Endüstri 4.0 için Yeterli Görmeleri Arasındaki Farkı Ölçen T Testi

FAKTÖRLER		F	Sig.	t	Sig. 2
Mevcut kabiliyetleriniz ve kaynaklarınız Endüstri 4.0 için yeterli mi? (üretim, bilgi sistemleri, organizasyonel yapı vb.)	Eşit varyans varsayımında	,561	,457	-3,428	,001
	Eşit olmayan varyans varsayımında			-3,317	,003

H₂: Otomotiv ve gıda sektörleri arasında Endüstri 4.0 ve benzeri teknolojik yaklaşımların firmalara katkısında fark vardır.

H₂ hipotezini test etmek için, otomotiv ve gıda sektörü olmak üzere 2 grup firma incelenmiştir. Bu hipotez bağımsız gruplar t testi ile analiz edilmiştir. T testi sonucunda yüzde 95 güven aralığında bulunan değerler Tablo 4’da gösterilmiştir. Yapılan t testi sonucunda yüzde 95 güven aralığında sig.2 değeri 0,001 olup bu değer 0,05’den küçük olduğu için H₂ kabul edilir. Gıda sektöründe çalışanların Endüstri 4.0 ve benzeri teknolojik yaklaşımların firmalara katkısı sorusuna cevaplarının ortalaması 3,20, otomotiv sektörü çalışanlarının cevapları ortalaması ise 3,93 çıkmıştır.

Tablo 4. Otomotiv ve Gıda Sektörleri Arasında Endüstri 4.0 ve benzeri Teknolojik Yaklaşımların Firmalara Katkısında Farkı Ölçen T Testi

FAKTÖRLER		F	Sig.	t	Sig. 2
Endüstri 4.0 ve benzeri teknolojik yaklaşımların firmanıza katkısı olacağını düşünüyor musunuz?	Eşit varyans varsayımında	,006	,937	-3,693	,001
	Eşit olmayan varyans varsayımında			-3,614	,001

H₃: Otomotiv ve gıda sektörleri arasında KOBİ’lerin Endüstri 4.0’a geçişi gerekli görüp görmemesi hususunda fark vardır.

H₃ hipotezini test etmek için, otomotiv ve gıda sektörü olmak üzere 2 grup firma incelenmiştir. Bu hipotez bağımsız gruplar t testi ile analiz edilmiştir. T testi sonucunda yüzde 95 güven aralığında bulunan değerler Tablo 5’da gösterilmiştir. Yapılan t testi sonucunda yüzde 95 güven aralığında sig.2 değeri 0,169 olup bu değer 0,05’den büyük olduğu için H₃ reddedilir. Gıda sektöründe çalışanların KOBİ’lerin Endüstri 4.0’a geçişi gerekli görüp görmemesi sorusuna cevaplarının ortalaması 3,91, otomotiv sektörü çalışanlarının cevapları ortalaması ise 3,56 çıkmıştır.

Tablo 5. Otomotiv ve Gıda Sektörleri Arasında KOBİ’lerin Endüstri 4.0’a Geçişi Gerekli Görüp Görmemesi Hususunda Farkı Ölçen T Testi

FAKTÖRLER		F	Sig.	t	Sig. 2
KOBİ’lerin Endüstri 4.0’a geçişin gerekli görüyor musunuz?	Eşit varyans varsayımında	3,383	,072	1,396	,169
	Eşit olmayan varyans varsayımında			1,277	,214

H₄: Otomotiv ve gıda sektörleri arasında KOBİ’lerin Endüstri 4.0 gerekliliklerini sağlayıp sağlamaması hususunda fark vardır.

H₄ hipotezini test etmek için, otomotiv ve gıda sektörü olmak üzere 2 grup firma incelenmiştir. Bu hipotez bağımsız gruplar t testi ile analiz edilmiştir. T testi sonucunda yüzde 95 güven aralığında bulunan değerler Tablo 6’da gösterilmiştir. Yapılan t testi sonucunda yüzde 95 güven aralığında sig.2 değeri 0,005 olup bu değer 0,05’den küçük olduğu için H₄ kabul edilir. Gıda sektöründe çalışanların KOBİ’lerin Endüstri 4.0 gerekliliklerini sağlayıp sağlamaması sorusuna cevaplarının ortalaması 2,44, otomotiv sektörü çalışanlarının cevapları ortalaması ise 3,18 çıkmıştır.

Tablo 6. Otomotiv ve Gıda Sektörleri Arasında KOBİ'lerin Endüstri 4.0 Gerekliliklerini Sağlayıp Sağlamaması Hususunda Farkı Ölçen T Testi

FAKTÖRLER		F	Sig.	t	Sig. 2
KOBİ'ler Endüstri 4.0 gerekliliklerini sağlayabilirler mi?	Eşit varyans varsayımında	,329	,569	-2,977	,005
	Eşit olmayan varyans varsayımında			-2,963	,006

H₅: KOBİ'ler ve büyük ölçekli firmalar arasında mevcut kabiliyet ve kaynakları Endüstri 4.0 için yeterli görmeleri arasında fark vardır.

H₅ hipotezini test etmek için, katılımcılar KOBİ ve büyük ölçekli firma çalışanları olarak gruplara ayrılmıştır. Bu hipotez bağımsız gruplar t testi ile analiz edilmiştir. T testi sonucunda yüzde 95 güven aralığında bulunan değerler Tablo 7'da gösterilmiştir. Yapılan t testi sonucunda yüzde 95 güven aralığında sig.2 değeri 0,006 olup bu değer 0,05'den küçük olduğu için H₅ kabul edilir. KOBİ çalışanlarının mevcut kabiliyet ve kaynakların Endüstri 4.0 için yeterliliği sorusuna cevaplarının ortalaması 2,51, büyük ölçekli firmalarda çalışanların cevapları ortalaması ise 2,92 çıkmıştır.

Tablo 7. KOBİ'ler ve Büyük Ölçekli Firmalar Arasında Mevcut Kabiliyet ve Kaynakları Endüstri 4.0 İçin Yeterli Görmeleri Arasındaki Farkı Ölçen T Testi

FAKTÖRLER		F	Sig.	t	Sig. 2
Mevcut kabiliyetleriniz ve kaynaklarınız Endüstri 4.0 için yeterli mi? (üretim, bilgi sistemleri, organizasyonel yapı vb.)	Eşit varyans varsayımında	,215	,643	-2,761	,006
	Eşit olmayan varyans varsayımında			-2,697	,008

H₆: KOBİ'ler ve büyük ölçekli firmalar arasında Endüstri 4.0 ve benzeri teknolojik yaklaşımların firmalara katkısında fark vardır.

H₆ hipotezini test etmek için, katılımcılar KOBİ ve büyük ölçekli firma çalışanları olarak gruplara ayrılmıştır. Bu hipotez bağımsız gruplar t testi ile analiz edilmiştir. T testi sonucunda yüzde 95 güven aralığında bulunan değerler Tablo 8'da gösterilmiştir. Yapılan t testi sonucunda yüzde 95 güven aralığında sig.2 değeri 0,028 olup bu değer 0,05'den küçük olduğu için H₆ kabul edilir. KOBİ çalışanlarının Endüstri 4.0 ve benzeri teknolojik yaklaşımların firmalara katkısı sorusuna cevaplarının ortalaması 3,16, büyük ölçekli firmalarda çalışanların cevapları ortalaması ise 3,52 çıkmıştır.

Tablo 8. KOBİ'ler ve Büyük Ölçekli Firmalar Arasında Endüstri 4.0 ve Benzeri Teknolojik Yaklaşımların Firmalara Katkısında Farkı Ölçen T Testi

FAKTÖRLER		F	Sig.	t	Sig. 2
Endüstri 4.0 ve benzeri teknolojik yaklaşımların firmanıza katkısı olacağını düşünüyor musunuz?	Eşit varyans varsayımında	6,093	,015	-2,225	,028
	Eşit olmayan varyans varsayımında			-2,168	,032

H₇: KOBİ'ler ve büyük ölçekli firmalar arasında KOBİ'lerin Endüstri 4.0'a geçişi gerekli görüp görmemesi hususunda fark vardır.

H₇ hipotezini test etmek için, katılımcılar KOBİ ve büyük ölçekli firma çalışanları olarak gruplara ayrılmıştır. Bu hipotez bağımsız gruplar t testi ile analiz edilmiştir. T testi sonucunda yüzde 95 güven aralığında bulunan değerler Tablo 9'da gösterilmiştir. Yapılan t testi sonucunda yüzde 95 güven aralığında sig.2 değeri 0,08 olup bu değer 0,05'den küçük olduğu için H₇ kabul edilir. KOBİ çalışanlarının KOBİ'lerin Endüstri 4.0'a geçişi gerekli görüp görmemesi sorusuna cevaplarının ortalaması 3,48, büyük ölçekli firmalarda çalışanların cevapları ortalaması ise 3,82 çıkmıştır.

Tablo 9. KOBİ'ler ve Büyük Ölçekli Firmalar Arasında KOBİ'lerin Endüstri 4.0'a Geçiş Gerekli Görüp Görmemesi Hususunda Farkı Ölçen T Testi

FAKTÖRLER		F	Sig.	t	Sig. 2
KOBİ'lerin Endüstri 4.0'a geçişin gerekli görüyor musunuz?	Eşit varyans varsayımında	,013	,908	-2,690	,008
	Eşit olmayan varyans varsayımında			-2,613	,010

H₈: KOBİ'ler ve büyük ölçekli firmalar arasında KOBİ'lerin Endüstri 4.0 gerekliliklerini sağlayıp sağlamaması hususunda fark vardır.

H₈ hipotezini test etmek için, katılımcılar KOBİ ve büyük ölçekli firma çalışanları olarak gruplara ayrılmıştır. Bu hipotez bağımsız gruplar t testi ile analiz edilmiştir. T testi sonucunda yüzde 95 güven aralığında bulunan değerler Tablo 10'da gösterilmiştir. Yapılan t testi sonucunda yüzde 95 güven aralığında sig.2 değeri 0,221 olup bu değer 0,05'den büyük olduğu için H₈ reddedilir. KOBİ çalışanlarının, KOBİ'lerin Endüstri 4.0 gerekliliklerini sağlayıp sağlamaması sorusuna cevaplarının ortalaması 2,51, büyük ölçekli firmalarda çalışanların aynı soruya cevapları ortalaması ise 2,69 çıkmıştır.

Tablo 10. KOBİ'ler ve Büyük Ölçekli Firmalar Arasında KOBİ'lerin Endüstri 4.0 Gerekliliklerini Sağlayıp Sağlamaması Hususunda Farkı Ölçen T Testi

FAKTÖRLER		F	Sig.	t	Sig. 2
KOBİ'ler Endüstri 4.0 gerekliliklerini sağlayabilirler mi?	Eşit varyans varsayımında	,016	,901	-1,230	,221
	Eşit olmayan varyans varsayımında			-1,216	,226

H₉: Sektörler arasında mevcut kabiliyet ve kaynakları Endüstri 4.0 için yeterli görmeleri arasında fark vardır.

H₉ hipotezinin testinde tek yönlü ANOVA (tek yönlü varyans analizi) yöntemi kullanılmıştır. Tablo 11'de varyansların homojenliği testi görülmektedir. Sig. değeri 0,10'dan büyük olduğu için (0,134)varyanslar homojendir. Tek yönlü ANOVA analizinin temel varsayımı sağlanmıştır.

Tablo 11. H₉ için Varyansların Homojenliği Testi

LeveneStatistic	df1	df2	Sig.
1,492	12	136	,134

Tablo 12'de H₉ için yapılmış tek yönlü ANOVA testi sonucu görülmektedir. Sig. değeri (0,016), 0,10'dan

büyük olduğu için H₉ reddedilir. Çalışma sonuçlarına göre, sektörler arasında mevcut kabiliyet ve kaynakları Endüstri 4.0 için yeterli görmeleri arasında fark yoktur.

Tablo 12. H₉ için Varyans Analizi

	Kareler Toplamı	df	Ortalamanın karesi	F	Sig.
Gruplar arası	15,296	12	1,275	2,175	,016
Gruplar içi	79,710	136	,586		
Toplam	95,007	148			

H₁₀: Sektörler arasında Endüstri 4.0 ve benzeri teknolojik yaklaşımların firmalara katkısında fark vardır.

H₁₀ hipotezinin testinde tek yönlü ANOVA (tek yönlü varyans analizi) yöntemi kullanılmıştır. Tablo 13'de varyansların homojenliği testi görülmektedir. Sig. değeri(0,625) 0,10'dan büyük olduğu için varyanslar homojendir. Tek yönlü ANOVA analizinin temel varsayımı sağlanmıştır.

Tablo 13. H₁₀ için Varyansların Homojenliği Testi

LeveneStatistic	df1	df2	Sig.
,825	12	136	,625

Tablo 14’de H₁₀ için yapılmış tek yönlü ANOVA testi sonucu görülmektedir. Sig. degeri (0,000) 0,10’dan küçük olduğu için H₁₀ kabul edilir. Çalışma sonuçlarına göre, sektörler arasında Endüstri 4.0 ve benzeri teknolojik yaklaşımların firmalara katkısında fark vardır.

Tablo 14. H₁₀ için Varyans Analizi

	Kareler Toplamı	df	Ortalamanın karesi	F	Sig.
Gruplar arası	24,050	12	2,004	3,268	,000
Gruplar içi	83,413	136	,613		
Toplam	107,463	148			

H₁₁: Sektörler arasında KOBİ’lerin Endüstri 4.0’a geçişi gerekli görüp görmemesi hususunda fark vardır.

H₁₁ hipotezinin testinde tek yönlü ANOVA (tek yönlü varyans analizi) yöntemi kullanılmıştır. Tablo 15’de varyansların homojenliği testi görülmektedir. Sig. degeri 0,10’dan büyük olduğu için (0,133)varyanslar homojendir. Tek yönlü ANOVA analizinin temel varsayımı sağlanmıştır.

Tablo 15. H₁₁ için Varyansların Homojenliği Testi

LeveneStatistic	df1	df2	Sig.
1,496	12	136	,133

Tablo 16’de H₁₁ için yapılmış tek yönlü ANOVA testi sonucu görülmektedir. Sig. degeri (0,085), 0,10’dan

küçük olduğu için H₁₁ kabul edilir. Çalışma sonuçlarına göre, sektörler arasında KOBİ’lerin Endüstri 4.0’a geçişi gerekli görüp görmemesi hususunda fark vardır.

Tablo 16. H₁₁ için Varyans Analizi

	Kareler Toplamı	df	Ortalamanın karesi	F	Sig.
Gruplar arası	11,289	12	,941	1,649	,085
Gruplar içi	77,584	136	,570		
Toplam	88,872	148			

H₁₂: Sektörler arasında KOBİ’lerin Endüstri 4.0 gerekliliklerini sağlayıp sağlamaması hususunda fark vardır.

H₁₂ hipotezinin testinde tek yönlü ANOVA (tek yönlü varyans analizi) yöntemi kullanılmıştır. Tablo 17’de varyansların homojenliği testi görülmektedir. Sig. degeri 0,10’dan küçük olduğu için (0,009)varyanslar homojen değildir. Tek yönlü ANOVA analizinin temel varsayımı sağlanmamıştır.

Tablo 17. H₁₂ için Varyansların Homojenliği Testi

LeveneStatistic	df1	df2	Sig.
2,333	12	136	,009

Tablo 18’de H₁₂ için yapılmış tek yönlü ANOVA testi sonucu görülmektedir. Sig. degeri (0,045), 0,10’dan küçük olduğu için H₁₂ kabul edilir. Çalışma sonuçlarına göre, sektörler arasında KOBİ’lerin Endüstri 4.0 gerekliliklerini sağlayıp sağlamaması hususunda fark vardır.

Tablo 18. H₁₂ için Varyans Analizi

	Kareler Toplamı	df	Ortalamanın karesi	F	Sig.
Gruplar arası	17,798	12	1,483	1,858	,045
Gruplar içi	108,565	136	,798		
Toplam	126,362	148			

4. Sonuçlar

Bu çalışmada Endüstri 4.0 için ülkemiz endüstrisinin genel bakış açısı değerlendirilmeye çalışılmıştır. Gelişmiş ülkelerde fikir olarak ortaya çıkan Endüstri 4.0'ın son yıllarda giderek yaygınlaşarak üretim sistemlerinde yerini aldığı görülmektedir. Ülkemizde ise henüz fikir olarak konuşulan Endüstri 4.0 için devlet sanayi işbirliğinde politikalar geliştirilmesi gerektiği kesindir. Mevcut sanayi teknoloji altyapımızın yeni endüstri devrimine hazır olmadığı bilinmektedir. Devlet teşvikleri, yasalarda uygun değişiklikler, işletmelere yeni teknolojik üretim sistemlerini uygulamada ve satın almada maddi destek, yeni teknolojileri uygulama konusunda vasıflı işgören eğitimlerinde işletmelere destek, üniversitelerde eğitim programlarının yeni teknolojilerin ve oluşacak yeni mesleklerin düşünülerek revize edilmesi gibi konular Endüstri 4.0'ı uygulamaya geçmeden önce yapılması gereken konulardır.

Çalışma kapsamında anket soruları dahilinde mevcut durum analiz edilmeye çalışılmıştır. Ülke sanayisinin çoğunluğunu oluşturan KOBİ'ler anket sorularının odağını oluşturmuştur. Öncelikle, ankette katılımcılara 7 madde arasından KOBİ'lerin Endüstri 4.0'a geçişte karşılaşacakları en büyük 3 sorunu belirlemeleri istenmiştir. Alınan cevaplara göre belirlenen en büyük 5 sorun; sermaye (% 58,8), nitelikli işgücü (% 52,9), bilgi (% 45,8), fiziksel ve teknolojik altyapı (% 45,1) ve eğitim, danışmanlık, iş birliği, destek yetersizlikleri (%41,8) olarak belirlenmiştir.

Anket sorularına ise verilen ortalama cevaplar, KOBİ'lerin Endüstri 4.0'a geçişin gerekli görüp görmemesine 3,55, Endüstri 4.0 ve benzeri teknolojik yaklaşımların firmalarına katkısının olup olmayacağına 3,18, mevcut kabiliyetlerinin ve kaynaklarının Endüstri 4.0 için yeterli olup olmamasına 2,69 ve KOBİ'lerin Endüstri 4.0 gerekliliklerini sağlayıp sağlamamasına ise 2,59 olmuştur. Çıkan sonuçlara göre, KOBİ'lerin Endüstri 4.0 geçmesi gerektiği düşünülmekte, Endüstri 4.0'ın firmalarına katkısı olacağı daha yüksek yüzdelerde düşünülmektedir. Fakat, katılımcıların firmaların mevcut durumlarının Endüstri 4.0 için yeterli olmadığını ve Endüstri 4.0 gerekliliklerin sağlayamayacaklarını düşündükleri anket sorularına verilen düşük ortalama cevaplardan görülmektedir. Eğer anket katılımcıları KOBİ ve büyük ölçekli firmalar olarak kategorize edilirse sonuçlarda KOBİ çalışanlarına göre büyük ölçekli firma çalışanlarının KOBİ'lerin Endüstri 4.0'a geçişte ve gerekliliklerini karşılama konusunda daha istekli oldukları ve şartların sağlanacağını düşündükleri görülmektedir.

Anket soruları paralelinde katılımcıların sektör ve firma çalışan sayılarına göre cevaplarında farklılıkların olup olmadığı incelenmiştir. Ayrıca, verilen cevaplarda önemli farklar olacağı düşünülen otomotiv ve gıda sektörleri arasındaki farklar da cevaplar doğrultusunda incelenmiştir. Oluşturulan hipotezlere göre, otomotiv ve gıda sektörleri arasında KOBİ'lerin Endüstri 4.0'a geçişinin gerekli görülüp görülmemesi sorusuna cevaplarda fark bulunamamıştır. Diğer 3 soruya, yani Endüstri 4.0 ve benzeri teknolojik yaklaşımların firmalarına katkısının olup olmayacağına, mevcut kabiliyetlerinin ve kaynaklarının Endüstri 4.0 için yeterli olup olmayacağına ve KOBİ'lerin Endüstri 4.0 gerekliliklerini sağlayıp sağlamamasına verilen cevaplar doğrultusunda otomotiv ve gıda sektörleri arasında fark bulunmuştur. Anket sorularına verilen cevapları KOBİ çalışanları ve büyük ölçekli firmalarda çalışanlar olarak incelenirse, KOBİ'lerin Endüstri 4.0 gerekliliklerini sağlayıp sağlayamayacağı sorusuna verilen cevaplarda firmalar arasında farklılık bulunmamıştır. Diğer 3 soruya, yani Endüstri 4.0 ve benzeri teknolojik yaklaşımların firmalarına katkısının olup olmayacağına, mevcut kabiliyetlerinin ve kaynaklarının Endüstri 4.0 için yeterli olup olmayacağına ve KOBİ'lerin Endüstri 4.0'a geçişinin gerekli görülüp görülmeceğine verilen cevaplarda KOBİ'ler ve büyük ölçekli firma çalışanları arasında farklılıklar bulunmuştur. Sektörlere göre farklılıklar incelendiğinde, mevcut kabiliyetlerinin ve kaynaklarının Endüstri 4.0 için yeterli olup olmayacağı sorusuna sektörler arası verilen cevaplarda fark bulunamamıştır. Diğer 3 soruya, KOBİ'lerin Endüstri 4.0'a geçişinin gerekli görülüp görülmemesi, KOBİ'lerin Endüstri 4.0 gerekliliklerini sağlayıp sağlamaması ve Endüstri 4.0

ve benzeri teknolojik yaklaşımların firmalarına katkısının olup olmayacağı sorularına verilen cevaplarda sektör arasında farklılık olduğu görülmüştür.

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FOOD PROCESSING AND PACKAGING: A VERITABLE TOOL FOR ENSURING HIGHER PRODUCER PRICES FOR SUSTAIN PRODUCTION, TOWARDS NATIONAL DEVELOPMENT

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Abstract

The post-harvest losses, market glut at products seasons, scarcity at off-seasons and attendant consequences of low producer prices, fluctuation in the prices of the food products within and between seasons and lack of demand pull for raw materials; are prevalent in Nigeria's agricultural production value-chain. These are as a result of inadequate and inefficient processing and packaging system in the country. The paper highlighted the major food products technologies in Livestock and Fishery sectors. For instance, milk products technologies include: Clarification, Pasteurization, homogenization; leading to various products such as butter, flavoured milk, concentrated milk such as evaporated milk, Sweeten condensed milk, ghee, cheese, paneer, choa, dried milk, fermented milk such as yoghurt, ice cream and skinned milk. Whereas meat is processed by technologies such as ageing or ripening, tenderizing, curing, cut and grading, cooking and canning in order to suit different human desires. Fish processing technologies include salt curing and fish fermentation, drying, smoking, chilling, freezing, canning, filleting, fish sausage and fish cheese. Recommendations on ways of creating awareness of processing and packaging technologies and creation of enabling environment were made, such as intensive extension education in livestock and fishery products handling, formal education in Schools, Colleges, Institutes and Universities; Provision of basic infrastructure particularly electricity, water supply, roads, railways, airways and communication facilities; modern abattoirs and adhering to code of conduct for responsible fisheries, to guard against wastages and increase the shelf life and quality of our agricultural products, for domestic and international markets, for National Development.

Keywords: Food Processing and Packaging, Higher Producer Prices, Sustain Production and National Development.

1. Introduction

Man's basic drive is for food to satisfy his hunger. Most of the agricultural produces such as cereals, pulses, fruits and vegetables, milk, eggs, fish and flesh from animals constitute food materials. After production and before consumption all such types of food materials are subjected to several adverse physical and chemical factors as well as microbial and parasitic agents, which may cause their spoilage or lead to disease when consumed. To prevent these losses, both qualitative and quantitative and to prepare food for immediate or future use, some processing, preservation, packaging and storage practices are required. (ICAR, 2006).

Post-harvest management also enables creation of agro-processing industries at the rural threshold to produce value-added products, assuring greater financial returns and generation of employment opportunities (Olukosi and Isitor, 1990) this enhances greater potential in reviving rural economy for National Development.

In view of the value in terms of quality of protein, perishable nature of animal products relative to the crop products and the huge imports of dairy and fish products, a deliberate attempt was made to dwell on the processing and packaging of animal products to enhance the value addition, thereby increasing the economic fortunes of the participants from production to consumption levels of the chain.

2. Processing and Packaging of Dairy Products

Milk is processed into various products such as butter, flavoured milk, concentrated milk such as evaporated milk; sweeten condensed milk, ghee, cheese, paneer, choa, dried milk product and fermented milk such as yoghurt, ice cream, skimmed milk etc. spoilage of milk during collection and handling and at users level is not uncommon due to lack of adequate refrigerated handling and storage facilities. To ensure safe milk, free from disease producing bacteria, toxic substances and foreign flavor, fresh whole milk needs to be processed before marketing or consumption.

Processing helps in producing milk that has initial low bacterial count, good flavor and satisfactory keeping qualities.

Milk-processing operation consists of clarification, separation, pasteurization and homogenization (ICAR, 2006 and Shakuntala and Shadaksharaswamy, 2005).

Shakuntala and Shadaksharaswamy (2005) reported that, to ensure safe milk free from disease producing bacteria, toxic substances and foreign flavor, fresh whole milk is to be processed before marketing.

- **Clarification:** Noticeable qualities of foreign materials, such as particles of dust, dirt and many other undesirable substances find their way into milk due to careless handling. To remove these, milk is generally passed through a centrifugal clarifier. The speed of the clarifier will be such that there is little separation of cream. This operation removed all dirt, filth, cells from the udder and some bacteria. Clarification does not remove all pathogenic bacteria from milk. The clarified milk is ready for pasteurization.

- **Pasteurization:** Derives its name from Louis Pasteur, who found that the heating of liquids, especially wines, to a high temperature improves their keeping qualities. The aim of pasteurization of milk is to get rid of any disease producing bacteria it may contain and to reduce substantially the total bacteria count for improved keeping qualities. Pasteurization of milk destroys approximately 99 percent(%) of all bacteria, as well as most of the yeast and molds. Two methods are employed for pasteurization (i) Low Temperature Long Time (LTLT), in which every partied of milk is held for 30 min at 61.7°C sometimes at 62.8° followed by rapid cooling and (ii) High Temperature Short Time (HTST) method, the milk is held for not less than 15s. at 71.7°C, Ultra-high temperature treatment at 93.4°C for 3s or 149.5°c for 1s is also employed. Followed by rapid cooling to sterilize the surviving bacteria.

- **Homogenization:** the process of making a stable emulsion of milk fat and milk serum by mechanical treatment and rendering the mixture homogeneous is homogenization. This is achieved by passing warm milk or cream through a small aperture under high pressure and velocity. High pressure homogeneous, low pressure rotary type homogenizers and sonic vibrators are used for the purpose. This prevents the formation of clumps by milk and cream fat globules.

The processing of milk described above is for the production of milk to be marketed as such. However, a slight departure or additional steps can be employed to produce a number of closely related milk products such as Vitamin D milk, skim milk, concentrated milk, ice cream, butter, cheese and ghee.

3. Processing and Packaging of Meat Products and By-Products

The term meat as defined by Shakuntala and Shakaksharaswamy (2005) is a muscle of warm blooded terrestrial four legged animals, the chief ones being cattle, sheep, goats and pigs. Meat also includes the glands and organs of these animals. Meat products include many of the by-products from animal slaughter such as animal gut used for sausage casings, the fat used for the manufacture of lard, gelatin and others.

Table 1. Raw Materials and Finished Products from Animals

Raw Materials	Finished Products
Bone	Bone Meal
Blood	Blood Meal
Wool	Sweaters, Trousers etc.
Hides/Skin	Leather for making shoes, belts, handbags, jackets, gloves, helmets etc.
Fur/Hair	Wigs
Eggs	Vaccines, dyes, paint, food, pomade, shampoo etc.
Milk	Liquid/Powdered Milk, ice cream, yoghurts etc.
Feather	Feather meal, ornamentals, stuffing materials for pillows and mattress also for making glue, inorganic fertilizers, gum, resins.
Horn	Buttons, comb, handle for spoons and knives
Meat	Food
Manure/Guano	Fish feed, organic manure
Poultry Offal	Processed into livestock feed

Source: Ezike (2001)

Meat as food for human consumption is subjected to many processes in order to maintain its nutritive value, flavor, shelf life and economic value for domestic and international market. Shakuntala and Shakaksharaswamy (2005), opined that meat could be processed through Ageing or ripening, tenderizing, curing, cuts and grading, cooking, canning etc.

Ageing or ripening is done by holding meat at a temperature of 0.50c to -20c in a cold room. Ageing may take 1 to 4 weeks. The best flavor and the greatest tenderness develop in meat aged from 2 to 4 weeks, during ageing, humidity of the cold room is to be controlled and meat may be covered with wrapping to minimize drying and weight loss.

Beef is usually the only kind of meat that is commercially aged, mutton are occasionally aged. Pork is never aged because of its high fat content.

4. Tenderizing

Tenderizing is the most desired quality in meat. There are several artificial methods of increasing the tenderness of meat to various extents. These includes mechanical methods, use of enzymes and salts.

The mechanical methods of tenderizing meat include pounding, cutting, grinding, needling or pinning and the use of ultrasonic vibrations.

5. Curing Meat

Curing of meat has additional objectives, as it brings about the modification of meat that affects preservation, flavor, colour and tenderness due to added curing agents. Originally curing was practiced as a means of preservation before the days of refrigeration. When modern methods of preservation are available, the prime purpose of curing is to produce the unique flavoured meat products and a special purpose is to preserve the red colour of meat. Thus cured beef (corned beef) and cured pork (ham), remain red on cooking while in the uncured condition they become brown. The ingredients used for curing are common salt, sodium nitrate or nitrite, sugar and spices. During the curing process, the curing mixture may be rubbed only on the surface of a cut of meat or the meat may be immersed in a solution of the curing agent (prickling). A cured meat could be dried or smoked.

6. Fish Processing and Packing

Fresh fish is one of the most perishable food staples. Fish spoils very quickly because of intrinsic factors. The high ambient temperature in the tropics hastens fish spoilage by accelerating the activities of bacteria, by enzymes and chemical oxidation of fat in fish flesh. Unwholesome fish may be

discarded by fisher folk at different states of handling and processing, leading to economic and nutritional losses in the fishery industry.

Post harvest losses may occur at different points, from capture to marketing and in some fishery, the level of losses could be considerable. Post harvest losses have been estimated at 20-50% in tropical countries. This level of post harvest losses could be very significant especially in this period of fish scarcity and escalating prices and could have negative impact on the national food security (Eyo, 2001).

Eyo, (2001) further categorized fish post harvest losses into three ways as follows:

- **Physical Losses**

Referred to losses of fish either completely (gross physical losses) or by loss of some pieces (net physical losses). Gross physical loss happens when low value by-catch which could have been utilized are dumped at sea or from fish that fall into the fire during smoking and cannot be retrieved or when the entire fish is thrown away.

Net physical losses include infested fish in which some edible parts are lost to insects and maggots during storage and fragmented fish.

- **Economic Losses**

When fishermen cannot sell fish at the price they would have been sold, due to spoilage occasioned by absence of handling and preservation facilities, poor access roads in fishing villages, supply greater than demand (glut) loss in revenue could be enormous. The price of fish often drops in response to the degree of fish spoilage.

- **Nutritional Losses**

Nutritional losses is the loss in nutritive value of fish due to spoilage or exposure to high temperature during smoking, especially during traditional hot smoking and fish burning, causing damage to part of the protein fraction such as lysine. Other heat labile essential amino acids are also affected. Nutritional losses although important when considering fish utilization is always difficult to determine since it requires special reagent and expensive equipment such as amino acid analyzer.

7. Fish Processing Techniques

7.1. Salt Curing and Fish Fermentation

Common salt (Sodium Chloride) as a preservative has been used globally for centuries in curing, fermentation and in association with fish smoking. It is on record that salt fish was prepared by ancient Egyptians over 100 years ago by picking fatty fish such as scombrids. (Eyo, 2001).

7.2. Fish Drying

Drying or dehydration is used to describe any process involving the removal of water from fish or fish products by evaporation. It could be in the form of sun drying, box-type dryer, mechanical dryers, vacuum contact dryer, freezer dryer, frying etc. (Omotowo Ihuahi, 2006).

7.3. Fish Smoking

The use of smoke from smoldering wood for the preservation of perishable food dates back to civilization. It is done in the form of (a) Traditional Smoke House (b) Pit Oven (c) Mud-type Smoke Kiln (d) Drum-type Smoking Kiln with a single smoking rack (e) Earthenware Pot-type Smoking Kiln etc. (Simko, 1991, Ligia, 2002).

7.4. Fish Packaging

Pack dried fish in clean good quality sacks lined with polythene or thick brown paper to slow the rates of immigration of desmetid beetle and prevent cross infestation in storage e.g. in cartons, crates, baskets, head-pans, glass boxes, sacks etc.

7.5. Chilling of Fish

Fresh fish spoil very quickly after capture and the rate of spoilage is influenced to a large extent by temperature. The rate at which bacteria grow is significantly reduced at low temperature. One of the simplest ways of lowering fish temperature, thereby retarding bacteria growth is to ice the fish. Ice is used extensively in the fishery industry as a cooling medium for fresh fish in order to preserve its quality and prolong its storage life.

7.6. Fish Freezing

Fish freezing is a method of fish preparation in which the product is brought into contact with refrigerated air or refrigerated surface in a compartment. As heat is removed from the fish, its temperature falls steadily until the fish begins to freeze. During freezing the temperature falls below that of ice (0°C); microbial activity is slowed down and as the temperature goes further down to -30°C most bacteria may die out. Freezing therefore enhances the microbial stability of fish and thereby extends its shelf life (Eyo, 2001).

7.7. Fish Canning

Canning is a process involving heat treatment of fish in sealed containers made of tin-plates, aluminium cans or glass, until the product has been fully sterilized (Eyo, 2001).

Others include fish preservation by irradiation, filleting (fish mince) fish sausage, fish cheese etc.

8. Fish by-Products

In the fishery industry, the most desirable or choice species are often used for human consumption. The undesirable species are never discarded; rather they are used in the industry in the manufacture of by-products. Such fishes include the by-catches, fish waste, fish offal and other trash fishes. Fishery by-products may be consumed directly or indirectly when used in compounding feeds in feed mills.

9. Conclusion and Recommendations

Nigeria with our immense potentials in the Livestock and Fishery sectors are capable of providing the much needed animal protein for the citizens, only when we have a well articulated value addition chain that will ensure the processing and packing of the perishable animal and fish products. That will prevent wastage, increase return on investment, higher productivity and possible export of the surplus processed and packaged to earn us foreign exchange for national development. Recommendations:

1. All the major cities and towns in Nigeria should have modern abattoirs with the state of the earth facilities to process and package meat for human consumption. To be owned and managed by the private sector while government should play supervisory role.
2. Government should pay greater attention in the provision of basic infrastructure particularly electric power and water for the processing plants to thrive effectively.
3. Educational institutions should impart more knowledge in the aspects of animal products post-harvest management.
4. Intensive extension education in livestock and fishery products handling, processing and packaging in the country.

5. The various governments in charge of water bodies should implement the code of conduct for responsible fisheries as indicated in the Food and Agricultural Organization (FOA). Publications on this subject for post-harvest practices and trade. This will minimize wastage and reduce post-harvest losses in fisheries. The fisher folk should be sensitized on the provisions of the code of conduct and possibly, the code should be translated into the various local languages to enable them understand its provisions.
6. The commercial fisheries of many tropical countries are gradually approaching the Maximum Sustainable Yield (MSY). Then emphasis therefore should be placed on increase production, rational exploitation and responsible utilization of the catch. The latter can be possible if fish handling, preservation and processing are improved upon throughout the fishery industry.
7. Although fish is a natural resource and everyone has the right to harvest it, that right must be carried with its responsibility on the part of government, fisher-folk, fish processors and fish traders to ensure that post-harvest losses are minimized and fish utilization maximized for national development

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INTERNATIONAL LINKAGES AND PRODUCTIVITY IN THE TURKISH AUTOMOTIVE PARTS INDUSTRY

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Abstract

Situated extensively in the global automotive sector, the Turkish automotive industry is one of the largest internationally involved industries in Turkey. This study employs a number of unique enterprise level datasets to investigate whether there are productivity effects through international technology transfer in the Turkish automotive parts industry. Being at sector level, previous studies cannot account for heterogeneities across sectors and within sectors. Focusing mainly on the motor vehicle assembly section of the industry, former case studies also have not thoroughly examined the automotive parts supply section of the industry. This study utilises the TurkStat's enterprise level datasets of Foreign Trade Statistics, Annual Industry and Service Statistics, and Annual Business Registers Frames. Among others, this study also estimates a flexible model of translog production function by the quantile regression method to obtain more robust and consistent results. This study first reveals that enterprises in the Turkish automotive parts industry with higher international linkages pay more and employ more during the period of 2003-2011. This study also reveals that enterprises in the Turkish automotive parts industry with international linkages are more productive which is robust to estimation of a flexible model of translog production function by the quantile regression method during the period of 2003-2011. In contrast to the literature, import as a channel of international technology transfer appears to be the lead in productivity effect, compared to international direct investment and export. This study argues that the Turkish government should specifically promote design and R&D activities, and international economic interactions of automotive parts suppliers more that increasingly constitute a larger section of the industry.

Keywords: International direct investment, Import, Export, Productivity, Automotive parts supplying enterprises, Turkey.

**COMPARING PRICES RECEIVED BY PARTICIPATING AND
NON-PARTICIPATING FARMERS IN THE NRMDP: KWA-ZULU NATAL
PROVINCE, SOUTH AFRICA**

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Abstract

We seek to evaluate how the National Red Meat Development Program has impacted on livestock farmers in the rural communities of South Africa. The NRMDP project aims to create feedlot capacity for communal farmers in the rural areas, through the Custom Feeding Program (CFP). The project enhances the productivity of livestock in communal areas and farmers' returns. The key beneficiaries are smallholder and communal farmers. Specifically, we compare whether the average weight of cattle that benefit through the Custom Feeding Programme (CFP) initiative differs from that of their counterparts. In addition, we compare the average price received by farmers whose cattle are fed at the CFP facility versus what non-participating farmers earn. We use secondary data compiled from auctions conducted between June and December, 2016. These data were obtained from three auction sites, that is, Umhulumayo, Nqutu and Phelindaba all of which are found in KwaZulu Natal (KZN) province. Cattle auctioned through at Umhulumayo are fed through the custom feeding programme (here after referred to as CFP facility) as described earlier while at Nqutu and Phelindaba animals are not custom fed (hereafter referred to as non-CFP facility). A two-sample t test was used to test the hypotheses. Findings indicate that cattle sold through the CFP facility weigh more than those sold through non-CFP facilities. Generally, CFP participating farmers receive higher incomes from cattle sales but when we took into consideration of the R800 fee paid per animal sold through the CFP facility, results were insignificant $t(499) = 0.83, p = 0.41$. This implies that higher mean price of about R125 received by farmers participating in CFP did not differ from the prices received by non-participants. Conclusively, the NMRDP plays a vital role in enabling farmers to gain access into the formal cattle market. As recommendation, the NMRDP team should devise means to reduce the R800 fee per animal sold through the CFP facility.

Keywords: Custom feeding programme, National red meat development program, Livestock communal areas, KwaZulu Natal.

AN ANALYSIS OF HETEROGENEITY IN INFLATION EXPECTATIONS ACROSS CITIES IN INDIA

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Abstract

Inflation expectations are an important marker for monetary policy makers in any economy. With inflation targeting being the explicit goal of many central banks around the world, including India, tracking and analysing inflation expectations is of primary importance. Inflation expectations anchoring is feasible through monetary policy provided the policy makers are aware of how inflation expectations among the general public are formed, to begin with.

In September 2005, the Reserve Bank of India initiated the Inflation Expectations Survey of Households (IESH) across 12 cities in the country. Each round of IESH provides evidence of inflation expectations variability for all categories, i.e., current inflation, 3-month ahead inflation and one-year ahead inflation. The IESH summary tables mention that the factors that cause this variability are city, gender, and age-group, out of which city seems to be the most dominant factor across all categories. One finds it curious that despite having a central monetary authority and being exposed to the same set of macroeconomic shocks at the economy wide level, various regions/cities of the same economy exhibit variations in inflation expectations. This leads us to the question that what might be the cause(s) of this dispersion in inflation expectations across cities in India?

This paper analyses heterogeneity in inflation expectations across 12 cities in India between 2008 and 2017. We decompose our analysis into three parts. In the first part, we present the extent of city-level dispersion in inflation expectations at each survey round. Further, we map city-level economic characteristics with expected inflation and find that cities with a high level of economic activity and high inflation rates, record higher expected inflation. In the second part of our work, we trace how this disagreement regarding inflation expectations vary over the business cycle. We find that this disagreement in inflation expectations among cities increases during the times of economic boom and recession, and with the rise in inflation. Lastly, we investigate the source(s) of heterogeneity in inflation expectations. We conclude that the presence of “information friction” is the main source of heterogeneity. Additionally, macro-level variables like the interest rate, exchange rate, economic policy uncertainty, and oil prices, have varying degrees of effect on each city, thereby accentuating the dispersion in city-level inflation expectations. These results point to the fact that the RBI should increase its monetary policy-related communication with the general public so that the information friction is lowered.

Keywords: Inflation expectations, Heterogeneity, Information friction, Central Bank communication, India.

REGIONAL DYNAMICS OF PHILLIPS CURVE IN TURKEY

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Abstract

This study aims to analyze the Phillips Curve Relationship in Turkey for the period 2005-2017 by using the data of 26 NUTS-2 regions by means of spatial panel econometrics. It is found that there is a high spatial interaction (spatial autocorrelation) among the regions. This means that the inflation rate of a region is significantly affected by the inflation rate of other regions. The empirical test results claim that the Phillips curve relationship is not valid for Turkey. On the contrary, it suggests that a rise in unemployment is a boosting effect on inflation. Another empirical finding is that the unemployment gap directly and indirectly influences inflation. Through the spatial econometric model, both the effect of the unemployment gap of a region on the inflation in that region (direct effect) and the effect of the neighboring regions on inflation (indirect effect or spillover effect) are separately obtained.

Keywords: Phillips Curve, Inflation, Unemployment, Spatial Panel Econometrics.

TÜRKİYE'DE PHILLIPS EĞRİSİNİN BÖLGESEL DİNAMİKLERİ

Özet

Bu çalışma, 26 İBBS-2 bölgesine ait verileri kullanarak 2005-2017 dönemi için Türkiye'de Phillips eğrisi ilişkisini mekânsal panel ekonometrisi yöntemiyle analiz etmeyi amaçlamaktadır. Ekonometrik analizler sonucunda bölgeler arasında yüksek bir mekânsal etkileşim (mekânsal otokorelasyon) olduğu bulgusuna ulaşılmıştır. Bu, bir bölgenin enflasyon oranının diğer bölgelerin enflasyon oranından önemli oranda etkilendiği anlamına gelmektedir. Ampirik test sonuçları, Phillips eğrisi ilişkisinin ilgili dönemde Türkiye'de geçerli olmadığını iddia etmektedir. Hatta aksine işsizlik açığındaki bir yükselişin enflasyon üzerinde artırıcı bir etkisinin olduğunu öne sürmektedir. Bir diğer ampirik bulgu ise işsizlik açığı değişkeninin enflasyonu doğrudan ve dolaylı olarak etkilediği yönündedir. Mekânsal ekonometrik model yardımıyla bir bölgeye ait işsizlik açığı değişkeninin hem o bölgenin enflasyonu üzerindeki etkisi (doğrudan etki) hem de komşu bölgelerin enflasyonu üzerindeki etkisi (dolaylı etki veya yayılma etkisi) ayrı ayrı elde edilmiştir.

Anahtar Kelimeler: Phillips Eğrisi, Enflasyon, İşsizlik, Mekânsal Panel Ekonometrisi.

1. Giriş

Enflasyon ve işsizlik makroekonominin en temel konuları arasında yer almaktadır. Bir ekonomi için bu iki değişkenin birlikte düşük düzeylerde olması arzu edilen bir durumdur. 1958 yılında A. W. Phillips tarafından enflasyon ve işsizlik arasında negatif istikrarlı bir ilişki olduğu iddia edilmiştir. Diğer bir ifadeyle, birinin düşük kalmasının ancak diğerinin daha yüksek olması ile mümkün olabileceği öne sürülmüştür. Phillips (1958)'in bu çalışması literatürde diğer çalışmalar için önemli bir temel teşkil etmiştir. Phelps (1967 ve 1968) ve Friedman (1968) beklentileri de (uyarlayıcı beklentiler) dikkate alarak, enflasyon ve işsizlik arasındaki bu istikrarlı ilişkiye yeni açıklamalar getirmişlerdir. Bu açıklamalarıyla iktisat literatürüne kısa ve uzun dönem Phillips eğrisi kavramlarını ve ayrıca denge (doğal) işsizlik kavramını kazandırmışlardır. Bu iktisatçılar enflasyon ve işsizlik arasında ancak kısa dönemde negatif bir ilişki olduğunu öne sürmüşlerdir. Lucas (1972) ise bu konuyu rasyonel beklentiler çerçevesinde ele almıştır. Ancak beklenmeyen (şok) bir makroekonomi politikası uygulanması durumunda bu iki değişken arasında kısa dönemde bir değiş-tokuşun (trade-off) olabileceğini iddia etmiştir. Yeni klasik iktisatçıların ardından yeni Keynesyen iktisatçılar da enflasyon-işsizlik değiş-tokuşuna dair yeni modeller geliştirmişlerdir. Yeni Keynesyenler, modellerinde Friedman'ın doğal

işsizlik oranı yerine NAIRU (non-accelerating inflation rate of unemployment – enflasyonu hızlandırmayan işsizlik oranı) kavramını kullanmayı tercih etmişler ve yukarıdakilere benzer sonuçlara ulaşmışlardır.

Türkiye’de 2001 krizinin ardından uygulamaya konan “Güçlü Ekonomiye Geçiş Programı” ile birlikte bir dezenflasyon süreci yaşanmaya başlamıştır. 2001 yılında %70 civarında olan enflasyon, programla beraber kademeli bir şekilde düşüşe geçmiş ve 2004 yılından itibaren tek haneye (% 9,3) inmiştir. Bu yıllara ait enflasyon oranları bölgesel düzeyde incelendiğinde önemli farklılıklar göze çarpmaktadır. Örneğin 2005 yılında en düşük enflasyon oranı %5,2 ile TRC2 bölgesinde (Şanlıurfa, Diyarbakır) gözlemlenirken, en yüksek oran % 10,3 ile TR51 bölgesinde (Ankara) gözlemlenmiştir. Bölgesel enflasyon oranları arasında neredeyse iki kat fark bulunmaktadır. İlerleyen yıllarda bölgeler arası enflasyon farkları kısmen azalsa da tamamen kapanmamıştır. Benzer şekilde bölgeler arasında işsizlik oranları açısından da ciddi farklılıklar bulunmaktadır. Örneğin 2005 yılında en yüksek işsizlik oranı % 18,8 ile TRB1 bölgesinde (Malatya, Elazığ, Bingöl, Tunceli) gözlemlenirken, en düşük işsizlik oranı ise % 3,3 ile TRA2 bölgesinde (Ağrı, Kars, Iğdır, Ardahan) gözlemlenmiştir. Bölgeler arasındaki işsizlik farkları ilerleyen yıllarda da devam ederek kalıcı bir durum sergilemiştir.

Bu bölgesel farklılıklar dikkate alındığında enflasyon ve işsizlik arasındaki ilişkinin dinamiklerinin daha doğru bir şekilde belirlenebilmesi için ulusal düzeydeki veriler yerine bölgesel düzeydeki verilerin kullanılması daha doğru olacaktır. Ayrıca komşu iki bölgenin enflasyon/işsizlik oranlarının birbirinden tamamen bağımsız olduğu varsayılmaz. Çünkü bölgelerin idari sınırları bölgelerin aynı kurumsal yapıyı paylaşmalarına engel değildir. Dolayısıyla bu konudaki ampirik bir analiz için sadece bölgesel verilerin kullanılması da yeterli değildir. Çünkü geleneksel ekonometrik yöntemler örtük bir şekilde her bölgeyi (yani analiz birimini) bağımsız bir birim olarak görmekte ve bu bölgelerin potansiyel etkileşimlerini büyük oranda ihmal etmektedirler. Anselin ve Griffith (1988)’e göre ampirik çalışmalarda mekânsal bağımlılığın (mekânsal otokorelasyonun) ihmal edilmesi sapmalı sonuçların elde edilmesine ve yanıltıcı hükümlere varılmasına neden olmaktadır. Dolayısıyla analiz sonuçlarının tutarlı olabilmesi için bölgesel verilerin yanı sıra mekânsal bağımlılığı da dikkate alan ekonometrik yöntemlerin kullanılması gerekmektedir.

Bu düşünceden hareketle bu çalışma, 26 İBBS-2 bölgesinin verilerini kullanarak 2005-2017 dönemi için Türkiye’de Phillips eğrisi ilişkisini mekânsal panel ekonometrisi yöntemiyle analiz etmeyi amaçlamaktadır. Kullanılan mekânsal ekonometrik yöntemler ve bölgesel veriler sayesinde bu çalışma literatüre üç katkı sunmaktadır. Bunlardan ilki, Türkiye’de enflasyon ve işsizlik arasındaki ilişkisinin dinamiklerinin bu yöntemlerle daha doğru bir şekilde ortaya konulabilecek olmasıdır. İkincisi, bölgeler arasında bir mekânsal bağımlılık ilişkisinin olup olmadığının belirlenebilecek olmasıdır. Diğer bir ifade, bir bölgenin enflasyon oranındaki artışın komşu bölgelerin enflasyon oranları üzerindeki etkisi belirlenebilecektir. Üçüncü katkı ise, yayılma etkilerinin tespit edilebilecek olmasıdır. Yani, bir bölgenin enflasyon oranını belirleyen unsurların aynı zamanda komşu bölgelerin enflasyon oranları üzerindeki etkileri hesaplanabilecektir.

Çalışmanın geri kalanı şu şekilde planlanmıştır. İkinci bölümde literatür özeti verilmiştir. Bir sonraki bölümde Phillips eğrisi modeli tanımlanmıştır. Dördüncü bölümde veri setine ilişkin açıklamalar yapılmıştır. Takip eden bölümde ampirik sonuçlar sunulmuştur. Son bölümde ise genel değerlendirmelere yer verilmiştir.

2. Literatür Özeti

Uluslararası literatürde Phillips eğrisi hipotezinin geçerliliğini test eden çok sayıda ampirik çalışma bulunmaktadır. Fakat bu çalışmaların neredeyse tamamı ulusal düzeydeki verilerle analizlerini gerçekleştirmişlerdir. Bölgesel bakış açısıyla analiz yapan tek çalışma ise Yeşilyurt ve Elhorst (2013)’a aittir. Adı geçen iktisatçılar Türkiye’nin İBBS-3 bölgesine (67 il) ait verileri kullanarak 1987-2001 dönemi için mekânsal panel ekonometrisi yöntemleri ile Phillips eğrisi ilişkisini test etmişlerdir. Enflasyon ile çıktı açığı arasında istatistiksel olarak anlamlı bir ilişki bulamamışlardır. Cari dönem enflasyon oranının temel belirleyicisinin geçmiş dönem enflasyonu olduğunu iddia etmişlerdir. Ayrıca bir bölgenin enflasyonunun komşu bölgelerin enflasyon oranlarından etkilendiğini ortaya koymuşlardır. Ancak yazarların bu çalışması Türkiye’nin yüksek enflasyon yaşadığı 1987-2001 dönemindeki dinamiklere ilişkin bilgiler verirken, 2001 krizi sonrasındaki düşük enflasyonlu dönemdeki dinamiklere ilişkin bir bilgi vermemektedir. Bizim çalışmamızın amacı ise, yapısal

dönüşümün yaşandığı 2001 sonrası bu dönemi bölgesel bir perspektiften ele alarak literatürdeki bu açığı kapatmaktadır.

Önder (2004), Phillips eğrisi ilişkisini kullanarak alternatif zaman serisi modelleriyle 1987-2001 dönemi için enflasyon tahminlemesi yapmıştır. Yazar, Türkiye için yapılacak olan bir enflasyon tahminlemesinde açıklayıcı değişken olarak enflasyon gecikmesi ve çıktı açığını kullanan bir modelin (Phillips eğrisi modelinin), para arzı ve faiz oranı gibi değişkenleri kullanan diğer makro modellerden daha doğru sonuçlar ürettiği sonucuna ulaşmıştır. Önder (2009) bir diğer çalışmada Türkiye için Phillips ilişkisini (1987-2004 dönemi) yapısal kırılma ve Markow-Rejim değişimi modelleriyle test etmiştir. Türkiye’de Phillips ilişkisinin istikrarlı ve lineer olmadığını ileri sürmüştür. Düşük enflasyonlu dönemlerde bu ilişkinin güçlü olduğunu, yüksek enflasyonlu dönemlerde ilişkinin zayıfladığını ve ekonomik krizlerin yaşandığı yüksek oynaklığın olduğu dönemlerde ise bu ilişkinin ortadan kalktığını iddia etmiştir.

Kuştepelı (2005) Türkiye’nin farklı dönemleri (1980-2001 dönemi ve 1988:2-2003:1 dönemi) için Phillips eğrisinin geçerliliğini test etmiştir. Önder (2004, 2009)’den farklı olarak Phillips eğrisi modelinde açıklayıcı değişken olarak çıktı açığı yerine işsizlik açığını kullanmıştır. Ayrıca bağımsız değişken olarak hem geçmiş ve hem de beklenen enflasyon oranlarına modelde yer vermiştir. Analize konu olan dönemler için Türkiye’de Phillips ilişkisinin geçerli olmadığı sonucuna ulaşmıştır.

Türkiye için Phillips eğrisi hipotezini açıklamaya çalışan çalışmaların bazıları da geleneksel modeli ek değişkenlerle genişletmişlerdir. Çiçek (2012) küresel çıktı açığını ve döviz kurunu açıklayıcı değişken olarak modele eklemiştir. Ulusal ve küresel çıktı açıklarının enflasyonu açıklamada istatistiksel olarak anlamlı olduğu sonucuna ulaşmıştır. Ayrıca, küresel ekonomik faaliyetlerdeki artışın Türkiye’de Phillips eğrisini daha yatık hale getirdiğini öne sürmüştür. Arabacı ve Eryiğit (2012) parasal şokun, ithalat şokunun ve kapasite kullanım oranlarının bağımsız değişken olarak yer aldığı bir Phillips eğrisi modelini eşik regresyon yöntemi ile test etmiştir. Düşük ve yüksek kapasite kullanım oranlarının enflasyon üzerinde farklı etkilerinin bulunduğu sonucuna ulaşmıştır. Ayrıca enflasyon ve reel ekonomik faaliyet arasında pozitif bir ilişki olduğu bulgusuna ulaşmıştır. Baştav (2015) da marjinal maliyet endeksi, işgücü gelir payı ve işgücü beklentileri açığı gibi değişkenleri modele dahil etmiştir. 2000-2013 dönemi için çıktı açığı ile enflasyon arasında anlamlı bir ilişki bulunmazken, enflasyon ile çıktı büyümesi arasında anlamlı bir ilişki olduğunu ileri sürmüştür.

3. Model

Mankiw (2010), toplam arz eğrisi denkleminde Phillips eğrisi denklemini aşağıdaki gibi elde etmektedir. Toplam arz eğrisi denklemi şu şekilde tanımlanmaktadır:

$$P_t = P_t^e + (1/\alpha)(Y_t^f - Y_t^p) \quad (1)$$

Burada t zamanı simgeleyen alt indekstir. P fiyat düzeyini, P^e beklenen fiyat düzeyini, Y^f fiili çıktı düzeyini ve Y^p potansiyel (doğal) çıktı düzeyini temsil etmektedir. α ise fiyat düzeyindeki beklenmeyen değişimlere çıktının vereceği tepkiyi göstermektedir.

Yukarıdaki denklem üç aşamada Phillips eğrisi ilişkisini temsil eden bir denkleme dönüştürülebilir. İlk olarak, fiyat düzeyinde değişime yol açan ve kısa dönem arz eğrisini kaydıran dışsal olayları (petrol şoku gibi) temsilen denklemin sol tarafına bir arz şoku (ε) değişkeni eklenir.

$$P_t = P_t^e + (1/\alpha)(Y_t^f - Y_t^p) + \varepsilon \quad (2)$$

İkinci olarak, fiyat düzeyinden enflasyon oranına geçiş yapabilmek için geçen yılın fiyat düzeyi (P_{t-1}) denklemin her iki tarafından da çıkartılır.

$$P_t - P_{t-1} = (P_t^e - P_{t-1}^e) + (1/\alpha)(Y_t^f - Y_t^p) + \varepsilon \quad (3)$$

Denklemin sol tarafı, cari ve geçen dönem fiyat düzeyleri arasındaki farkı, yani enflasyonu (π_t) temsil etmektedir. Denklemin diğer tarafındaki ($P_t^e - P_{t-1}^e$) ifadesi ise beklenen fiyat düzeyi ile geçen dönem fiyat düzeyi arasındaki farkı, yani beklenen enflasyonu (π_t^e) temsil etmektedir. Bu durumda 3 nolu denklemi aşağıdaki gibi ifade edebiliriz.

$$\pi_t = \pi_t^e + (1/\alpha)(Y_t^f - Y_t^p) + \varepsilon \quad (4)$$

Üçüncü olarak, modelin işsizlik ile bağlantısının kurulabilmesi için Okun kanunundan yararlanılabilir. Okun kanunu, çıktı açığı (fiili çıktı düzeyi ile potansiyel çıktı düzeyi arasındaki fark, $Y_t^f - Y_t^p$) ile işsizlik açığı (fiili işsizlik oranı u_t^f ile doğal işsizlik oranı u_t^d arasındaki fark, $u_t^f - u_t^p$) arasında şu şekilde bir ilişki kurar:

$$(1/\alpha)(Y_t^f - Y_t^p) = -\beta(u_t^f - u_t^p) \quad (5)$$

5 nolu denklemdeki eşitlikten yararlanarak 4 nolu denklemdeki çıktı açığını temsil eden ifade yerine işsizlik açığı konulabilir:

$$\pi_t = \pi_t^e - \beta(u_t^f - u_t^p) + \varepsilon_t \quad (6)$$

Eğer bekleyişlerin uyarlayıcı olduğu kabul edilirse burada beklenen enflasyon (π_t^e) yerine geçen yılın enflasyonu (π_{t-1}) kullanılabilir:

$$\pi_t = \pi_{t-1} - \beta(u_t^f - u_t^p) + \varepsilon_t \quad (7)$$

Yukarıdaki Phillips eğrisi denklemi cari dönem enflasyonunun geçmiş dönem enflasyonuna, işsizlik açığına ve arz şoklarına bağlı olduğunu ifade eder.

7 nolu denklem mekânsal ekonometrik modellere dönüştürülebilir. Mekânsal bağımlılığın yapısına bağlı olarak dönüşüm için iki model kullanılabilir. Bunlardan ilki, bağımlı değişkene ilişkin gözlemler arasında mekânsal bağımlılığı dikkate alan SAR (mekansal gecikme modeli) modelidir. Diğeri ise hata terimleri arasındaki mekânsal bağımlılığı dikkate alan SEM (Mekânsal hata modeli) modelidir.

Mekânsal etkileşim göz ardı edilerek SAR modeli yerine klasik EKK (En Küçük Kareler) modelinin kullanılması halinde elde edilen tahminler sapmalı ve tutarsız olacaktır. Elhorst (2014) SAR modelini şu şekilde tanımlamaktadır:

$$\pi_{it} = \alpha + \rho \sum_{j=1}^N W_{ij} \pi_{jt} + X_{it} \beta + \varepsilon_{it} \quad i = 1, \dots, N \quad t = 2005, \dots, 2007 \quad (8)$$

burada i bölgeyi temsil eden alt indekstir. $\sum_{j=i}^N W_{ij} \pi_{jt}$ ifadesi bağımlı değişkenin (π_{it}) komşu bölgelerin bağımlı değişkeni (π_{jt}) ile etkileşimini ölçmektedir. W satır normalizasyonu uygulanmış komşuluk (mekânsal ağırlık) matrisini temsil etmektedir. ρ mekansal otokorelasyon katsayısıdır. α sabit terim parametresidir. X_{it} , $1 \times K$ boyutundaki açıklayıcı değişkenler vektörüdür. β , $K \times 1$ boyutundaki katsayı vektörüdür. ε_{it} birbirinden bağımsız ve aynı dağılıma sahip, sıfır ortalamalı ve sabit varyanslı hata terimidir.

SEM modeli yerine EKK modelinin kullanılması halinde ise, elde edilen varyans tahminleri sapmalı ve regresyon katsayı tahminleri de etkisiz olacaktır. Elhorst (2014) bu tür bir bağımlılığı dikkate alan panel regresyon modelini de aşağıdaki şekilde formüle etmiştir:

$$\pi_{it} = \alpha + X_{it} \beta + u_{it}, \quad u_{it} = \delta \sum_{j=1}^N W_{ij} u_{jt} + \varepsilon_{it} \quad (9)$$

burada u_{it} mekansal otokorelasyon hata terimini ve δ mekansal otokorelasyon katsayısını temsil ederken diğer tüm parametreler bir önceki modelde tanımlandığı gibidir.

4. Veri

2005-2017 dönemine ait yıllık bölgesel (İBBS-2 bölgeleri) işsizlik değerleri TÜİK'ten elde edilmiştir. Bölgesel TÜFE endeksi (2003=100) değerleri TCMB'nin elektronik veri dağıtım sitesinden alınmıştır. Enflasyon oranı, t dönemindeki fiyat endeksinin logaritması ile bir önceki dönemin fiyat endeksinin logaritması arasındaki fark şeklinde tanımlanmıştır. Yani, $\pi_t = [\ln(P_t) - \ln(P_{t-1})]$ şeklinde hesaplanmıştır. 2008 yılında başlayan küresel finans krizinin etkilerini Türkiye 2009 yılında hissetmiştir. Bu nedenle modele bir kukla değişken eklenmiştir. Kriz kukla değişkeni, 2009 yılı için "1" diğer yıllar için "0" değeri alan bir değişken olarak tanımlanmıştır.

Doğal işsizlik oranı doğrudan gözlemlenebilir bir değişken değildir. Bunu elde etmek için Hodrick ve Prescott (1997) tarafından geliştirilen filtreleme yöntemi (HP filtresi) kullanılmıştır. HP filtresi işsizlik u_t serisine ait trend (u_t^*) ve devresel bileşenleri aşağıdaki formüle dayalı olarak ayırmaktadır:

$$\min_{u_t^*} \frac{1}{T} \sum_{t=1}^T (u_t - u_t^*)^2 + \frac{\lambda}{T} \sum_{t=2}^{T-1} ((u_{t+1}^* - u_t^*) - (u_t^* - u_{t-1}^*))^2 \quad (10)$$

Denklemden yer alan λ , trenddeki oynaklığı cezalandıran düzleştirme parametresini göstermektedir. Hodrick ve Prescott (1997) yıllık veriler için bu parametre değerini 100 olarak önermektedir. Çalışmamızda da bu değer kullanılmıştır.

Verilerle ilgili bir diğer önemli konu serilerin durağanlığı sorunudur. Serilerin durağan olmaması halinde elde edilen katsayılar sapmalı ve yanıltıcı olacaktır. Durağanlığın belirlenebilmesi için ise birim kök testine ihtiyaç duyulmaktadır. Panel birim kök testi uygulamadan önce birimler arasında korelasyon olup olmadığının belirlenmesi gerekmektedir. Diğer bir ifadeyle, veri setinin yatay kesit birimini oluşturan bölgelerin birinde meydana gelen bir şokun, diğerlerini de etkileyip etkilemediğinin (yatay kesit bağımlılığı) belirlenmesi gerekmektedir. Bunun için Pesaran (2004) CD testi kullanılmıştır. Pesaran (2004)'ün ikili korelasyon katsayılarının ortalamasına ($\hat{\phi}_{ij}$) dayalı test istatistiği aşağıdaki gibi hesaplanmıştır:

$$CD = \sqrt{\frac{2T}{N(N-1)}} \left(\sum_{i=1}^{N-1} \sum_{j=i+1}^N \hat{\phi}_{ij} \right) \quad (11)$$

Değişkenlere ait CD test değerleri tablo 1'de verilmiştir. Her iki değer de % 1 anlamlılık düzeyinde “yatay kesit birimleri arasında korelasyon yoktur” hipotezini reddetmektedir.

Tablo 1. Pesaran (2004) CD Testi

Değişkenler	CD Test Değeri	P-değeri	
π	50,08	(0,000)	***
π_{t-1}	41,17	(0,000)	***
$u^f - u^p$	23,12	(0,000)	***
Kriz	65	(0,000)	***

*** işaretleri, istatistiksel olarak %1'de anlamlılığı temsil etmektedir.

Bu durumda yatay kesit bağımlılığını dikkate alan bir birim kök testi uygulanmalıdır. Bu amaçla, durağanlığın araştırılmasında Pesaran (2007)'ün *CADF* testi (yatay kesit genişletilmiş Dickey Fuller testi) kullanılmıştır. Bir *Z* panel serisi için basit *CADF* testi, aşağıdaki regresyona dayalı olarak gerçekleştirilebilmektedir:

$$\Delta z_{it} = a_i + b_i z_{i,t-1} + c_i \bar{z}_{t-1} + d_i \Delta \bar{z}_t + \varepsilon_{it}, \quad \bar{z}_t = N^{-1} \sum_{i=1}^N z_{it} \quad (12)$$

Testin boş hipotezi, her bir yatay kesite ait seride birim kök olduğu ($H_0: b_i = 0$) şeklindedir. Paneli oluşturan her bir birime (bölgeye) ait *CADF* değeri hesaplandıktan sonra, bunların ortalamasını ifade eden *CIPS* (yatay kesit *IPS* testi) değeri hesaplanabilir. Böylelikle panel veri setinin tamamında durağanlığın test edilmesi mümkün hale gelmektedir. *CIPS* istatistiği şu şekilde hesaplanmaktadır:

$$CIPS = \frac{1}{N} \sum_{i=1}^N CADF_i \quad (13)$$

CIPS test sonuçları tablo 2'de verilmiştir. Tüm değişkenler istatistiksel olarak % 1'de anlamlıdır. Bu sonuca göre değişkenlerin hiçbiri birim kök içermemektedir. Yani, serilerin tamamı durağandır.

Tablo 2. Pesaran (2007) CIPS Panel Birim Kök Testi

	Sabitsiz ve Trendsiz Model		Sabitli Model	
π	-3,087	***	-3,178	***
π_{t-1}	-2,545	***	-2,687	***
$u^f - u^p$	-2,614	***	-2,507	***
Kriz	4,16	***	2,61	***

Not: Seriler HP filtresi kullanılarak trendden arındırıldığı için trendli model kullanılmamıştır. Kritik istatistik değerleri Pesaran (2007)'in çalışmasından alınmıştır. Sabitsiz ve trendsiz modele ait kritik değerler % 1 için -1,87, %5 için -1,65 ve % 10 için -1,53 dir. Sabitli modele ait kritik değerler % 1 için -2,45, %5 için -2,25 ve % 10 için -2,14 dir.

*** işaretleri, istatistiksel olarak %1'de anlamlılığı temsil etmektedir.

5. Ampirik Sonuçlar

Türkiye’de Phillips eğrisi ilişkisini ampirik olarak test etmek amacıyla öncelikle 7 nolu denklem havuzlanmış EKK yöntemi ile tahminlenmiştir. Sonuçlar tablo 3’ün ilk sütununda verilmiştir. Beklenen enflasyon dışında diğer tüm değişkenler anlamlı bulunmuştur. Ancak bu modelin sonuçlarının güvenilebilir olması için bölgeler arasında bir mekânsal bağımlılığın bulunmaması gerekmektedir. Bunu tespit edebilmek için Anselin vd. (2008) tarafından önerilen Lagrange Multiplier (LM) testleri kullanılmıştır. Hem LM_{lag} hem de LM_{error} test istatistiklerinin ikisinin birden anlamlı olması, mekânsal bağımlılığın varlığına işaret ederken bu bağımlılığın formunun belirlenmesi konusunda yetersiz kalmaktadır. Bu durumda söz konusu istatistiklerin Elhorst (2010) tarafından önerilen dirençli versiyonlarının kullanılması gerekmektedir. Dirençli LM_{lag} istatistiğinin % 1’de anlamlı olması uygun modelin mekânsal gecikme modeli olduğuna işaret etmektedir. Dolayısıyla Phillips eğrisi için tahminlenmesi gereken uygun model 8 nolu denklemde yer alan SAR modelidir.

Tablo 3. Phillips Eğrisi Tahmin Sonuçları

Açıklayıcı Değişkenler	Havuzlanmış EKK	SAR _{SE}	SAR _{RE}
π_{t-1}	0,0681 (0,310)	0,0326 (0,293)	0,0566 (0,084) *
$u^f - u^p$	0,0014 (0,002) ***	0,0004 (0,059) *	0,0004 (0,050) *
Kriz	-0,0275 (0,000) **	-0,0057 (0,001) ***	-0,0066 (0,000) ***
Sabit terim	0,0789 (0,000) ***		
ρ		0,84 (0,000) ***	0,83 (0,000) ***
R^2	0,18	0,20	0,18
LM_{lag}	423,1 (0,000) ***		
Dirençli LM_{lag}	13,8 (0,000) ***		
LM_{error}	409,9 (0,000) ***		
Dirençli LM_{error}	0,64 (0,425)		
Hausman		137,6 (0,000) ***	

***, ** ve * işaretleri sırasıyla istatistiksel olarak %1, %5 ve 10’da anlamlılığı temsil etmektedir. Parantez içindeki değerlerler p olasılık değerleridir.

Tablo 3’de hem sabit etkiler mekânsal gecikme panel modelinin (SAR_{SE}) hem de rassal etkiler mekânsal gecikme panel modelinin (SAR_{RE}) tahmin sonuçları verilmiştir. Rassal etkiler modelinde tüm değişkenler istatistiksel olarak anlamlı iken sabit etkiler modelinde beklenen enflasyon değeri anlamsız çıkmıştır. % 1’de anlamlı olan Hausman test istatistiği, rassal etkiler yerine sabit etkiler modelinin geçerli olduğuna işaret etmektedir. SAR_{SE} modelinin sonuçları geçmiş dönem enflasyonunun cari dönem enflasyonu üzerinde etkili olmadığını göstermektedir. Yeşilyurt ve Elhorst (2013) ile Önder (2009)’in çalışmaları ise bunun aksini iddia etmektedirler. Çünkü her iki çalışmanın de analiz dönemi (1987-2001 ve 1987-2004 dönemleri) Türkiye’de geriye dönük endekslemenin yüksek olduğu yılları kapsamaktadır. Ancak bu çalışmanın analiz dönemi ise, hükümet tarafından ileriye dönük endeksleme politikasının (yani, fiyat artışlarının geçmiş enflasyona değil ilan edilen hedef enflasyon göre yapıldığı) uygulandığı bir döneme denk gelmektedir. Burada elde edilen ampirik sonuç, söz konusu politikanın, geriye dönük endeksleme davranışını ortadan kaldırmakta başarılı olduğunu iddia etmektedir.

Modeldeki işsizlik açığı değişkeninin istatistiksel olarak anlamlı ve pozitif olması, bu değişkenin cari dönem enflasyonu üzerinde artırıcı bir etkisinin olduğunu göstermektedir. Diğer bir ifadeyle, işsizlik açığı değişkeni beklenen aksine enflasyon ile aynı yönlü hareket etmektedir. Enflasyon ile işsizlik oranı arasındaki bu pozitif ilişki analiz döneminin genel karakterinin de bir yansıması olarak karşımıza çıkmaktadır. Örneğin analiz döneminin başında ülke genelinde enflasyon ve işsizlik oranları sırasıyla % 7,7 ve % 9,5 iken, dönem sonuna kadar bu oranlar birlikte artış göstererek % 11,9 ve

%10,8’e yükselmişlerdir. Modelde elde edilen bir diğer ampirik bulgu ise, krizin enflasyon üzerinde azaltıcı bir etkisinin olduğu şeklindedir. Krizin yaratmış olduğu gelir kaybının ve bunun talep üzerindeki daraltıcı etkisi bu sonucu doğurdu düşünülmektedir.

Tablo 3’de yer alan mekânsal gecikmeli değişkenin katsayısı (mekânsal gecikmeli enflasyon oranı, $W*\pi$) istatistiksel olarak anlamlı bulunmuştur. 0,84 olarak bulunan bu katsayı, (mekânsal otokorelasyon katsayısı) mekânsal etkileşim derecesinin yüksek olduğunu ima etmektedir. Diğer bir ifadeyle, bir bölgedeki enflasyonun komşu bölgelerdeki enflasyon oranlarından etkilendiğini göstermektedir. Ayrıca katsayının pozitif olması, yüksek (ya da düşük) enflasyona sahip bölgelerin bir araya gelme (kümelenme) eğiliminde olduğuna işaret etmektedir.

Tablo 4. Doğrudan ve Dolaylı Etkiler

	Doğrudan Etki		Dolaylı Etki		Toplam Etki	
π_{t-1}	0,048	(0,296)	0,167	(0,317)	0,215	(0,311)
$u^f - u^p$	0,001	(0,034) **	0,002	(0,042) **	0,003	(0,038) **
Kriz	-0,008	(0,000) ***	-0,028	(0,001) ***	-0,036	(0,001) ***

*** ve ** işaretleri sırasıyla istatistiksel olarak %1 ve %5’de anlamlılığı temsil etmektedir.

Parantez içindeki değerlerler p olasılık değerleridir.

Mekânsal modellerden elde edilen sonuçların doğrudan yorumlanması konusunda LeSage ve Pace (2009)’in bazı çekinceleri bulunmaktadır. Bu nedenle, bu katsayılar yerine kısmi türev yaklaşımı ile elde ettikleri katsayıların kullanılmasını önermektedirler. Ayrıca bu yaklaşımla bir açıklayıcı değişkene ait doğrudan, dolaylı ve toplam etki olmak üzere üç farklı etkiyi hesaplayabilmektedirler. Doğrudan etki, bir bölgedeki bir açıklayıcı değişkenin (örneğin işsizlik açığı değişkeninin) o bölgenin enflasyon oranı üzerindeki etkisini ifade etmektedir. Dolaylı etki (yayıma etkisi), bir bölgedeki bir açıklayıcı değişkenin diğer bölgelerin enflasyon oranı üzerindeki etkisini ifade etmektedir. Toplam etki ise bu ikisinin toplamını temsil etmektedir. Tablo 4’te doğrudan, dolaylı ve toplam etkiler verilmiştir. İşsizlik açığı ve kriz değişkenleri, cari enflasyonu hem doğrudan hem de dolaylı olarak (bölgesel yayılma etkileri vasıtasıyla) etkileyebilmektedir. Tablodaki sonuçlara göre bir bölgeye ait işsizlik açığındaki 1 puanlık bir artış bölgenin enflasyonunda % 0,1’lik bir artışa yol açarken, komşu bölgelerin enflasyonunda da % 0,2’lik bir artışa yol açmaktadır. Kısacası, işsizlik açığının enflasyon üzerindeki artırıcı etkisi toplamda % 0,3 dür. Bu sonuç, doğal işsizlik üzerindeki her 1 puan işsizliğin enflasyon üzerinde artırıcı bir etkisini bulunduğunu fakat bunun oldukça düşük olduğunu ima etmektedir. Krizin ise enflasyon üzerindeki azaltıcı etkisi işsizliğe göre çok daha yüksek bulunmuştur. Ayrıca krizin dolaylı etkisinin doğrudan etkisinden daha yüksek olduğu bulgusu elde edilmiştir.

6. Sonuç

Phillips eğrisinin bir önermesi olan enflasyon ve işsizlik arasındaki negatif istikrarlı ilişki ortaya atıldığı günden bu yana tartışmalı bir konudur. Literatürde bu görüşü destekleyenler olduğu gibi ciddi eleştiri yapanlar da bulunmaktadır. Enflasyon ve işsizlik arasında bir değiş-tokuş ilişkisinin tespit edilmesi en çok politika yapımcılar açısından önem arz etmektedir. Çünkü bu ilişkinin istikrarından yararlanarak makro ekonomik politikalar üretmek istemektedirler. Bu amaçla ampirik literatürde bir çok çalışma yapılmıştır. Bunların bir kısmı bu ilişkinin geçerli olduğunu iddia ederken bir kısmı da aksini iddia etmektedir. Bu nedenle Phillips eğrisi ilişkisi, üzerinde görüş birliği sağlanmış ve çözüme kavuşturulmuş bir konu değildir. Türkiye ekonomisi için de aynı durum söz konusudur. Kimi çalışmalar Türkiye ekonomisinde bu ilişkinin geçerli olduğunu iddia ederken kimileri de böyle bir ilişkinin olmadığını iddia etmektedirler. Özellikle 2001 sonrasında Türkiye ekonomisinin bir yapısal dönüşüm ve bir dezenflasyon sürecine girmesi bu dönemin yeniden analizini gerektirmiştir. Ayrıca bu değişkenlerin bölgeler arasında ciddi farklılıklar göstermesi, bu ilişkinin dinamiklerinin daha doğru bir şekilde ortaya konulabilmesi için ulusal düzeyde değil bölgesel düzeyde analiz edilmesi yönünde bir motivasyon yaratmıştır.

Bu düşünceden hareketle bu çalışmada bölgesel bir bakış açısıyla Türkiye’de Phillips eğrisi ilişkisi analiz edilmiştir. Bölgeler arası etkileşimi de dikkate alarak enflasyon ve işsizlik arasında negatif istikrarlı bir ilişkinin olup olmadığı araştırılmıştır. Yapılan testler böyle bir ampirik araştırma için

mekânsal ekonometrik yöntemlerin daha uygun olduğunu bize göstermiştir. Bu yöntemlerle elde edilen ilk ampirik bulgu, bölgeler arasında yüksek mekânsal bağımlılık ilişkisi olduğunu yönündedir. Diğer bir ifadeyle, bir bölgenin enflasyon oranının diğer bölgelerin enflasyon oranlarından etkilendiği (mekânsal otokorelasyon) şeklindedir. Çalışmadan elde edilen bir diğer önemli bulgu ise, ilgili dönemde enflasyon ile işsizlik arasında bir değiş-tokuşun olmadığı yönündedir. Aksine ikisi birlikte artış göstermektedir. Yani, işsizlik açığındaki bir artışın enflasyonu artırıcı bir etkisinin olduğu görülmüştür. Ancak bu etkinin oldukça düşük olduğu tespit edilmiştir. Bir bölgedeki işsizlik artışının ilgili bölgenin enflasyonu üzerindeki etkisinin yanı sıra komşu bölgelerin enflasyonu üzerinde de etkili olduğu sonucuna ulaşılmıştır. Ama bu etki de oldukça düşük bulunmuştur. Daha önceki ampirik çalışmalarda tespit edilen “geriye yönelik endeksleme davranışının” bu dönemde geçerli olmadığı bulgusuna da bu çalışmada ulaşılmıştır.

Çalışmanın sonuçları, Phillips eğrisinin önerdiği enflasyon-işsizlik değiş-tokuşunun Türkiye için hazırlanacak bir politika tasarımı için uygun bir araç olmadığını ortaya koymuştur. Ancak bir bölgenin enflasyonunun diğer bölgelerin enflasyonu tarafından önemli oranda etkilendiğinin bilinmesi, bölgesel makro politika tasarımlarına yönelmeleri konusunda politika yapıcılara bir motivasyon sağlayabilir.

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ANALYSIS OF TAX REVENUES BY NUMBER OF REGISTERED TAXPAYERS

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Abstract

Tax is an important tool for the formation of resources used in services that the state has made. In this study, the relationship between the number of taxpayers and the tax revenues in the period of 2003-2017 was examined. The data of the work was entered into the Eviews 8.0 program and the database of the work was created and tried to be modeled by the linear trend model. In the estimation made with Linear Trend Model, the number of registered taxpayers in the years is the independent variable, and total tax revenues are also dependent variables. According to the findings of the study, there is a positive relationship between total tax revenues and taxpayer numbers. The increase in the number of taxpayers and the increase in tax revenues, together with the decrease in the size of the informal economy, are expected to lead to an increase in the tax base. As a result, in the study, it was determined how much the tax revenues increased with the increase of the number of taxpayers. In addition, Granger causality tests have been carried out in the study and it has been found that causality relation between variables.

Keywords: Tax, Informal economy, Taxpayer.

VERGİ GELİRLERİNİN KAYITLI MÜKELLEF SAYISI İLE ANALİZİ

Özet

Vergi, devletin yapmış olduğu hizmetlerde kullanılan kaynağın oluşabilmesi için önemli bir araçtır. Bu çalışmada 2003-2017 döneminde vergi mükellefi sayıları ile vergi gelirleri arasındaki ilişki incelenmiştir. Çalışmanın verileri Eviews 8.0 programına girilerek çalışmanın veri tabanı oluşturulmuştur ve doğrusal trend modeli ile modellenmeye çalışılmıştır. Doğrusal Trend Modeli ile yapılan tahminde söz konusu yıllardaki kayıtlı mükellef sayısı bağımsız değişken, toplam vergi gelirleri de bağımlı değişken olarak bulunmaktadır. Çalışmanın bulgularına göre, toplam vergi gelirleri ile mükellef sayıları arasında pozitif bir ilişki görülmektedir. Mükellef sayısının artması ile vergi gelirlerinin artması ve bununla birlikte kayıt dışı ekonominin boyutunun azalacağı, vergi tabanının genişlemeye yol açacağı düşünülmektedir. Sonuç olarak çalışmada, mükellef sayılarının artması ile birlikte vergi gelirlerinin ne kadar arttığı tespit edilmiştir. Ayrıca çalışmada Granger nedensellik testleri yapılmış ve değişkenler arasında nedensellik ilişkisi olduğu görülmüştür.

Anahtar Kelimeler: Vergi, Kayıtdışı Ekonomi, Mükellef

1. Giriş

Vergi devletin egemenlik gücünü kullanarak özellikle kamu giderlerini karşılamak için tek taraflı, zorunlu ve karşılıksız bir ödeme aracıdır.

Vergi, halkın yararına çeşitli kamu harcamalarını finanse etmek için hükümetin mükellefine zorunlu bir mali yük veya başka bir ödeme getirmesi demektir. Bu kanun ve kamu düzeni, ekonomik altyapı, refah ve kamu hizmetlerinin yürütülmesi masraflarını da içerir. Devlet borçları da toplanan vergilerden sağlanan fonlardan ödenmektedir (Oseni, 2016: 49). Vergiler, hükümetin veya onun temsilcilerinin farklı kademeleri tarafından alınabilir ve "zorunlu" olması kaçakçılığın yasalar tarafından cezalandırılabilmesini ifade eder. Vergiler doğrudan ve dolaylı olabilir ve nakit ya da emek eşdeğeri ile ödenebilir. Kurumlarla birlikte bireylerin ve işletmelerin de gelirleri vergiye tabidir. Vergi genellikle iş dünyasından net kârlar, net kazançlar ve diğer gelirler üzerinden verilir. Vergi karşılığındaki gelir hesaplamaları, muhasebe ilkeleri ve sözleşmeleri uyarınca belirlenebilir (Allahverdi, 2017:84).

2. Veri ve Yöntem

Çalışmada Gelir İdaresi Başkanlığı istatistiklerinden yararlanılmış olup, 2003-2017 yılları arasında gelir vergisi mükellef sayısı ve kurumlar vergisi mükellef sayısı ile vergi gelirleri arasındaki ilişki incelenmiştir.

3. Serilerin Durağanlıklarının Test Edilmesi

Zaman serilerinin incelenmesi gereken en önemli yönlerinden biri; bu serilerin durağanlıklarının tespitidir. Değişkenler arasında ekonometrik olarak anlamlı ilişkiler elde edilebilmesi için; analizi yapılan serilerin durağan seriler olması gerekmektedir (Öztürk, 2016:292). Birim kök sınavında sıklıkla kullanılan yöntemler ADF (Augmented Dickey-Fuller), PP (Phillips Perron) ve KPSS (Kwiatkowski Phillips-Schmidt-Shin) testleridir (Güvenek vd., 2010: 8). Serilerin durağı Augmented Dickey Fuller Birim Kök Testi birim kök testi ile sınanmıştır.

Gelir Vergisi Mükellef Sayısı serisi 1.dereceden farkı alınarak durağan hale getirilirken vergi gelirleri serileri ve gelir vergisi mükellef sayısı serilerinin ise 2.dereceden farkları alınarak durağan hale getirilmiştir. Değişkenler arasında sahte ilişkilere neden olunmaması adına yapılan bu işlemi gösterir tablolar aşağıda sunulmuştur (Öztürk, 2016:292).

Tablo 1. Vergi Gelirleri Serisinin ADF Birim Kök Testi Sonuçları

ADF Test İstatistiği	Normal Form	13.22590	% 1	-2.740613	Prob. 0.9999
			% 5	-1.968430	
			% 10	-1.604392	
	Birinci Farklar Cinsinden	1.783705	% 1	-2.771926	Prob. 0.9740
			% 5	-1.974028	
			% 10	-1.602922	
	İkinci Farklar Cinsinden	-3.687182	% 1	-2.771926	Prob. 0.0015
			% 5	-1.974028	
			% 10	-1.602922	

Tablo 2. Gelir Vergisi Mükellef Sayısı Serisinin ADF Birim Kök Testi Sonuçları

ADF Test İstatistiği	Normal Form	1.027602	% 1	-2.740613	Prob. 0.9104
			% 5	-1.968430	
			% 10	-1.604392	
	Birinci Farklar Cinsinden	-3.865820	% 1	-2.754993	Prob. 0.0010
			% 5	-1.970978	
			% 10	-1.603693	

Tablo 3. Kurumlar Vergisi Mükellef Sayısı Serisinin ADF Birim Kök Testi Sonuçları

ADF Test İstatistiği	Normal Form	0.011898	% 1	-2.792154	Prob. 0.6651
			% 5	-1.977738	
			% 10	-1.602074	
	Birinci Farklar Cinsinden	1.128850	% 1	-2.792154	Prob. 0.9207
			% 5	-1.977738	
			% 10	-1.602074	
	İkinci Farklar Cinsinden	-7.383778	% 1	-2.771926	Prob. 0.0000
			% 5	-1.974028	
			% 10	-1.602922	

4. Analiz

Tablo değerlendirildiğinde vergi geliri ile kurumlar vergisi mükellef sayısı arasında pozitif ve istatistiki açıdan anlamlı bir ilişki olduğu görülürken, vergi geliri ile gelir vergisi mükellef sayısı arasında pozitif fakat istatistiki açıdan anlamlı bir ilişki olmadığı görülmektedir. VIF (Variance Inflation Factors) değerli göz önüne alındığında modelin çoklu doğrusal bağlantı sorunu olmadığı görülmektedir. Normallik varsayımı araştırıldığında da Jarque-Bera (0.401739) testi sonuçlarına göre model normal dağılmıştır(Kuzucu, 2016:286).

Tablo 4. Vergi Gelirlerinin Mükellef Sayısı İle Regresyonu

Bağımlı Değişken Vergi Gelirleri			
Değişkenler	Katsayılar	t-ist	Olasılık
C	- 1.22E+10	- 6.089668	0.0001
Kur.Ver.Mük.Say	14.1915,4 4	6.443263	0.0000
Gel.Ver.Mük.Say.	2.181,19	1.267566	0.2290

$$GEL = C(1) + C(2)*Kurumlar Vergisi Mükellef Sayısı + C(3)*Gelir Vergisi Mükellef Sayısı$$

$$GEL = -12191941212.5 + 14915.4373837*KVMS + 2181.19166749*GVMS$$

Tablo 5. Granger Nedensellik Tablosu

H0 Hipotezi	Veri	All	P Değeri
Kur.Ver.Mük.Say, Vergi Gelirlerinin nedeni değildir.	15	0.1 325	0.9864
Gel.Ver.Mük.Say, Vergi Gelirlerinin nedeni değildir.			0.9827
Vergi Gelirleri, Kurumlar Ver. Mük. Say. nedeni değildir.	15	5.3 646	0.4743
Gel.Ver.Mük.Say, Kurumlar Ver. Mük. Say. nedeni değildir.			0.1085
Vergi Gelirleri, Gelirler Ver. Mük. Sayısının nedenidir.	15	7.3 229	0.0380
Kur.Ver.Mük.Say, Gelirler Ver. Mük. Say. nedeni değildir.			0.4138

5. Sonuç

Kayıt dışı ekonominin mali ve sosyal yapı üzerindeki olumsuz etkisi düşünüldüğünde kayıt dışı ekonominin artışıyla kamu gelirlerinin azalacağını, vergi ahlakı ve eşitlik ilkelerinde zedelenme olacağını belirtebiliriz (Aybar, 2017:115).

Granger Analizine Göre;

- Vergi gelirleri, gelirler vergisi mükellef sayısının nedenidir.

Regresyon Analizine Göre;

- Kurumlar vergisi mükellef sayısı vergi gelirini pozitif açıdan etkilemektedir.

Çalışmada da belirtildiği gibi kayıtlı mükellef sayısının artışı ile vergi gelirleri artmaktadır. Bunun sonucunda;

- Bütçe açıklarının borçlanma ya da para basma yoluyla karşılanmaması,
- Enflasyonun yükselme eğilimine girmemesi,
- Özel sektörün yatırım maliyetlerini azalarak yatırımların artması,
- Kaynak dağılımında verimliliğin sağlanarak ekonominin sağlıklı ve dengeli büyümesini sağlayacağını belirtebiliriz (Sarılı, 2002: 43).

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INVESTIGATION OF FACTORS THAT AFFECT RENEWABLE ELECTRIC ENERGY OUPUT IN TURKEY

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Abstract

Over the next 20 years, it is foreseen that the world electricity demand will increase %70. But such an increase in electricity production is not foreseen. In order to meet this increase in demand, renewable energy sources such as hydroplants, sun, wind and waste are gaining more importance compared to non-renewable fossil fuels.

The aim of this study is to investigate the factors affecting the production of renewable electric energy in Turkey. For this purpose, renewable electric energy output, total electric energy consumption, renewable electric energy consumption share in total energy consumption and GDP per capita data are obtained from World Bank databases for the period 1998-2014. As a result of analysis using OLS estimate model, it is found that total electric energy consumption, renewable electric energy consumption share in total energy consumption and GDP per capita contribute significantly and positively affect the production of renewable electric energy in Turkey. We found positive bilateral causality between renewable electric energy production and per capita GDP growth. Moreover, the variables of total electricity energy consumption and the share of renewable energy consumption in total electric energy consumption positively affect both renewable electricity production and per capita Gross Domestic Product growth rate positively.

In order to ensure sustainable economic growth, it is necessary to increase both the production of renewable energy and the share of renewable energy consumption within total electrical energy consumption. To ensure this, the government and especially the Ministry of Energy should increasingly continue to support the projects developed in this respect. Increasing the Renewable Energy Resources (YEK) fee to be paid to license holder for each licensed production plant which Renewable Energy Resources Support Mechanism (YEKDEM) participant will increase Turkey's renewable electricity production.

Keywords: Renewable Energy Resources, Renewable Electricity Energy, Renewable Energy Resources Support Mechanism, VAR Analysis, Granger Causality.

TÜRKİYE'DE YENİLENEBİLİR ELEKTRİK ENERJİSİ ÜRETİMİNE ETKİ EDEN FAKTÖRLERİN İNCELENMESİ

Özet

Önümüzdeki 20 yıl içerisinde dünya elektrik talebinde %70'lik bir artış öngörülmektedir. Fakat enerji üretiminde bu büyüklükte bir artış öngörülmemektedir. Talepteki bu artışı karşılayabilmek için, yenilenemeyen fosil yakıtlardan ziyade hidro, güneş, rüzgâr ve atıklar gibi yenilenebilir enerji kaynakları daha fazla önem kazanmaktadır.

Bu çalışmanın amacı Türkiye'de yenilenebilir elektrik enerjisi üretimine etki eden faktörleri araştırmaktır. Bu amaçla 1998-2014 yılları arası Türkiye'nin yenilenebilir elektrik enerjisi üretimi, toplam elektrik enerjisi tüketimi, toplam elektrik enerjisi tüketimi içerisinde yenilenebilir enerji tüketiminin payı ve kişi başına Gayri Safi Yurt İçi Hâsıla yıllık büyüme oranı verileri Dünya Bankası verilerinden elde edilmiştir. OLS tahmin modeli kullanılarak yapılan analiz sonucunda Türkiye'de toplam elektrik enerjisi tüketiminin, toplam elektrik enerjisi tüketimi içerisinde yenilenebilir enerji tüketiminin payının ve kişi başına Gayri Safi Yurt İçi Hâsıla'nın yenilenebilir elektrik enerjisi üretimine anlamlı ve pozitif yönde katkı sağladığı bulunmuştur. Yenilenebilir elektrik enerjisi üretimi ile kişi başına GSYİH büyüme hızı arasında pozitif yönde çift yönlü nedensellik bulunmuştur. Dahası,

toplam elektrik enerjisi tüketimi değişkeni ile toplam elektrik enerjisi tüketimi içerisinde yenilenebilir enerji tüketiminin payının değişkenleri hem yenilenebilir elektrik enerjisi üretimini hem de kişi başına Gayri Safi Yurt İçi Hâsıla büyüme hızı değişkenlerini tek yönlü olarak pozitif yönde etkilemektedir.

Sürdürülebilir ekonomik büyümenin sağlanması için hem yenilenebilir enerji üretiminin artırılması hem de toplam elektrik enerjisi tüketimi içerisinde yenilenebilir enerji tüketiminin payının artırılması gerekir. Bunun için de devletin ve özellikle enerji bakanlığının bu konuda geliştirilen projelere desteğinin artarak devam etmesi gerekir. Yenilenebilir Enerji Kaynakları Destekleme Mekanizması (YEKDEM) katılımcısı olan her bir lisanslı üretim tesisi için lisans sahibine ödenecek Yenilenebilir Enerji Kaynakları (YEK) bedelinin artırılması Türkiye'nin yenilenebilir elektrik enerjisi üretimini artıracaktır.

Anahtar Kelimeler: Yenilenebilir Enerji Kaynakları, Yenilenebilir Elektrik Enerjisi, Yenilenebilir Enerji Kaynakları Destekleme Mekanizması, VAR Analizi, Granger Nedensellik

1. Giriş

Yenilenebilir enerji, doğal kaynaklardan elde edilen, kendini yenileyen, işlem görmelerine rağmen azalmayan enerji kaynaklarıdır. Güneş enerjisi, rüzgâr enerjisi, hidrolik enerji, jeotermal enerji, hidrojen enerjisi, biyo kütle enerjisi ve deniz kökenli enerjiler bu kaynaklar arasında sayılabilmektedir. Önümüzdeki 20 yıl içerisinde dünya elektrik talebinde %70'lik bir artışla birlikte, enerji üretiminde bu büyüklükte bir artış öngörülmektedir. Talepteki bu artışı karşılayabilmek için, yenilenemeyen fosil yakıtlardan ziyade yenilenebilir enerji kaynakları daha fazla önem kazanmaktadır. Geleneksel enerji kaynakları bugün çevre kirliliğinin önemli nedenlerinden biri olmakla birlikte, fosil yakıtların bir süre sonra tükeneceği de yadsınamayacak bir gerçektir (Kumbur vd., 2005; 1).

Dünya enerji tüketiminin yaklaşık beşte biri yenilenebilir enerji kaynaklarından karşılanmakta olup, bu oranın 2020 yılında %25'e çıkması öngörülmektedir. Teknolojik ve finansal gelişmeler ve yeni pazar olanakları rüzgâr ve güneş enerjileri başta olmak üzere yenilenebilir enerji üretiminde maliyetleri düşürücü etki yapmaktadır (REN21, 2018).

Tablo 1. Yenilenebilir Enerji Yatırımlarında Dünyada İlk 5 Ülke

	Yıllık Yatırım/ Net Kapasite İlaveleri / 2017 Üretimi				
	1	2	3	4	5
Yenilenebilir enerji ve yakıt yatırımı (50 MW'ın üzerindeki hidro dâhil değil)	Çin	A.B.D.	Japonya	Hindistan	Almanya
Birim GSYİH başına yenilenebilir enerji ve yakıt yatırım	Marshall Adaları	Ruanda	Solomon Adaları	Gine	Sırbistan
Jeotermal Güç Kapasitesi	Endonezya	Türkiye	Şili	İzlanda	Honduras
Hidro güç Kapasitesi	Çin	Brezilya	Hindistan	Angola	Türkiye
Güneş PV Kapasitesi	Çin	A.B.D.	Hindistan	Japonya	Türkiye
Rüzgar Gücü Kapasitesi	Çin	A.B.D.	Almanya	İngiltere	Hindistan
Gün-ısı Kapasitesi	Çin	Türkiye	Hindistan	Brezilya	A.B.D.
Bio-dizel Üretim	A.B.D.	Brezilya	Almanya	Arjentina	Endonezya
Ethanol Üretim	A.B.D.	Brezilya	Çin	Kanada	Tayland

Kaynak: Renewables 2018 Global Status Report, Renewable Energy Policy Network for the 21st Century.

Tablo 1'e göre, yenilenebilir enerji yatırımlarında dünyada önde gelen ülkeler Çin ve A.B.D'dir. Türkiye jeotermal güç kapasitesi ve gün-ısı kapasitesinde dünyada ikinci sırada, hidro güç ve güneş PV kapasitesinde beşinci sıradadır.

Tablo 2. Dünyada Yenilenebilir Enerji Üretiminde İlk 5 Ülke

2017 Sonu İtibariyle Toplam Kapasite ve Üretim					
	1	2	3	4	5
GÜÇ					
Yenilenebilir Güç Kapasitesi (hidro güç dahil)	Çin	A.B.D.	Brezilya	Almanya	Hindistan
Yenilenebilir Güç Kapasitesi (hidro güç hariç)	Çin	A.B.D.	Almanya	Hindistan	Japonya
Kişi başına yenilenebilir güç kapasitesi (hidro hariç)	İzlanda	Danimarka	Almanya	İsveç	Finlandiya
Bio-güç üretimi	Çin	A.B.D.	Brezilya	Almanya	Japonya
Bio-güç kapasitesi	A.B.D.	Brezilya	Çin	Hindistan	Almanya
Jeotermal Güç Kapasitesi	A.B.D.	Filipinler	Endonezya	Türkiye	Yeni Zelanda
Hidro güç Kapasitesi	Çin	Brezilya	Kanada	A.B.D.	Rusya
Hidro güç Üretimi	Çin	Brezilya	Kanada	A.B.D.	Rusya
Güneş PV Kapasitesi	Çin	A.B.D.	Japonya	Almanya	İtalya
Kişi başına Güneş PV Kapasitesi	Almanya	Japonya	Belçika	İtalya	Avustralya
Rüzgâr Gücü Kapasitesi	Çin	A.B.D.	Almanya	Hindistan	İspanya
Kişi başına Rüzgâr Gücü Kapasitesi	Danimarka	İrlanda	İsveç	Almanya	Portekiz
ISI					
Gün-ısı kollektör kapasitesi	Çin	A.B.D.	Türkiye	Almanya	Brezilya
Kişi başına gün-ısı kollektör kapasitesi	Barbados	Avusturya	Kıbrıs	İsrail	Yunanistan
Jeotermal ısı kapasitesi	Çin	Türkiye	İzlanda	Japonya	Macaristan

Kaynak: Renewables 2018 Global Status Report, Renewable Energy Policy Network for the 21st Century

Tablo 2’ye göre yenilenebilir enerji üretiminde Çin ve A.B.D’nin ağırlığı görülmektedir. Türkiye, jeotermal güç, jeotermal ısı ve gün-ısı kollektör kapasitesinde dünyada ilk beş ülke arasına girmiştir. Yenilenebilir enerji üretiminin diğer alanlarında sıralamaya girememiştir.

Türkiye’nin yenilenebilir enerji üretimindeki toplam kurulu güç kapasitesi 2009 yılında 15,5 GW iken 2016 yılında 34,2 GW olmuştur. Türkiye yenilenebilir enerji potansiyeli açısından oldukça iyi bir coğrafi konumda yer almakla birlikte, yenilenebilir enerji üretimi potansiyeline göre düşük seviyelerde kalmaktadır. Potansiyel ile yararlanma arasındaki farkın sebepleri yüksek maliyetler ve yasal düzenlemelerdeki eksikliklerdir. Türkiye’nin enerjide dışa bağımlılığı yüzde 70 civarındadır. Bu oranın ilerleyen dönemlerde artabileceği düşünüldüğünde yerli ve yenilenebilir enerji üretiminin artırılması önem kazanmaktadır. (Karagöl ve Kavaz, 2017;11-17). Türkiye, yenilenebilir enerji kaynaklarının üretimdeki payını arttırmak için hedeflerbelirlemiştir. 2023 yılı “Ulusal Yenilenebilir Enerji Eylem Planı” hedeflerine göre, 2023 yılında hidroelektrik santrallerinin kurulu gücünün 34 GW, jeotermalenerjiye dayalı kurulu gücünün 1GW, güneş enerjisi kurulu gücünün 5 GW, rüzgâr enerjisi kurulu gücünün 20 GW ve biokütleyle dayalı elektrik üretimsantrallerinin kurulu gücünün 1 GW olması planlanmaktadır (Dal, 2017).

Türkiye’de yenilenebilir enerji üretimini artırma ve teşvik etme konusunda politika belirleyebilmek için, enerji üretimini etkileyen faktörlerin tespit edilmesi gerekmektedir. Bu çalışmanın amacı Türkiye’de yenilenebilir elektrik enerjisi üretimine etki eden faktörleri araştırmak ve bu faktörlerin yenilenebilir enerji üretimiyle olan ilişkisini ortaya koymaktır. Türkiye’de yenilenebilir enerji üretimi konusunda etkin bir ulusal program ya da yeterli teşvik uygulamaları nasıl olmalı konularına değinebilmek için öncelikli olarak, enerji üretimini etkileyen faktörlerin tespit edilmesi gerekmektedir.

2. İlgili Literatür

Yenilenebilir enerjiye dair yapılan çalışmalar incelendiğinde, daha çok yenilenebilir enerji kullanımı ile ekonomik büyüme ilişkisini ele alan çalışmalar dikkati çekmektedir. Türkiye üzerine de enerji tüketimi ekonomik büyüme ilişkisini inceleyen pek çok çalışma bulunmaktadır.

Apergis ve Payne (2010), 1985-2005 yılları arasında yirmi OECD ülkesi üzerinden panel veri yaklaşımı ile yenilenebilir enerji tüketimi ile ekonomik büyüme arasındaki ilişkiyi araştırmıştır. Yapılan Granger nedensellik araştırmaları her ikisi arasında hem kısa hem de uzun dönemde çift yönlü nedensellik olduğunu göstermiştir.

Büyükyılmaz ve Mert (2010), 1960-2010 arası Türkiye için MS-VAR yaklaşımı ile yaptıkları araştırmaları sonucunda ekonomik büyüme ve yenilenebilir enerji tüketimi arasında çift yönlü nedensellik saptamışlardır.

Özşahin, Mucuk ve Gerçekler (2016), yenilenebilir enerji tüketimi ile ekonomik gelişme arasındaki ilişkiyi, BRICS ülkeleri ve Türkiye için 2000-2013 dönemine ait verilerle panel veri setinde yer alan ülkeler için yatay kesit bağımlılığı ve homojenlik testleri uygulamıştır. Yenilenebilir enerji tüketimi ve ekonomik gelişmişlik arasında uzun dönemde pozitif yönlü bir ilişki olduğunu göstermiştir.

Bakırtaş ve Çetin (2016), 1992-2010 dönemi için G-20 ülkeleri üzerinden yaptıkları çalışmalarında ekonomik büyümenin uzun dönemde yenilenebilir enerji tüketimini pozitif etkilediğini saptamışlardır.

Usta ve Berber (2017), tarım, sanayi, konut ve ulaştırma sektörlerinden oluşan çok sektörlü bir ekonomide enerji tüketimi ve ekonomik büyüme arasındaki nedensellik ilişkilerini Toda ve Yamamoto nedensellik sınamasıyla araştırmıştır. Ulaştırma ve sanayi sektörlerinde enerji tüketimi ile ekonomik büyüme arasında çift yönlü nedensellik olduğunu saptamışlardır.

Karakaş (2018), yenilenebilir enerji kaynaklarının ekonomik büyüme üzerindeki etkilerini araştırmıştır. Bunun için 1990-2014 dönemi için OECD ülke örnekleri ile panel eşbütünleşme analizi yapmışlar ve DOLS yöntemi ile modeli tahmin ederek, Granger nedensellik testi ile nedensellik araştırması yapmışlardır. Analiz sonuçlarına göre, elektrik tüketiminin ekonomik büyümeyi pozitif yönde etkilediği sonucuna ulaşılmıştır.

Literatürde yenilenebilir enerji üretimi konusuna değinen çalışma eksikliği söz konusudur. Bu çalışmayla bu eksiklik giderilmeye çalışılmıştır. 1998-2014 yılları arası Türkiye'nin yenilenebilir elektrik enerjisi üretimine etki eden faktörler olarak toplam elektrik enerjisi tüketimi, toplam elektrik enerjisi tüketimi içerisinde yenilenebilir enerji tüketiminin payı ve kişi başına Gayri Safi Yurt İçi Hâsıla yıllık büyüme oranı değişkenleri seçilmiştir.

3. Veri, Ekonometrik Yöntem ve Model

3.1. Veri Seti

Çalışmada kullanılan 1998-2014 yılları arası Türkiye'ye ait yenilenebilir elektrik enerjisi üretimi, toplam elektrik enerjisi tüketimi, toplam elektrik enerjisi tüketimi içerisinde yenilenebilir enerji tüketiminin payı ve kişi başına Gayri Safi Yurt İçi Hâsıla yıllık büyüme oranı yıllık verileri Dünya Bankası veri merkezinden elde edilmiştir. Yenilenebilir elektrik enerjisi üretimi verisi için *UR*, toplam elektrik enerjisi tüketimi verisi için *TK*, toplam elektrik enerjisi tüketimi içerisinde yenilenebilir enerji tüketiminin payı verisi için *YP* ve kişi başına Gayri Safi Yurt İçi Hâsıla yıllık büyüme oranı verisi için *GR* kısaltmaları kullanılmıştır. Analizlerin gerçekleştirilmesinde Eviews7.0 programı kullanılmıştır.

3.2. Ekonometrik Yöntem ve Bulgular

Bu çalışmada, ekonometrik yöntem olarak zaman serisi yaklaşımı kullanılmıştır. Bu çerçevede ilk olarak, Augmented Dickey-Fuller (ADF) birim kök testi kullanılarak değişkenlerin durağanlığı test edilmiştir. İkinci olarak, Johansen Eşbütünleşme Testi kullanılarak değişkenler arasında eşbütünleşmenin varlığı araştırılmıştır. Daha sonra değişkenlere ilişkin OLS tahmin modeli kullanılarak çoklu regresyon modeli ile denklem tahmini yapılmıştır. Denklem tahmini yapıldıktan sonra Granger nedensellik testi kullanılarak değişkenler arasındaki ilişkinin yönü tespit edilmeye

çalışılmıştır. VAR analizi yapılarak değişkenler arasındaki ilişkiler varyans ayrıştırması ve etki-tepki fonksiyonları yardımıyla incelenmiştir.

3.2.1. ADF Birim Kök Analizi

Zaman serileri arasındaki regresyon hesaplanırken, değişkenler arasında anlamlı bir ilişki olmasa bile genellikle yüksek bir R^2 değeri ortaya çıkmaktadır. Bu duruma düzmece regresyon denilmektedir. Gözlenen yüksek R^2 değeri gerçek bir ilişkiden ziyade trend eğilimindeki benzerliğin bir sonucu olarak ortaya çıkmaktadır. Bu sorunu gidermek için serilerin durağan olup olmadığına bakmak gerekir (GUJARATI, 1999). Serilerde durağanlığı tespit etmek için birim kök testlerine başvurulmaktadır. Eğer seri birim kök içeriyorsa durağan değildir ve serileri durağan hale getirmek gerekmektedir. Bir zaman serisinin birim köke sahip olup olmadığını belirlemede yaygın olarak kullanılan testlerden en önemlileri, Augmented Dickey-Fuller (ADF) ve Phillips-Perron (PP) testleridir (Özer ve Erdoğan, 2006).

Dickey-Fuller testleri seri birim köke sahipse ve bu durum fark alma yöntemiyle ortadan kaldırılabiliyorsa kullanılması uygun olur. Tari ve Yıldırım (2011)'a göre serilerin durağanlığının sınanması için $Y_t = PY_{t-1} + ut$ gibi bir model oluşturulduğunda ut sklastik bir hata terimidir. P katsayısı için P=1 bulunursa birim kök sorunu ortaya çıkar ve ilişki, $Y_t = Y_{t-1} + ut$ biçimini alır. Denklemin sağ ve sol tarafından Y_{t-1} çıkarıldığında, $\Delta Y_t = (P-1)Y_{t-1} + ut$ denklemi elde edilir. $\Delta Y_t = (Y - Y_{t-1})$ birinci farktır. (P-1) de δ olarak ifade edilirse ilişki, $\Delta Y_t = \delta Y_{t-1} + ut$ olarak yazılabilir. P=1 olduğunda $\delta=0$ olur. Bu durumda, $\Delta Y_t = (Y - Y_{t-1}) = ut$ olacak ve birinci fark durağan olacaktır.

Tablo 4. ADF Birim Kök Test Sonuçları

	Değişkenler	Sabit	Sabit – Trendli
Düzeyde	UR	-1.246023 (0.6269)	-3.473510 (0.0820)
	TK	-0.534725 (0.8598)	-2.991892 (0.1658)
	YP	-1.976110 (0.2931)	-2.614547 (0.2790)
	GR	-0.634103 (0.4267)	-2.905652 (0.1862)
1.Fark	UR	-3.384764 (0.0289)	-3.819720 (0.0009)
	TK	-4,682591 (0.0035)	-4,220113 (0.0276)
	YP	-4.167433 (0.0068)	-4.351455 (0.0187)
	GR	-6.848414 (0.0001)	-6.624611 (0.0005)

Yapılan Augmented Dickey-Fuller birim kök analizine göre düzey değerlerinde durağan olmayan ve birim kök içeren tüm değişkenlerin birinci farkı alındığında değişkenler durağan hale gelmektedir.

3.2.2. Johansen Eşbütünleşme Testi

Verilerin hepsinin birinci farkının durağan olması sebebiyle eşbütünleşme testine geçilmiştir. Seriler arasındaki eşbütünleşme ilişkisini belirlemede, yaygın olarak Engle ve Granger ile Johansen ve Juselius tarafından önerilen yöntemler kullanılmaktadır. Maksimum özdeğer (λ Max) ve iz istatistiği (λ Trace) şeklinde iki olabilirlik test istatistiği kullanılarak seriler arasındaki uzun dönemli ilişki Johansen-Juselius yöntemi ile belirlenebilir (Arısoy ve Ünlükaplan, 2010).

Bir sistemde kullanılan serilerin durağan olmamasına karşın bu serilerin lineer kombinasyonları durağan olabilir ve bu durum eşbütünleşme kavramı ile açıklanabilir. Eşbütünleşme analizi sayesinde birbirleriyle ilişkili olduğu düşünülen ekonomik değişkenlerin uzun dönemde birlikte hareket edip etmediği ortaya çıkarılabilir (Bayraktutan ve Arslan, 2008).

Çalışmada öncelikli olarak değişkenlerin eş-bütünleşme testi yapılacağı için değişkenlerin düzey değerleri kullanılarak VAR modeli kurulmuş ve Akaike (AIC), LL, LR, FBE, SC ve HQ bilgi kriterleriyardımla uygun gecikme sayısı bir olarak belirlenmiştir. Uygun gecikme uzunluğunun belirlenmesine ilişkin analiz sonuçları Tablo 5'te sunulmuştur.

Tablo 5. Uygun Gecikme Sayısı

Gecikme Sayısı	LogL	LR	FPE	AIC	SC	HQ
0	44.14128	NA	5.57e-08	-5.352171	-5.163357	-5.354182
1	68.40773	32.35527*	2.06e-08*	-6.454364*	-5.510297*	-6.464421*
2	81.95505	10.83786	5.40e-08	-6.127340	-4.428020	-6.145442

Not: LogL: Logaritmik Olasılık Oranı, LR: LR Test İstatistiği, FBE: Son Tahmin Hatası, AIC: Akaike Bilgi Kriteri, SC: Schwartz Kriteri, HQ:Hannan-Quinn Kriteri.* ilgili test için uygun gecikme uzunluğunu göstermektedir.

Uygun gecikme uzunluğunun belirlenmesinin ardından Johansen Eşbütünleşme testine geçilmiştir. Johansen Eşbütünleşme testinin yapılabilmesi için modelde yer alan değişkenlerin durağanlık derecelerinin aynı olması gerekir. Var model kurulup ilgili model tahmin edilerek eşbütünleşme durumuna bakılmıştır. Bu teste ilişkin sonuçlar aşağıda yer alan Tablo 6'da gösterilmiştir:

Tablo 6. Johansen Eşbütünleşme Testi Sonuçları

Maximum Özdeğer Testi (Max. Eigenvalue Testi)					İz Testi (Trace Test)				
H_0 Hipotezi	Alternatif Hipotez	Test İstatistiği	%5 Kritik Değeri	Olasılık (p)	H_0 Hipotezi	Alternatif Hipotez	Test İstatistiği	%5 Kritik Değeri	Olasılık (p)
$r=0$	$r=1$	41.83151	30.81507	0.0015	$r=0$	$r=1$	79.07638	55.24578	0.0001
$r=1$	$r=2$	21.84831	24.25202	0.1007	$r=1$	$r=2$	37.24486	35.01090	0.0283
$r=2$	$r=3$	11.36903	17.14769	0.2837	$r=2$	$r=3$	15.39655	18.39771	0.1252

Tablo 6'daki sonuçlar incelendiğinde hem maksimum öz değer testi hem de iz testi açısından ele alınan seriler arasında uzun dönemli bir ilişki olduğu görülmektedir. Herhangi bir eş-bütünleşik vektörün bulunmadığı ifade edilen H_0 hipotez için, maksimum öz değer 41.83151 olup, %5 anlamlılık düzeyindeki kritik değer olan 30.81507'den büyüktür. Maximum özdeğer testi bir eşbütünleşik vektör bulunduğunu gösterir. İz testi açısından da değerler sırasıyla 79.07638 ve 37.24486'dır ve %5 kritik değerden büyük olduğu için H_0 hipotezi red edilir ($p < 0.05$). İz testine göre iki eşbütünleşik vektörün var olduğu tespit edilmiştir. Değişkenler arasında uzun dönemli bir ilişki tespit edildiği için hata düzeltme modeli kullanılmıştır. Bu model değişkenler arasın uzun dönemli ilişkiden (dengeden) sapmayı göstermektedir. Serilere fark işlemi uygulandığında uzun dönem bilgisinde oluşan kayıpları ortadan kaldırmak amacıyla hata düzeltme modeline başvurulmuştur.

3.2.3. Hata Düzeltme Modeli (VECM)

Değişkenler arasında uzun dönemli ilişki bulunmuştur yani değişkenler uzun dönemde dengeye gelmektedir fakat değişkenlerin farkları alındığı için değer kayıpları yaşanmıştır. Bu değer kayıpları sonuçlarda olumsuz etki yapmaktadır. Bu olumsuz etkiyi gidermek için hata düzeltme modeli uygulanmıştır. Hata düzeltme modelleri uzun dönemli ilişkiden yani dengeden sapmayı gösterirler. Analiz yapılırken ilk olarak regresyon denklemi kurulmuştur. Bağımlı değişken olarak UR değişkeni seçilmiştir. Değişkenlerde trend mevcut olduğundan modele trend eklenmiştir. Oluşan regresyon denklemi sonuçları Tablo 7'dedir.

Denklem sonuçlarına göre olasılık değerlerinin tamamı 0.05'ten küçük olduğundan değişkenlerin hepsi anlamlıdır. R^2 ve *düzeltilmiş* R^2 değerleri oldukça yüksektir. F istatistik değerinin olasılık değeri de 0.05'ten küçüktür. Dolayısıyla model anlamlıdır. Hata düzeltme modelinde hata terimlerinin bir gecikmeli hali modele eklenmektedir. Hata terimleri düzeyde durağandır.

Tablo 7. TREND Eklenmiş Regresyon Denklemi

Değişken	Katsayı	Standart Hata	t istatistiği	Olasılık (p)
ΔTK	0.045567	0.006404	7.115515	0.0000
ΔYP	7322.851	608.4665	12.03493	0.0000
ΔGR	297.6677	105.6189	2.818319	0.0167
c	3863.869	1272.395	3.036691	0.0113
@TREND	-288.0932	127.3997	-2.261333	0.0450
R^2	0.952436		Akaike bilgi kriteri	18.48888
Düzeltilmiş R^2	0.935140		Schwarz kriteri	18.73032
F -statistic	55.06668		Hannan-Quinn kriteri	18.50125
$Prob(F$ -statistic)	0.000000		Durbin-Watson istatistiği	2.652044

Tablo 8. Hata Terimi Eklenmiş Hata Düzeltme Modeli

Değişken	Katsayı	Standart Hata	t istatistiği	Olasılık (p)
ΔTK	0.045583	0.007729	5.897470	0.0002
ΔYP	7432.387	788.4819	9.426199	0.0000
ΔGR	304.9981	124.8460	2.442994	0.0347
c	1427.813	819.7675	1.741729	0.1122
HATA(-1)	-0.523881	0.424558	-1.233944	0.2454
R^2	0.937212		Akaike bilgi kriteri	18.80584
Düzeltilmiş R^2	0.912096		Schwarz kriteri	19.04186
F -statistic	37.31628		Hannan-Quinn kriteri	18.80332
$Prob(F$ -statistic)	0.000006		Durbin-Watson istatistiği	1.329699

Model sonuçlarına göre hata teriminin katsayısı 0 ile -1 arasındadır. Dolayısıyla hata düzeltme modeli doğru çalışmaktadır. Geçen yılın dengesindeki bozulmanın ne kadar düzeldiği hata teriminin katsayısına bakarak görülebilir. Buna göre 1 birim sapmanın yaklaşık %52'si bir sonraki dönem düzeliyor ve kısa dönem dengesizlikler bu şekilde giderilmektedir.

3.2.4. Çoklu Regresyon Modeli

Çalışmada 1998-2014 yılları arası yenilenebilir elektrik enerjisi üretimine etki eden faktörlerin tespiti amacıyla çoklu regresyon modeli kurulmuştur. Yenilenebilir elektrik enerjisi üretiminin bağımlı değişken olarak alındığı modelde açıklayıcı değişken olarak toplam elektrik enerjisi tüketimi, toplam elektrik enerjisi tüketimi içerisinde yenilenebilir enerji tüketiminin payı ve kişi başına Gayri Safi Yurt İçi Hâsıla yıllık büyüme oranı değişkenleri alınmıştır. Bu değişkenlerin yenilenebilir elektrik enerjisi üretimine olan etkilerinin tespiti amacıyla kurulan model:

Tablo 9. Çoklu Regresyon Modeli

Değişken	Katsayı	Standart Hata	t istatistiği	Olasılık (p)
ΔTK	0.041848	0.007172	5.834989	0.0001
ΔYP	6860.544	664.0965	10.33064	0.0000
ΔGR	336.1614	120.7904	2.783013	0.0166
c (β_0)	1424.553	781.9745	1.821738	0.0935
R^2	0.930324		Akaike bilgi kriteri	18.74566
Düzeltilmiş R^2	0.912906		Schwarz kriteri	18.93880
F -statistic	53.40898		Hannan-Quinn kriteri	18.75555
$Prob(F$ -statistic)	0.000000		Durbin-Watson istatistiği	1.750481

$$UR_t = \beta_0 + \beta_1 TK_t + \beta_2 YP_t + \beta_3 GR_t + u_t \quad (1)$$

UR= Yenilenebilir elektrik enerjisi üretimi

TK= Toplam elektrik enerjisi tüketimi

YP= Toplam elektrik enerjisi tüketimi içerisinde yenilenebilir enerji tüketiminin payı

GR= Kişi başına Gayri Safi Yurt İçi Hâsıla yıllık büyüme oranını göstermektedir.

OLS tahmin modeli kullanılarak yapılan analiz sonucunda oluşan regresyon denklemi Tablo 9'da verilmiştir.

Oluşan regresyon denklemine göre sadece sabit katsayının çok küçük bir farkla anlamlı olmadığı, diğer tüm değişkenlerin anlamlı olduğu ve işaretlerinin de beklendiği gibi pozitif olduğu görülmüştür. Analiz yaparken kullanılan E views programı çift taraflı tablo kullanmaktadır. Tek taraflı tabloya bakıldığında 0.05'e göre tablo değeri 1,64 çıkmaktadır. *c* sabit katsayısının *t* istatistiği 1.82'dir ve 1,64'ten büyüktür. Bu durumda H_0 hipotezi red edilir ve alternatif hipotez kabul edilir. Dolayısıyla *c* sabit katsayısı da anlamlıdır. Diğer değişkenlerin olasılık değerleri 0.05'ten küçüktür, H_0 hipotezi reddedilir ve H_1 hipotezi kabul edilir. Tüm değişkenler anlamlıdır. R^2 değerleri yüksektir. Modelin anlamlılığı için *F* istatistik değerine bakıldığında olasılık değeri 0.05'ten küçük olduğu için H_0 hipotezi reddedilir ve H_1 hipotezi kabul edilir. Kurulan bu regresyon modeligenel olarak anlamlıdır. Buna göre toplam elektrik enerjisi tüketimi, toplam elektrik enerjisi tüketimi içerisinde yenilenebilir enerji tüketiminin payı ve kişi başına Gayri Safi Yurt İçi Hâsıla yıllık büyüme oranı yenilenebilir elektrik enerjisi üretimine anlamlı ve pozitif yönde etki etmektedir.

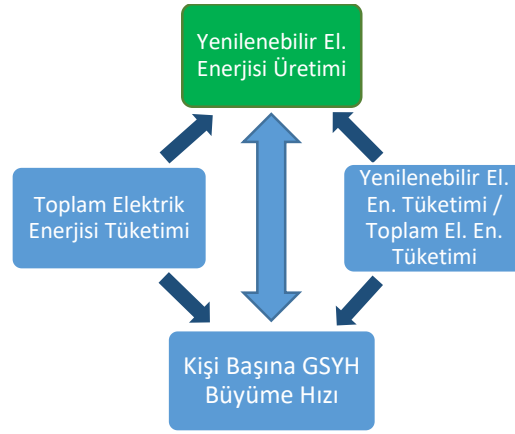
3.2.5. Granger Nedensellik Analizi

Granger ve Newbold (1974)'a göre nedenselliğin tanımı şu şekildedir: “Y'nin öngörüsü, X'in geçmiş değerleri kullanıldığında X'in geçmiş değerleri kullanılmadığı duruma göre daha başarılı ise X, Y'nin Granger nedenidir”. Bu tanım doğrulanırsa ilişki $X \rightarrow Y$ şeklinde gösterilir. Bu test yapılmadan önce değişkenlerin önceden durağanlaştırılması gerekir. Seriler durağan değilse regresyon analizi ile elde edilen sonuçlar gerçek ilişkiyi yansıtmada yanıltıcı olmaktadır (Granger, Newbold, 1974).

Tablo 10. Granger Nedensellik Analizi Sonuçları

Değişkenler	Ki Kare Test İstatistiği	Olasılık Değeri (<i>p</i>)
Bağımlı Değişken: UR		
<i>TK</i>	7.487038	0.0237
<i>YP</i>	8.510784	0.0142
<i>GR</i>	9.209897	0.0100
Tüm Değişkenler	15.17482	0.0189
Bağımlı Değişken: TK		
<i>UR</i>	4.265701	0.1185
<i>YP</i>	4.081098	0.1300
<i>GR</i>	1.643756	0.4396
Tüm Değişkenler	7.519075	0.2755
Bağımlı Değişken: YP		
<i>UR</i>	1.313510	0.5185
<i>TK</i>	0.847542	0.6546
<i>GR</i>	1.931486	0.3807
Tüm Değişkenler	5.212604	0.5168
Bağımlı Değişken: GR		
<i>UR</i>	16.48562	0.0003
<i>TK</i>	19.66023	0.0001
<i>YP</i>	18.97056	0.0001
Tüm Değişkenler	57.66335	0.0000

Çalışmada ilgili değişkenler arasındaki ilişkinin yönünü ve kaynağını tespit etmek amacıyla Granger nedensellik testi yapılmıştır. Granger nedensellik testi yapılırken gecikme uzunluğu 1 olarak tespit edilmiştir. Ho hipotezi Granger nedeni değildir olarak tanımlanırken H1 hipotezi Granger nedenidir olarak tanımlanmıştır.



Şekil 1. Granger Nedenselliği Sonuçlarına göre Değişkenlerin Birbirleri ile Olan İlişkisi

Kaynak: Granger nedensellik analizi sonuçlarına göre tarafımızdan oluşturulmuştur.

Tablo 10’da yer alan sonuçlar göz önüne alınarak tarafımızca oluşturulan Şekil 1’e göre Türkiye’de kişi başına Gayri Safi Yurt İçi Hâsıla yıllık büyüme oranı ve yenilenebilir elektrik enerjisi üretimi arasında çift yönlü nedensellik vardır. Bunun yanında toplam elektrik enerjisi tüketimi ve toplam elektrik enerjisi tüketimi içerisinde yenilenebilir enerji tüketiminin payı hem kişi başına Gayri Safi Yurt İçi Hâsıla yıllık büyüme oranının hem de yenilenebilir elektrik enerjisi üretiminin Granger nedenidir.

3.2.6. VAR Tahmini

Çalışmanın bu bölümünde Türkiye’de toplam elektrik enerjisi tüketimi, toplam elektrik enerjisi tüketimi içerisinde yenilenebilir enerji tüketiminin payı ve kişi başına Gayri Safi Yurt İçi Hâsıla yıllık büyüme oranının yenilenebilir elektrik enerjisi üretimi üzerindeki etkisi VAR (Vektör Otoregresif) Analizi yardımıyla analiz edilmiştir. VAR analizi sayesinde birbirleriyle ilişkili zaman serileri analizinde ve değişkenler sisteminde tesadüfi şokların dinamik etkiler analizi edilebilir. VAR analizinde, parametre tahmininden çok değişkenler arasındaki ilişkilerin belirlenmesini amaçlamaktadır. VAR analizinde bir değişkenin değeri kendi gecikmeli değerlerinin yanında diğer değişkenlerin de gecikmeli değerlerine bağlıdır (Bozdağlıoğlu ve Özpınar, 2011). Kurulan VAR modeli aşağıdadır.

$$UR_t = \alpha + \sum \beta_i TK_{t-i} + \sum \delta_i YP_{t-i} + \sum \theta_i GR_{t-i} + \sum \gamma_i UR_{t-i} + \varepsilon_{1t} \quad (2)$$

$$TK_t = \alpha + \sum \lambda_i TK_{t-i} + \sum \nu_i YP_{t-i} + \sum \eta_i GR_{t-i} + \sum \vartheta_i UR_{t-i} + \varepsilon_{2t} \quad (3)$$

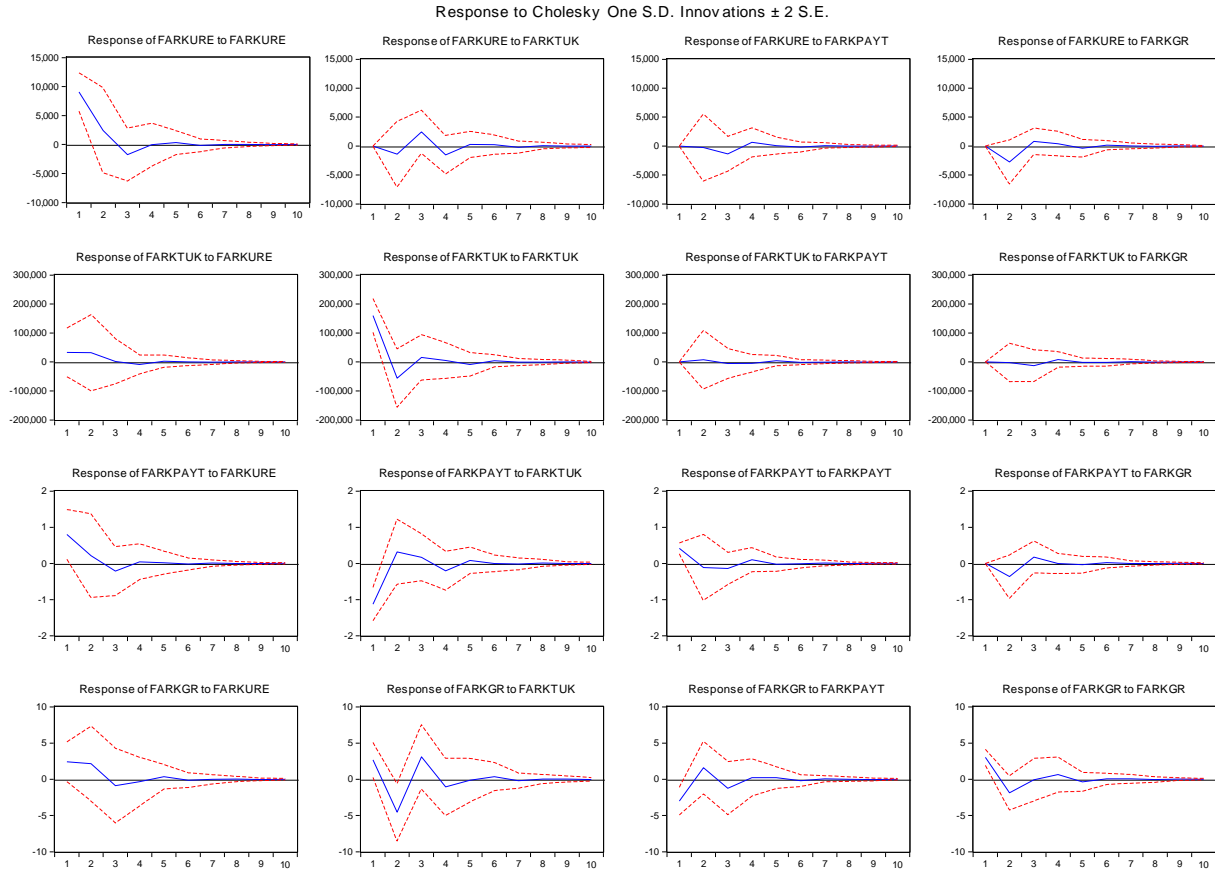
$$YP_t = \alpha + \sum \omega_i TK_{t-i} + \sum \rho_i YP_{t-i} + \sum \xi_i GR_{t-i} + \sum \tau_i UR_{t-i} + \varepsilon_{3t} \quad (4)$$

$$GR_t = \alpha + \sum \zeta_i TK_{t-i} + \sum \sigma_i YP_{t-i} + \sum \phi_i GR_{t-i} + \sum \mu_i UR_{t-i} + \varepsilon_{4t} \quad (5)$$

Yukarıdaki modelde ε ortalaması sıfır, kendi gecikmeli değerleriyle olan kovaryansları sıfır ve varyansları sabit, normal dağılıma sahip, rassal hata terimlerini temsil etmektedir. VAR modelleri kullanılarak değişkenler arasındaki ilişkiler, etki tepki fonksiyonları ve varyans ayrıştırması teknikleri ile incelenebilir. Bu sayede değişkenler arasındaki değişimlerin birbirlerine verecekleri tepkiler ve değişkenlerin varyanslarındaki değişimin kaynakları görülebilir.

Etki-Tepki analizinde, VAR Modeli standart hatalarından birinin bugünkü değerinde oluşan şok karşısında, her bir değişkenin bugünkü ve gelecek değerlerine ilişkin dinamik tepkileri izlenebilir.

Tahmin edilen bu etki-tepkiler, tepkilerin şoklara karşı değişiminin kalıcılığını da gösterir. Etki-tepki fonksiyonları hesaplanırken, bu fonksiyon için gerekli olan güven aralıkları Monte Carlo simülasyonları yardımı ile (+-) 2 standart sapma için türetilmiştir. Elde edilen fonksiyonlar, Şekil 2’de verilmiştir. Bu grafiklerdeki sürekli çizgiler, modelin hata terimlerinde meydana gelen 1 standart sapmalı şoka karşı bağımlı değişkenin zaman içerisinde gösterdiği tepkiyi göstermektedir. Kesikli çizgiler ise (+-) 2 standart sapma için elde edilen güven aralıklarını göstermektedir. Güven aralıklarının birisi pozitif alanda iken diğeri negatif alanda yer alırsa bu durum, elde edilen sonuçların güvenilir olmadığını bir göstergesidir. Değişkenler arasındaki etki tepki ilişkileri incelendiğinde, yenilenebilir elektrik enerjisi üretimi hata teriminden kaynaklanan bir birimlik standart şoka karşılık diğer değişkenlerin verdiği tepkiler aşağıda görülmektedir.



Şekil 2. Etki – Tepki Analizi Sonuçları

Şekil 2’ye göre genel olarak bakıldığında 6. dönemden sonra tepkiler sona ermektedir. Yenilenebilir elektrik enerjisi üretimi hata teriminden kaynaklanan bir birimlik standart şoka karşılık diğer değişkenler önce azalan sonra artan tepkiler vermişlerdir. Toplam elektrik enerjisi tüketimi hata teriminde meydana gelen şoka kendisi ve kişi başına GSYİH büyüme oranı önce azalan güçlü bir tepki verip sonra artan ve tekrar azalan tepki vermişlerdir. Yenilenebilir elektrik enerjisi üretimi değişkeni ise aynı yönde fakat zayıf tepki vermiştir. Yenilenebilir enerjinin toplam içindeki payı değişkeni ise önce güçlü artan sonra azalıp tekrar artan tepki vermiştir. Yenilenebilir enerjinin toplam içindeki payı değişkeni hata teriminde meydana gelen şoka kişi başına GSYİH büyüme oranı güçlü şekilde artan sonra azalıp tekrar artan tepki vermiştir. Kendisi ve Yenilenebilir elektrik enerjisi üretimi değişkeni zayıf bir şekilde önce azalıp sonra artan tepkiler vermiştir. Yenilenebilir enerjinin toplam içindeki payı değişkeni ise zaman boyunca neredeyse sıfır tepki vermiştir. Son olarak kişi başına GSYİH büyüme oranı hata teriminde meydana gelen şoka yenilenebilir enerjinin toplam içindeki payı değişkeni neredeyse hiç tepki vermemiş, diğer üç değişken ise önce azalan sonra artan ve tekrar azalan tepkiler vermişlerdir.

VAR’ın hareketli ortalamalar bölümünden elde edilen varyans ayrıştırmaları, değişkenlerin kendilerinde ve diğer değişkenlerde meydana gelen şokların kaynaklarını yüzde olarak ifade eder. Sistemde yer alan değişkenlerden birinde meydana gelecek olan bir değişimin yüzde kaçının kendisinde, yüzde kaçının da diğer değişkenlerden kaynaklandığını gösterir. Bir değişimde meydana gelen değişimlerin büyük bölümü kendisindeki şoklardan kaynaklanıyorsa, bu durum söz konusu değişkenin dışsal olarak hareket ettiğini gösterir. Ayrıca varyans ayrıştırmaları değişkenler arası nedensellik ilişkilerinin derecesi konusunda da bilgi verir (Zengin, 2000). Burada yapılan varyans ayrıştırması analizinde, bir değişken üzerinde en çok hangi değişken ya da değişkenlerin etkili olduğu belirlenmeye çalışılmıştır. Değişkenler için yapılan varyans ayrıştırma sonuçları aşağıdaki tablolarda sırasıyla gösterilmiştir.

Tablo 11. Yenilenebilir Elektrik Enerjisi Üretimi Değişkeninin Varyans Ayrıştırması

Dönem	Standart Hata	UR	TK	YP	GR
1	9056.801	100.0000	0.000000	0.000000	0.000000
2	9879.615	90.06503	2.031678	0.073002	7.830286
3	10446.59	83.32813	7.343299	1.731146	7.597429
4	10580.90	81.22671	9.185080	2.037355	7.550854
5	10596.41	81.08174	9.216956	2.034132	7.667167
6	10602.21	81.01379	9.253882	2.058275	7.674056
7	10604.51	80.97920	9.286076	2.063911	7.670817
8	10604.82	80.97470	9.289812	2.063937	7.671550
9	10604.87	80.97432	9.289757	2.064047	7.671872
10	10604.89	80.97395	9.290057	2.064138	7.671850

Tablo 11’deki verilere göre yenilenebilir elektrik enerjisi üretimini hem kısa dönemde hem uzun dönemde büyük oranda kendisinin belirlediği söylenebilir. Birinci dönemde %100 oranında kendisi belirlerken, dönemler ilerledikçe TK değişkeninin etkisi %9, YP değişkeninin etkisi %2 ve GR değişkeninin etkisi yaklaşık %7 olarak kalmıştır.

Tablo 12. Toplam Elektrik Enerjisi Tüketimi Değişkeninin Varyans Ayrıştırması

Dönem	Standart Hata	UR	TK	YP	GR
1	163796.6	4.013665	95.98634	0.000000	0.000000
2	176060.9	6.723063	93.06498	0.201248	0.010706
3	177326.0	6.643013	92.54600	0.287952	0.523037
4	177849.1	6.846223	92.07342	0.348463	0.731890
5	178124.0	6.849859	92.00845	0.408394	0.733301
6	178181.3	6.846059	92.00207	0.413409	0.738460
7	178187.0	6.847662	91.99689	0.413654	0.741790
8	178189.7	6.847924	91.99564	0.414344	0.742096
9	178190.8	6.847857	91.99555	0.414496	0.742093
10	178190.9	6.847857	91.99552	0.414497	0.742127

Tablo 12’ye göre, Toplam Elektrik Enerjisi Tüketimi değişkeni üzerinde en güçlü etki kendisinden gelmiş, YP ve GR değişkenlerinin etkisi hiçbir dönemde %1’i geçememiştir. UR değişkeninin etkisi %6,8’de kalmıştır.

Tablo 13’e bakıldığında toplam enerji tüketimi içinde yenilenebilir enerji tüketiminin payını yenilenebilir elektrik enerjisi üretimi kısa dönemde % 30 oranında belirlerken YP değişkeni % 8.3 oranında, GR değişkeni ise %6.4 oranında etkilemiştir. YP değişkeni üzerinde en büyük belirleyici ilk dönemde % 60 ve son dönemde %56.5’luk oranıyla TK değişkenidir.

Tablo 13. Toplam Enerji Tüketimi İçinde Yenilenebilir Enerji Tüketiminin Payı Değişkeninin Varyans Ayrıştırması

Dönem	Standart Hata	UR	TK	YP	GR
1	1.440833	30.78400	60.99107	8.224937	0.000000
2	1.538933	28.88683	57.76556	7.736767	5.610847
3	1.579009	29.30172	55.96295	8.156727	6.578598
4	1.596186	28.75178	56.41905	8.390491	6.438674
5	1.599063	28.66135	56.49213	8.377855	6.468667
6	1.599379	28.66425	56.46988	8.379086	6.486781
7	1.599565	28.66002	56.47132	8.382111	6.486544
8	1.599620	28.65806	56.47338	8.382331	6.486232
9	1.599626	28.65794	56.47334	8.382271	6.486443
10	1.599627	28.65794	56.47328	8.382294	6.486486

Tablo 14. Kişi Başına GSYİH Büyüme Hızı Değişkeninin Varyans Ayrıştırması

Dönem	Standart Hata	UR	TK	YP	GR
1	5.582428	18.54779	22.85495	29.03829	29.55898
2	7.910523	16.67346	44.46432	18.55530	20.30692
3	8.629099	15.02210	50.25432	17.65157	17.07201
4	8.725928	14.82301	50.58488	17.34043	17.25168
5	8.744606	14.92026	50.39627	17.33112	17.35235
6	8.755207	14.90189	50.44538	17.33769	17.31505
7	8.757644	14.89369	50.46468	17.33305	17.30858
8	8.757873	14.89420	50.46330	17.33221	17.31028
9	8.757968	14.89430	50.46312	17.33233	17.31026
10	8.758008	14.89418	50.46341	17.33231	17.31010

Tablo 14'e göre kişi başına GSYİH büyüme hızını ilk dönemde sadece %29.5 oranında kendisi belirlerken *YP*, *TK* ve *UR* değişkenlerinin etkileri sırasıyla %29, %22.8 ve %15'tir. Dönemler ilerledikçe *GR*, *YP* ve *UR* değişkenlerinin etkisi giderek azalmış, *TK* değişkeninin etkisi %50.4'e çıkmıştır.

4. Sonuç ve Öneriler

Çalışmada 1998-2014 yılları arası Türkiye'ye ait yenilenebilir elektrik enerjisi üretimi, toplam elektrik enerjisi tüketimi, toplam elektrik enerjisi tüketimi içerisinde yenilenebilir enerji tüketiminin payı ve kişi başına Gayri Safi Yurt İçi Hâsıla yıllık büyüme oranı değişkenleri arasındaki etkileşim araştırılmıştır. İlk olarak *ADF birim kök analizi* yardımıyla serilerin durağan olup olmadıkları test edilmiştir. Yapılan analizler sonucu düzey değerlerinde durağan olmayan değişkenlerin birinci farklarında durağan oldukları tespit edilmiştir. Daha sonra değişkenler arasında uzun dönemli bir ilişki olup olmadığını ölçmek için *Johansen Eşbütünleşme analizi* yapılarak, değişkenler arasında bir eş bütünleşme ilişkisinin olduğu tespit edilmiştir. Değişkenler için gecikme uzunluğu olarak "bir" tespit edilmiştir ve bu gecikme uzunluğuna göre varyans ayrıştırması ve etki-tepki analizleri yapılmıştır.

Türkiye'ye ait yenilenebilir elektrik enerjisi üretimini belirleyen faktörleri tespit etmek amacıyla değişkenlere ilişkin *OLS tahmin modeli* kullanılarak çoklu regresyon modeli ile denklem tahmini yapılmıştır. *OLS tahmin modeli* kullanılarak kurulan çoklu regresyon denklemi sonuçlarına göre Türkiye'de toplam elektrik enerjisi tüketiminin, toplam elektrik enerjisi tüketimi içerisinde yenilenebilir enerji tüketiminin payının ve kişi başına Gayri Safi Yurt İçi Hâsıla'nın yenilenebilir elektrik enerjisi üretimine anlamlı ve pozitif yönde katkı sağladığı ortaya çıkmıştır.

Denklem tahmini yapıldıktan sonra *Granger nedensellik testi* kullanılarak değişkenler arasındaki ilişkinin yönü tespit edilmeye çalışılmıştır. Granger nedensellik analizi sonuçlarına göre yenilenebilir elektrik enerjisi üretimi ile kişi başına GSYİH büyüme hızı arasında pozitif yönde çift yönlü nedensellik bulunmuştur. Dahası, toplam elektrik enerjisi tüketimi değişkeni ile toplam elektrik enerjisi tüketimi içerisinde yenilenebilir enerji tüketiminin payının değişkenleri hem yenilenebilir elektrik

enerjisi üretimini hem de kişi başına Gayri Safi Yurt İçi Hasıla büyüme hızı değişkenlerini tek yönlü olarak pozitif yönde etkilemektedir.

Kurulan VAR modelinden elde edilen *varyans ayrıştırması* sonuçlarına göre yenilenebilir elektrik enerjisi üretimini ve toplam elektrik enerjisi tüketimini hem kısa dönemde hem uzun dönemde büyük oranda kendileri belirlemiştir. Diğer değişkenlerin bu iki değişken üzerindeki etkileri sınırlı kalmıştır. Toplam enerji tüketimi içinde yenilenebilir enerji tüketiminin payı değişkeni üzerinde ilk dönemde kendisi % 8,2 oranında belirleyici iken toplam elektrik enerjisi tüketimi %61, yenilenebilir elektrik enerjisi üretimi %30,78 oranında belirleyici olmuştur. Zaman boyunca bu etkiler çok fazla azalma göstermemiştir. kişi başına GSYİH büyüme hızını ilk dönemde sadece %29,5 oranında kendisi belirlerken *YP*, *TK* ve *UR* değişkenlerinin etkileri sırasıyla %29, %22,8 ve %15’tir. Dönemler ilerledikçe *GR*, *YP* ve *UR* değişkenlerinin etkisi giderek azalmış, *TK* değişkeninin etkisi %50,4’e çıkmıştır.

Etki – tepki analizi sonucu elde edilen çıktılar genel olarak değerlendirildiğinde 6. dönemden sonra tüm tepkilerin sona erdiği gözlemlenmektedir. Yenilenebilir elektrik enerjisi üretimi hata teriminden kaynaklanan bir birimlik standart şoka karşılık diğer değişkenler önce azalan sonra artan tepkiler vermişlerdir. Yenilenebilir enerjinin toplam içindeki payı değişkeni hata teriminde meydana gelen şoka kişi başına GSYİH büyüme oranı güçlü şekilde artan sonra azalır tekrar artan tepki vermiştir. Kendisi ve yenilenebilir elektrik enerjisi üretimi değişkeni zayıf bir şekilde önce azalır sonra artan tepkiler vermiştir. Yenilenebilir enerjinin toplam içindeki payı değişkeni ise zaman boyunca neredeyse sıfır tepki vermiştir.

Tüm analizler genel olarak değerlendirildiğinde Türkiye’de yenilenebilir elektrik enerjisi üretiminin toplam elektrik enerjisi tüketimine, toplam elektrik enerjisi tüketimi içerisinde yenilenebilir enerji tüketiminin payına ve kişi başına Gayri Safi Yurt İçi Hasıla’nın büyüme oranına bağlı olduğu anlaşılmıştır. Türkiye’de toplam elektrik enerjisi tüketimi, toplam elektrik enerjisi tüketimi içerisinde yenilenebilir enerji tüketiminin payı ve kişi başına Gayri Safi Yurt İçi Hasıla’nın büyüme oranı arttıkça yenilenebilir elektrik enerjisi üretimi artacaktır. Bunun yanında yenilenebilir elektrik enerjisi üretimi, toplam elektrik enerjisi tüketimi ve toplam elektrik enerjisi tüketimi içerisinde yenilenebilir enerji tüketiminin payı kişi başına Gayri Safi Yurt İçi Hasıla’nın büyüme oranının nedenidir.

Türkiye’nin yenilenebilir elektrik enerjisi üretim potansiyeli oldukça yüksek olmasına karşın, bu potansiyele göre üretim miktarı düşük seviyelerdedir. Potansiyel ile yararlanma arasındaki farkın sebepleri yüksek maliyetler ve yasal düzenlemelerdeki eksikliklerdir. Enerjide % 70 oranında dışa bağımlılığı bulunan Türkiye’nin sürdürülebilir ekonomik büyümenin sağlanması için hem yenilenebilir elektrik enerjisi üretiminin artırılması hem de toplam elektrik enerjisi tüketimi içerisinde yenilenebilir enerji tüketiminin payının artırılması gerekir. Bunun için de devletin ve özellikle enerji bakanlığının bu konuda geliştirilen projelere desteğinin artarak devam etmesi gerekir. Yenilenebilir Enerji Kaynakları Destekleme Mekanizması (YEKDEM) katılımcısı olan her bir lisanslı üretim tesisi için lisans sahibine ödenecek Yenilenebilir Enerji Kaynakları (YEK) bedelinin artırılması Türkiye’nin yenilenebilir elektrik enerjisi üretimini artıracaktır.

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**THE RELATIONSHIP AMONG TOURISM REVENUE, TOURISM EXPENDITURE,
NUMBER OF INTERNATIONAL TOURIST ARRIVALS AND BORSA ISTANBUL
TOURISM INDEX: EVIDENCE FROM TURKEY**

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Abstract

Tourism is one of the important sectors in the economy of Turkey. According to the data of trading economics, as of the second quarter of 2018, the tourism revenues of Turkey has increased to 4.44 billion USD where 84.7% of it comes from the foreign investors. The purpose of this study is to analyze the long run and short term relationship among tourism revenues, tourism expenditure, Borsa Istanbul tourism index and number of international tourist arrivals for the case of Turkey. As a methodology, firstly Johansen Co-integration model is applied. The findings show that there is no long run relationship between tourism revenues and tourism expenditure, tourism revenue and number of international tourist arrivals and tourism revenue and Borsa Istanbul tourism index. In order to test for the short term relationship, Granger (1969) causality relationship is performed. The results show that there exist short run relationship between tourism revenue and Borsa Istanbul tourism index suggesting that tourism revenue Granger cause Borsa Istanbul tourism index (uni-directional causality). There is short term relationship between tourism revenue and number of international tourist arrivals suggesting that tourism arrivals Granger cause tourism revenue (uni-directional causality). For the relationship between tourism revenue and tourism expenditure, no short term causality relationship is reported.

Keywords: Tourism revenue, BIST tourism index, Co-integration, Causality, Turkey.

1. Introduction

Tourism is one of the important sectors for some of the countries such as Mediterranean countries including Turkey. According to UNWTO, Turkey is the 10th. among the popular destinations for the tourists. Besides, tourism contributes to the current account deficit of Turkey with 36%. In economics literature, there are many studies that analyze the relationship between tourism arrival and economic growth. For ex: Kum, Aslan and Gungor (2015) analyzed the relationship between tourism arrival and economic growth for the Next 11 countries. The findings of their study suggest that there exists long run relationship between tourist arrivals and GDP. Moreover, they find unidirectional causality from GDP growth to tourism. Demir, Alici and Lau (2017) study the response of the Turkish tourism companies stock prices to some economic variables such as consumer price index, imports, exchange rate, consumer confidence index, oil price, money supply, foreign tourist arrivals, and monthly stock market return using Granger causality test. As a result of their work, for the pre structural period consumer confidence index, exchange rate, and foreign tourist arrivals Granger cause tourism stock returns whereas the results in the post-structural break period show that oil price growths and imports are reported as significant. In another study, Ohlan (2017) examines the relationship between tourism and economic growth for India for the period between 1960–2014. The results of the study state that tourism, economic growth and financial development are cointegrated. In addition, the findings show that there is a long-run one-way Granger

causality from tourism to economic growth. Tang and Ozturk (2017) examine the effect of tourism in the economic growth of Egypt for the period 1982–2011. Their findings show that economic growth, tourism, and capital stock are cointegrated. The results of TYDL causality tests show that the relationship between tourism and economic growth is bi-directional. The organization of the paper is as follows. Section 2 describes the data and methodology used in the study. The results are presented and discussed in Section 3.

2. Data and Methodology

In the study, the analysis on the relationship between tourism revenue, tourism expenditure, number of international tourist arrivals and Borsa Istanbul Tourism Index is performed. The quarterly data set covers the period between 2003:Q1-2017:Q4. The data on tourism revenue, tourism expenditure, and number of international tourist arrivals are obtained from the Turkish Statistical Institute (TURKSTAT) and the Borsa Istanbul tourism index is obtained from the EIKON database. For the period that is studied, all the data are tested in order to find whether they contain unit root or not. For that purpose, Augmented Dickey Fuller (ADF, 1979; 1981) tests are used. The tests are applied both at intercept and trend and intercept. The results of the tests are reported (see Table 1). The test results indicate that, the variables used in the study are integrated at order 1 $I(1)$. As a methodology, firstly to test the long run relationships among the pairs (tourism revenue and tourism expenditure, tourism revenue and Borsa Istanbul tourism index and tourism revenue and number of international tourist arrivals), Johansen (1988; 1991) Co-integration model is applied. The relationship between tourism revenues and tourism expenditure is reported (see Table 2). The results show that there is no relationship between tourism revenue and tourism expenditure.

The relationship between tourism revenues and international tourist arrival (see Table 3). The results of the analysis show that there is no long term relationship (cointegration) between tourism revenue and international tourist arrival. The relationship between tourism revenue and BIST tourism index is reported (Table 4). The results of the analysis show that there is also no long term relationship between tourism revenue and international tourist arrival.

Table 1. Augmented Dickey Fuller Unit Root Test Results

	ADF		ADF(I)	
	Intercept	Trend and Intercept	Intercept	Trend and Intercept
Tourism Arrival	-2.612 (0.0968)	-2.499 (0.327)	-3.564*** (0.0099)	-4.221*** (0.008)
Tourism Revenue	-1.835 (0.359)	-2.333 (0.409)	-3.051** (0.036)	-3.761** (0.026)
Tourism Expenditure	-2.453 (0.132)	-2.961 (0.151)	-7.227*** (0.000)	-7.435*** (0.000)
BIST Tourism Index	-2.630 (0.092)	-3.628** (0.035)	-6.861*** (0.000)	-6.987*** (0.000)

Notes: Mac Kinnon (1996) one-sided p-values.

*** and ** denote significance at 1% and 5% significance levels respectively.

Table 2. Johansen Cointegration Test with Tourism Revenue and Tourism Expenditure

	Eigenvalue	Trace Statistic	CV(5%)	Prob.
None	0.107	10.081	15.494	0.274
At most 1	0.067	3.844	3.841	0.049
	Eigenvalue	Max-Eigen Statistic	CV(5%)	Prob.
None	0.107	6.237	14.264	0.582
At most 1	0.067	3.844	3.841	0.049

Notes: Mac Kinnon-Haug-Michelis (1999) p-values

Table 3. Johansen Cointegration Test with Tourism Revenue and International Tourist Arrival

	Eigenvalue	Trace Statistic	CV(5%)	Prob.
None	0.110	9.691	15.494	0.305
At most 1	0.057	3.239	3.841	0.071
	Eigenvalue	Max-Eigen Statistic	CV(5%)	Prob.
None	0.110	6.452	14.264	0.555
At most 1	0.057	3.239	3.841	0.071

Notes: Mac Kinnon-Haug-Michelis (1999) p-values

Table 4. Johansen Cointegration Test with Tourism Revenue and BIST Tourism Index

	Eigenvalue	Trace Statistic	CV(5%)	Prob.
None	0.161	12.457	15.494	0.136
At most 1	0.048	2.751	3.841	0.097
	Eigenvalue	Max-Eigen Statistic	CV(5%)	Prob.
None	0.161	9.706	14.264	0.231
At most 1	0.048	2.751	3.841	0.097

Notes: Mac Kinnon-Haug-Michelis (1999) p-values

Table 5. Granger Causality Test with Tourism Revenue and Tourism Expenditure

	Tourism Revenue (Dependent)		
Tourism Expenditure (Independent)	Chi-Sq	Df	Prob.
	5.828	4	0.2124
	Tourism Expenditure (Dependent)		
Tourism Revenue (Independent)	Chi-Sq	Df	Prob.
	5.748	4	0.2187

Table 6. Granger Causality Test with Tourism Revenue and BIST Tourism Index

	Tourism Revenue (Dependent)		
BIST Tourism Index (Independent)	Chi-Sq	df	Prob.
	1.866	4	0.7603
	BIST Tourism Index (Dependent)		
Tourism Revenue (Independent)	Chi-Sq	df	Prob.
	10.871**	4	0.0280

Notes: ** denotes significance at 5% significance levels respectively.

Table 7: Granger Causality Test with Tourism Revenue and International Tourist Arrival

	Tourism Revenue (Dependent)		
International Tourist Arrival (Independent)	Chi-Sq	df	Prob.
	10.835**	4	0.0285
	International Tourist Arrival (Dependent)		
Tourist Revenue (Independent)	Chi-Sq	df	Prob.
	3.670	4	0.4525

Notes: ** denotes significance at 5% significance levels respectively.

The short term relationship (causality) between the tourism revenue and tourism expenditure, tourism revenue and tourism index and tourism revenue and international tourist arrivals are tested using Granger causality. It is reported that the short term relationship between tourism revenue and tourism expenditure (see Table 5). The results of the analysis show that there is no short term causality relationship. The short term relationship between the tourism revenue and BIST tourism index is tested using Granger causality. The test results (see Table 6) reported that there exist short run relationship between tourism revenue and Borsa Istanbul tourism index suggesting that tourism revenue Granger cause Borsa Istanbul tourism index (uni-directional causality). The short term relationship between tourism revenue and international tourist arrival is reported (see Table 7). The findings of the analysis suggest that there is short term relationship between tourism revenue and number of international tourist arrivals suggesting that international tourist arrivals Granger cause tourism revenue (uni-directional causality).

3. Conclusion

In this study a set of analysis are performed in order to test short term and long term relationship between tourism revenue and tourism expenditure, tourism revenue and number of international tourist arrivals, tourism revenue and BIST tourism index for the period 2003Q1-2017Q4. The results of the analysis show that there is no long run relationship between tourism revenues and tourism expenditure, tourism revenue and number of international tourist arrivals and tourism revenue and Borsa Istanbul tourism index. For the short term relationship, the results show that there is short run relationship between tourism revenue and Borsa Istanbul tourism index suggesting that tourism revenue Granger cause BIST tourism index (uni-directional causality). There is short term relationship between tourism revenue and number of international tourist arrivals suggesting that tourism arrivals Granger cause tourism revenue (uni-directional causality). There is no short term causality relationship is reported for the relationship between tourism revenue and tourism expenditure. When the results are evaluated, the increase in the income of the tourism companies, which are traded in the tourism stock index, causes the increase in the cash flows of the companies. This level of increase in cash flows not only allows companies to increase their auto financing resources but also allows new investments to be financed by their own internal resources without the need to raise capital through stock issuance and / or borrowing through bonds, as well as increase shareholders' creating a stable payment potential. This is reflected as a positive signal to the markets and leads to a demand increase in the firms' stocks. Thus, the price of stocks increases according to the increasing demand and capital gains are generated. As a result, changes in the tourism stock index, which are traded by the tourism companies, can be predicted based on the increase or decrease in the tourism revenues in the direction of the existing one-way causality relationship.

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SOCIAL ENTREPRENEURSHIP AND THE EVOLVING NATURE OF ECONOMIC DEVELOPMENT: AN ANALYSIS

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Abstract

The paper introduces the relevance of the concept and practice of social entrepreneurship against the backdrop of failures of the institutions of economic development like market and government in development space and the challenges that new institutions like globalization pose for societies and individuals at the margin. As an evolving concept, social entrepreneurship intends to provide inventive solutions to pressing socio-economic problems. Putting the concept of social entrepreneurship in the framework of the current concept and practice of sustainable development, the paper hypothesizes that social entrepreneurship as a practice can realise sustainable development in all its three important dimensions i.e. economic, social and environmental and in the process could make indeterminate or inefficient situations in the economic, social and environmental plane determinate and efficient. In its social dimension social entrepreneurship is meant to have social innovations that could ensure that the poor and the marginalised are not excluded from the proceeds of economic growth. In its economic dimension, it is assumed to create some income and wealth. In its environmental dimension, it could ensure that its innovations solve environmental challenges of pollution and climate change. This overriding hypothesis is vindicated with the help of case studies of social enterprises like Grameen from Bangladesh, SEWA, Selco Solar India, Crafts Bridge, Barefoot College, Narayana Hospitals from India, Empower Generation from Nepal and PPRDECOOP from Nicaragua .

Taking the specific case of challenges to development in North Eastern region of India in terms of presence of high transaction costs because of underdevelopment of market and limitations of Government, an argument is built upon that promotion of social entrepreneurship can reduce these high transactions costs manifested in the form of undefined property rights, high negotiation costs, higher costs of enforcement of contracts and governance deficits. Endorsement of social enterprise is also positioned as a means to expand the capability vector of individuals and societies in this region and for that matter in the developing world.

It is against these constructions and findings; the paper argues that innovations in the front of property rights, governance, conflict resolution and social and economic integration through social entrepreneurship hold the promise for the future growth and development of the North Eastern Region of India and similar regions in other developing world. This to materialise, requires provisioning of enabling legal, financial and business environment, support to research on social entrepreneurship and inclusion of courses on social entrepreneurship in school, college and university curriculums.

Keywords: Social entrepreneurship, Economic development, Sustainable development, Transaction costs, North East India.

**PUBLIC SIZE AND ECONOMIC GROWTH RELATIONSHIP: CAN A BETTER
INSTITUTIONAL QUALITY FIX THE OUTCOMES?**

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Abstract

The role of public size in economic growth has been widely studied since the early views of Keynes (1936). Currently, the topic regained its importance since both the developed and developing economies need more finance for supporting their welfare expenditures and for the completion of mega projects in the both groups, respectively. While public expenditures are considered vital for the provision of public goods, maintaining rule of law and securing property rights, an excessively large public size is also considered growth inhibiting due to its inefficient use and the crowding out of productive private investment. Theoretical literature argues that there exist certain macroeconomic and institutional features that can result in an efficient use of public spending for an economy. However, to the best of our knowledge, the relevance of these institutional characteristics is not tested by the empirical literature. Our paper makes first attempt to this direction. Using system GMM-model and innovative threshold estimation technique, this paper studies whether the growth effects of public size differ for countries with distinct levels of institutional quality. Our results, based on a large panel of 113 developed and emerging economies over the period 1981-2015, demonstrate that there exists a threshold effect in the public size–growth relationship. Specifically, we find that the public size–growth relationship is negative and significant for countries with weak level of institutions. Once the countries cross that threshold, public size either enhances economic growth or the relationship is nonexistent. For the conduct of fiscal policy, this finding suggests that quality of public finance is more important than the excessively large size of government spending.

Keywords: Public size, Institutions, Economic growth.

RESIDENTIAL ELECTRICITY DEMAND-GDP NEXUS IN ALGERIA: A STRUCTURAL TIME SERIES ANALYSIS

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Abstract

This study investigates the relationship between residential electricity consumption, Gross Domestic Product (GDP) and electricity prices in order to forecast future Algerian residential electricity demand. To achieve this purpose, a residential electricity demand function for Algeria is estimated by applying the structural time series technique to annual data over the period 1970 to 2015. In addition to identifying the size and significance of the GDP and price elasticities, this technique also uncovers the electricity Underlying Energy Demand Trend (UEDT) for this sector, which reflects all unobservable factors.

The results suggest that GDP, electricity prices and a UEDT all have an important role to play in driving Algerian residential electricity demand. Consequently, they should all be incorporated when modelling Algerian residential electricity demand. The GDP and price elasticities are estimated to be 0.68 and -0.46 respectively, with an increasing (but with different rate) UEDT, which might imply that there are few alternative options available to the consumer and reflects few energy efficiency in this sector. The preferred estimated equation required three interventions (Level in 1984, irregular in 1981 and 1987). The level intervention coincides with the restructuring of the agriculture sector and the second electrification program destined to the residential sector, while the irregular interventions can be described as a pulse effect. The relative contribution of the observable (GDP and Price) and unobservable (UEDT) factors shows that GDP and UEDT are the most contributing factors in the total change in electricity demand.

Based on the estimated equation, and different forecast assumptions, it is predicted that Algerian residential electricity demand will be somewhere between 34 and 97 TWh by 2030, based on three scenarios. Given its particular importance, the estimated UEDT should arguably be considered in future energy policy decisions concerning the Algerian electricity policy.

Keywords: Electricity demand, Stochastic trend, Elasticities, Forecasts, Algeria.

CONSUMER CONFIDENCE AND THE STOCK MARKET: EVIDENCE FROM TURKEY

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Abstract

The relationship between consumer confidence index (CCI) and stock market sub-indices of Turkey namely, BIST-Banks, BIST-Chem., petrol and plastic, BIST-Electricity, BIST-Insurance, BIST-Sports, BIST-Tourism, BIST-Transportation, BIST-Basic Materials, BIST-Food and Beverage, BIST-Information Technology, BIST-Telecommunications, BIST-Textile and Leather, BIST-Metal products and machinery, BIST-Wood-Paper-Printing and BIST-Non-metal min. products are examined for the period 2004:04-2017:07. The frequency of the dataset are monthly. As a methodology, Johansen Co-integration tests are used to test the long term relationship between CCI and stock market indices separately. The main results of the analysis show that there are long-run relationships between a set of stock market indices and CCI. Later, to test the short term relationship among the variables, Granger Causality tests are used. The results show that there are uni-directional and bi-directional causality relationships.

Keywords: Consumer Confidence Index, Stock market, Co-integration, Causality, Turkey.

1. Introduction

Consumer confidence has an important place in economy and finance literature. It is an indicator of economy that shows the households' consumption and saving in the future. In other words, it shows the consumer's state of mind towards economy which is subjective. Therefore, an increase in CCI shows that consumers are willing to spend more in the future and they are optimistic related to the market. On the other hand, a decrease in CCI shows that consumers are pessimistic related to the market and are not willing to spend more in the future. Consumers' consumption behavior is expected to affect the stock exchange as stock exchange is composed of firms.

In literature, there are some studies which examine the relationship between CCI and stock markets. For ex: Ferrer et al. (2016) examine the relationship between CCI and stock markets for two stock market meltdowns between 2002-2007 and 2007-2008. Their study finds that CCI-stock market relationship is not positive universally. Canoz (2018) examine the relationship between CCI and Istanbul Stock Exchange for the period between 2004-2017 using Toda-Yamamoto Causality Test. His findings suggest that there exist a one-way causality from stock returns to consumer confidence. Hsu et al. (2011) analyze the relationship between CCI and stock market index using correlated effects mean group estimation of Pesaran (2006) using a panel set of 21 countries. Their findings suggest two way causality (bi-directional) between CCI and stock market index.

Qiu and Welch (2004) have used surveys consisting of 5 questions for 500 households in US. As a result of this survey, they provide evidence that the index can be used as a proxy for investor sentiment. Rakotondramaro (2016) examine the relationship between CCI and stock market index using Granger causality for US for the post crises period 2007-2013. The findings of his work shows that the unidirectional causality exists from stock market index to consumer confidence.

In this paper, the relationship between CCI and stock market indices and subindices are examined for the case of Turkey. In section 2, data and methodology part are reported. The main empirical findings of the study are explained in section 3. In the last section the paper is concluded.

2. Data and Methodology

In this study, the relationship between consumer confidence index (CCI) and stock market indices BIST 30, BIST 50 and sub-indices namely, BIST-Banks, BIST-Chem., petrol and plastic, BIST-Electricity, BIST-Insurance, BIST-Sports, BIST-Tourism, BIST-Transportation, BIST-Basic Materials, BIST-Food and Beverage, BIST-Holding and inv., BIST-Information Technology, BIST-INV. Trusts, BIST-Leasing and Fac., BIST-Financials, BIST-Industrials, BIST-Services, BIST-Technology, BIST-Real estate, BIST-Telecommunications, BIST-Textile and Leather, BIST-Metal products and machinery, BIST-Whole. And ret. Trade, BIST-Wood-Paper-Printing and BIST-Non-metal min. products are analyzed.

The study covers the period between 2004:04-2017:07 and the data used are monthly. The data related to stock market indices and consumer confidence index are obtained from Datastream database. As a first step, for all the variables unit root tests (Augmented Dickey Fuller (ADF), 1981; Phillips Perron (PP), 1988) are applied and as a result all variables are found to be stable at the first difference. The long-term co-integration relationship among each of the stock market sub index and CCI is analyzed by using Johansen (1988; 1991) Co-integration test.

3. Empirical Findings

As a first step, unit root tests are applied to test the existence of unit root. Thus, we applied ADF and PP tests both at intercept, and trend and intercept. The results are reported (see Table 1). The results of both of the tests are alike. The results suggest that all the variables are $I(1)$ both at intercept, and trend and intercept.

It is reported long term cointegration and short term Granger (1969) causality relationship between the variables (see Table 2). In the first column the related variables, in column 2 lag length which is determined by Akaike Criterion, in column 3 cointegration relationship and in the last column Granger causality test results are reported. The results of the cointegration test suggest that in 8 out of the 26 pairs, long run relationship do not exist. In 18 pairs there is relationship. In short term relationship 3 out of the 26 pairs, there is Granger causality relationship. In 1 case there is bidirectional relationship exist. For the remaining pairs, there are unidirectional relationships.

4. Conclusion

As an indicator, consumer confidence has an important place in economy and finance literature. It is an indicator of economy that shows the households' consumption and saving in the future. In this direction, the aim of this study is to examine the relationships (short term - causality and long term - cointegration) between consumer confidence index (CCI) and stock market sub- indices of Turkey for the period between 2004:04-2017:07 by using the econometric methods.

First of all, the findings show that there are long-run relationship mostly between some of the stock market indices and CCI. Secondly, Granger Causality test is performed to analyze the short-run causality relationship among the variables. According to the empirical results, there are mostly unidirectional causality relationships from sector indices to CCI.

As a result, it can be expressed that stock prices conducts consumer's expectations and behaviors. Moreover, this expression is supported by Otto (1999). He states that, this result is because of the stock price's price movements creates wealth effect and also is a leading indicator of the economy. Therefore, the consumer confidence index is a healthy indicator for investors and business managers as regards the course of the stock market and the prediction of stock prices and benefits.

Table 1. Unit Root Test Results (Augmented Dickey Fuller and Phillips Perron Tests)

	ADF				PP			
	Level		1 st Difference		Level		1 st Difference	
	Intercept	Trend and Intercept	Intercept	Trend and Intercept	Intercept	Trend and Intercept	Intercept	Trend and Intercept
BIST 30	-2.0143	-3.1215	-12.3110***	-12.3139***	-2.0173	-3.2363*	-12.3114***	-12.3139***
Bank	-2.7579*	-3.1345	-12.1855***	-12.2434	-2.7579*	-3.1771*	-12.1862***	-12.2434***
Chemicals	-0.8754	-2.4649	-11.3265***	-11.2911***	-1.0025	-2.9549	-11.3740***	-11.3396***
Electricity	-2.6317*	-2.7910	-10.6846***	-10.6523***	-2.6348*	-2.7614	-10.7062***	-10.6741***
Insurance	-2.1291	-3.0404	-11.4968***	-11.5012***	-2.1644	-3.1375	-11.4902***	-11.4915***
Sports	-2.0172	-1.9732	-13.6551***	-13.6781***	-1.9502	-1.8666	-13.6935***	-13.7412***
Tourism	-2.2964	-2.3468	-10.8324***	-10.8036***	-2.6437	-2.6836	-10.8362***	-10.8067***
Transportation	-0.9749	-1.9231	-10.4877***	-10.4578***	-1.1556	-2.5536	-10.6745***	-10.6448***
Basic Materials	-1.2017	-2.9206	-10.8008***	-10.7688***	-1.3007	-3.3296*	-10.8007***	-10.7685***
Food and Beverage	-1.4977	-2.0367	-14.6697***	-14.7224***	-1.5047	-1.9676	-14.5722***	-14.6608***
Holding & Inv	-1.5516	-2.5898	-11.5644***	-11.5299***	1.551556	-2.8089	-11.5715***	-11.5372***
Inf. Tech.	-0.3547	-1.7140	-11.0006***	-10.9969***	0.633606	-2.0333	-11.0350***	-11.0310***
Inv. Trusts	-1.4061	-2.1619	-11.5206***	-11.5047***	-1.5507	-2.3413	-11.4903***	-11.4741***
Leasing & Fac.	-1.7755	-2.6678	-11.4241***	-11.3874***	-1.8751	-2.8901	-11.4163***	-11.3795***
BIST 50	-2.0067	-3.0046	-12.0949***	-12.1014***	-2.0193	-3.1423	-12.1047***	-12.1019***
Financials	-2.3965	-3.0569	-11.9592***	-11.9817***	-2.4042	-3.1467*	-11.9592***	-11.9817***
Industrials	-0.9656	-3.0592	-10.6722***	-10.6417***	-1.0778	-2.9063	-10.6659***	-10.6352***
Services	-2.1642	-3.0026	-13.6588***	-13.7721***	-2.2361	-2.9576	-13.6412***	-13.7717***
Technology	0.5756	-1.5534	-10.5671***	-10.6049***	0.1955	-1.6892	-10.6901***	-10.6858***
Real Estate	-2.7664*	-3.0454	-10.3005***	-10.2803***	-2.5054	-2.8379	-10.2501***	-10.2282***
Telecommunication	-3.3271**	4.1117***	-14.1847***	-14.2855***	3.3271**	3.9868**	-14.2979***	-14.3036***
Textile & Lthr	-0.3457	-2.3201	-10.3065***	-10.2927***	-0.5802	-2.2763	-10.3065***	-10.2927***
Metal Goods, Mch	-0.6692	-2.2929	-9.7067***	-9.6980***	-0.5662	-2.3529	-9.7381***	-9.7285***
Whsl & Ret. Trade	-1.4744	-2.1218	-11.8840***	-11.9391***	-1.4725	-2.2165	-11.8731***	-11.9402***
Wood, Paper & Print	-2.0295	-2.6395	-13.0107***	-12.9701***	-2.1302	-2.8354	-13.0041***	-12.9652***
Non Met. Mrl Prods.	-2.9860**	-3.2418*	-10.1217***	-10.1745***	-2.5498	-2.8005	-10.0884***	-10.1331***

Note: *** denotes the significance at 1% significance level.

Table 2. Johansen Cointegration and Granger Causality Test Results

Relationship	Lag Length (Akaike Criterion)	Co-integration (Long Term)	Granger Causality (VECM / VAR) (Short Term)
BIST 30 – CCI	2	Exist	Uni-directional (BIST 30 to CCI)
Bank – CCI	2	Exist	Uni-directional (Bank to CCI)
Chemicals-CCI	2	Do not Exist	Uni-directional (Chemicals to CCI)
Electricity-CCI	2	Exist	Uni-directional (Electricity to CCI)
Insurance- -CCI	2	Exist	Uni-directional (Insurance to CCI)
Sports –CCI	1	Exist	No Causality
Tourism –CCI	2	Exist	No Causality
Transportation –CCI	2	Do not Exist	Uni-directional (Transportation to CCI)
Basic Materials –CCI	2	Exist	Bi-directional (Basic Material to CCI)
Food & Beverage –CCI	2	Exist	Uni-directional (Food to CCI)
Holding & Inv –CCI	2	Exist	Uni-directional (Holding to CCI)
Inf. Tech. –CCI	2	Do not Exist	Uni-directional (Inf. Tech. to CCI)
Inv Trusts –CCI	1	Do not Exist	No Causality
Leasing & FAC. –CCI	2	Do not Exist	Uni-directional (Leasing to CCI)
BIST 50 –CCI	2	Exist	Uni-directional (BIST 50 to CCI)
Financials –CCI	2	Exist	Uni-directional (Financials to CCI)
Industrials –CCI	2	Exist	Uni-directional (Industrials to CCI)
Services –CCI	2	Exist	Uni-directional (Services to CCI)
Technology-CCI	2	Do not Exist	Uni-directional (Technology to CCI)
Real Estate-CCI	2	Exist	Uni-directional (Real Estate to CCI)
Telecomm. –CCI	2	Exist	No Causality
Textile & Lthr-CCI	2	Do not Exist	Uni-directional (Textile to CCI)
Metal Goods, Mch-CCI	2	Do not Exist	Uni-directional (Metal to CCI)
Whsl & Ret. Trade-CCI	2	Exist	Uni-directional (Wholesale to CCI)
Wood, Paper & Print-CCI	2	Exist	Uni-directional (Wood to CCI)
Non Met. Mrl. Prods.-CCI	2	Exist	Uni-directional (Non-metal to CCI)

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FLUCTUATIONS OF THE LEBANESE ECONOMY

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Abstract

The aim of this paper is to analyze How aggregate activity in Lebanon fluctuates with regards to recurrent shocks. The Research starts by identifying the Lebanese economic Business Cycle from the first quarter of 1998 to the fourth quarter of 2015 adopting a statistical method. Furthermore, this research studies the relationship between the capacity utilization rate and the inflation Rate and study theoretically and empirically How Monetary and Real Shocks account for the disturbances that affect the economic activity. Findings prove that, over the studied period, the Lebanese economy perform largely under its full capacity and that the Capacity utilization rate is related to inflation in the short run but not in the long run. In other terms, findings prove that monetary factors account for Business Cycle disturbances of the Lebanese economy in short run but not in the long run.

Keywords: Capacity utilization rate, Inflation, Monetary disturbances, Potential output.

1. Introduction

The Lebanese economy has practiced wide and irregular Fluctuations of its GDP over the period 1970 to 2015. The GDP growth rate has reached 12.5% in 1972 to drop 58% in 1976 with the beginning of the Lebanese civil war, to increase by 83% at the end of 1990. However, starting the after-war reconstruction in 1997, has enhanced the real GDP growth rate which oscillated over the period 1999 – 2015, from below 0% level in 1999 to 2.57% in 2009 (see figure 3).

On the other hand, since 1992, the Lebanese economy was characterized by a high level of dollarization as consequences of hyperinflation. To control the inflation rate, the Lebanese monetary authorities have adopted the fixed exchange rate regime in 1997 administrating the Lebanese currency price. Thus, to maintain the Lebanese currency parity against the Dollar within a very narrow limit, the Central Bank offered high interest rates on Lebanese treasury bills. The cost of fixing the Lebanese currency added to the cost of reconstruction after the civil war and the Israeli continual attacks to south Lebanon have produced a permanent budget deficit and contributed to increase the public debts to alarming level. The public debts were equivalent to 35 billion of \$ in 2004.

What causes GDP fluctuations? The Keynesian view line theoreticians advocated the role of monetary and argued that short-run fluctuations in employment and output are largely caused by variations in aggregate demand. Robert Lucas's (1972, 1977) pointed to the shortcoming of the Keynesian approach and provide a theoretical groundwork for the notion of "monetary policy ineffectiveness" by integrating the rational expectations to the economic model. However, Friedman and Schwartz (1963) postulated a link between monetary policy and real economic activity. Consequently, the monetarists led, explained that monetary authorities should prevent excessive expansion of the money supply to maintain price stability.

The aim of this paper is to identify the Lebanese Business Cycle over the period 1998 to 2015 and to explore how aggregate activity in Lebanon fluctuates with recurrent shocks. In other terms, this paper investigates how the output fluctuates around the trend level that reflects the business cycles amplitude and duration. Moreover, this paper discusses whether the adopted monetary policy in Lebanon had succeeded to smooth business cycles or not? However, the assessment of the causality relation between the capacity utilization rate and inflation allows to answer, if monetary disturbances matter for Business cycle?

As in (Cogley and Nason (1995)), this paper uses Hodrick Prescott filter to identify Lebanese business cycle. However, Granger causality test is used to evaluate the relationship between the capacity utilization rate and the inflation in the short run while OLS method is applied to assess this relation in the long run. This paper is organized as follows: Section 2 presents the empirical literature review. Section 3 presents the Hodrick Prescott Filter results and analysis for the Lebanese GDP;

followed in section 4 by an analysis to the relationship between the capacity utilization rate and inflation variables to conclude in section 5. All the tests are performed using EViews.

2. From Cycle Definition to Economic Models

An overview of the world history shows incessant series of recurrent cycles with either uniformities or variabilities. The history repeats itself and it goes through cycles in almost everything: climate, economic, war, geopolitical, life and so on. Thus, the academic world of the historiography describes a cyclical view of history analyzing the cycles of episodes since the 19th century. However, the originators of this analysis were the Genius Ibn Khaldun (1377).

In his famous book “Al Muqaddimah” written in 1377, Ibn Khaldun recorded an early view of the history and established a coherent economic theory that explains and predicts the rise and fall of all Empires, nations and civilizations, through the study of their life cycles. He explained that Empires are like organisms, their life trajectories can be plotted like points in a bell curve from their beginnings to their deaths.

On the other hand, Mitchell (1927), presented a descriptive approach of cycle which encompasses the decomposition of a wide number of time series into sequences of cycles. Furthermore, he divided each cycle into four different stages, unavoidably progressing from one into another: expansion, peak, contraction, and trough. He explained that the major fact about cycles is the recurrent nature of the events to present with Burns in 1943 a more detailed definition of business cycle where they compared cycle to “a type of fluctuation found in the aggregate economic activity of nations that organize their work mainly in business enterprises”. Nonetheless, in the conventional model of the economy, the business cycle is represented as fluctuations of actual GDP around a smooth trend line. The duration of these fluctuations can last from a few quarters to several years.

Investigating the sources of GDP fluctuations, economists are divided into two main groups supported by empirical works. A group of economists attached to Keynesian school, points to the Monetary Disturbances as source of Business cycle. Consequently, using time series techniques, Christiano and Eichenbaum (1992) accumulates evidences which support the important role monetary policy in determining aggregate output, employment, and other macroeconomic factors. Alternatively, a second group, related to classical school, advocates that Business cycles are generated by that Non-monetary factors. In this line of view the Baxter and King (1993), present an empirical work which decomposes the GDP time series into periodic components by regressing the time series in a set of sine and cosine waves to concluded that fiscal shocks count in expressing business cycles fluctuations.

However, the rational expectation idea initiated by Muth (1961), inspired Robert Lucas to develop in 1975 the rational expectation theory which emphasis the monetary policy ineffectiveness. Luca explained that that policymakers can guide the economy by systematically influencing the economic agents to make false expectations. Thus, in contrast with the Keynesian perspective, where policy offers relief from unemployment and market failures, Luca clarified that, in a world of rational expectations and market clearing, monetary policy is not the primary source of macroeconomic instability and that Only unanticipated monetary shocks can have real effect on real variables. Furthermore, he explained that Policies which tries to manipulate the economy by persuading economic agents to false expectations do not improve the economy’s performance but generate “noise” making economic decisions and adjustment more complicated. Nevertheless, while accepting Keynesian economics, the Monetarist theoreticians explained that excessive expansion of the money supply is fundamentally inflationary.

Otherwise, in the line of Joseph Shumpeter (1927) who has developed a theory of business cycles which puts its emphasis on industrial innovation rather than monetary sector, Classical economists have developed the real business cycle model (RBC) which advocates the role of technology shocks as a cause of economic fluctuations and limits the role of monetary factors in generating these economic fluctuations. The RBC ties a theory of economic growth, behavioral mode of economic agents based on the utility maximization, and an explanation of the business cycle. In other terms it integrates both growth (Solow Model) and the business cycles theory to confirm that business cycle fluctuations are the optimal responses to unanticipated supply shocks defined by the total factor productivity.

However, Kydland and Prescott (1982) proposed a theory of business cycle fluctuations far from the Keynesian tradition. Integrating growth and business cycle theory, they characterized a general

macroeconomic equilibrium model to predict the consequence of a policy rule upon the operating characteristics of the economy. This simple model, based on microeconomic foundations and where no role for monetary factors, generates quantitatively significant business cycles. They argued that periods of temporarily low output growth are not the results of market failure to clear but could simply be a supply shock where slow improvements in production technologies appear. Kydland and Prescott succeeded to correlate 70% of the fluctuation in output to changes and growth in technology.

Furthermore, Thomas Cooley and Gary Hansen (1989) proved, in a cash-in-advance real business cycle model, that adding monetary factors made little difference to the results, which assumes a minimal role for monetary aggregates. King, Plosser and Stock (1991) implemented a structural model for business cycle to conclude that business cycles are mutually determined by growth. Nelson and Plosser (1992) argued that the long run path of macro economy is permanently affected by contemporary events. Their empirical work demonstrates that the hypothesis that GDP growth follows a random walk cannot be rejected. In other terms, that most of the changes in GDP were permanent, and that output growth would not revert to an underlying trend following a shock. Thus, changes in aggregate demand – the heart of Keynesian macroeconomics- must be of relatively little importance.

Nevertheless, the conflict between normative implications and policy practice in one hand and between theoretical predictions and evidence in other hand, is considered as an indication that some fundamentals that are essential in actual economies may be missing in classical monetary models. To overcome these deficiencies a group of economists, while maintaining the RBC as an underlying structure introduces Keynesian assumptions to developed economic models. Consequently, the progress in economic research combined classical and Keynesian principles to developed the New Keynesian view. Keynesian elements as imperfect competition, and nominal rigidities were incorporated into a dynamic model to analyze the connection between inflation, money, and the business cycle. Equilibrium conditions for aggregate variables are resulting from optimal individual behavior regarding consumers and firms; as well they are consistent with the immediate markets' clearing. From that point of view, the new generation of Keynesian models has much stronger theoretical foundations than traditional ones. However, the stressing on the nominal rigidities as being a source of monetary non-neutralities, provides an important differentiation between classical monetary model frameworks and new Keynesian models.

However, the emphasizing on the nominal rigidities as being a source of non-neutralities, affords an important differentiation between classical monetary frameworks and new Keynesian models. However, and despite their different theoretical basics, there are important connections between the RBC model and the new Keynesian monetary model. These similarities are reflected in the assumption of an infinitely-lived representative household, who seeks to maximize the utility from consumption and leisure, subject to an intertemporal budget constraint, and large number of firms with access to an identical technology, subject to exogenous random shifts. Nevertheless, some key elements of RBC theory are missing in the canonical version of new Keynesian model, like the endogenous capital accumulation.

Thus, Mankiw (1989), in his famous paper "Real Business Cycles: A New Keynesian Perspective" developed a New Keynesian assumption. He considered that money has a primary role to explain the fluctuations of business cycles. Furthermore, he assumed that economic recessions are not caused by technological shocks, since economic agents are rational and response to any technological downturn causing a recession.

Though, Rotemberg and Woodford (1993), introduced imperfect competitive product markets into a standard neo classical growth model to analyze the effects of imperfect competition upon the economy's response to many types of real shocks including the technology shock. Their findings proved that imperfect competition affects the way in which the economy responds to several shocks which may occur.

Furthermore, Goodfriend and King (1997), in line with the New Keynesian paradigm developed the New Neoclassical synthesis (NNS). Merging Keynesian and classical elements, they produced the systematic application of intertemporal optimization and rational expectations as stressed by Robert Lucas proving that the evolution of inflation in the NNS models depends on current and expected future markups. Moreover, their findings specify that considering an NNS model, the near-zero inflation rate targeting is possible.

Nonetheless, a group of economists characterized business cycles by a dynamic stochastic general

equilibrium (DSGE) models. These models are based on microeconomic foundations which emphasize that all agents are rational and make decisions based on intertemporal optimization under uncertainty. In other terms, economic agents' decisions today depend on their expectations on future uncertain outcomes. Thus, Smets and Wouters (2003) developed a dynamic stochastic general equilibrium (DSGE) model with sticky wages and prices for the euro zone using Bayesian estimation techniques. Their model incorporates a variable capital utilization rate while findings prove a considerable degree of price stickiness in the euro zone. However, Christiano, Eichenbaum and Evans (2005), used a DSGE model along with staggered wages and price contracts to investigate the evidence of output persistence and inflation inertia that occurs under a mix of frictions. After policy shock, the model generates persistent response in output and inertial response in inflation. Furthermore, findings prove that after the hit of a monetary policy shock, the money growth rate and the interest rate move persistently in reverse directions.

This paper applies Hodrick Prescott (HP) filter to derive the output trend and the output Gap. However, a positive gap is related to the non-use of capacity utilization while a negative gap is related to the total use of capacity utilization implying an increase in demand and in inflation as results This paper analyzes therefore, the relation between capacity utilization rate and inflation in the short and long run to conclude empirically on the relation between Lebanese monetary policy and Business cycle.

3. Lebanese Business Cycle over 1998 to 2015

The fluctuations of actual GDP around long run trend which form the potential GDP constitute the Business Cycle. The strategy of constructing the cyclical fluctuations of the economic activity around the long-term trend, suggests a general estimation of the long-term trend, by calculating the potential GDP, decomposing the trend and generating the business cycles. Consequently, equation (1) represents the trend-cycle decomposition of real GDP time series x_t :

$$x_t = g_t + c_t + \varepsilon_t \quad (1)$$

Where, g_t represents the growth (the trend component of x_t), and c_t is the cyclical component of x_t for $t = 1$ to t , and ε_t represents the irregular components of x_t

Two main groups of methodologies to perform this strategy: the statistical approach and the economic variables approach. This paper uses the statistical approach to determine Business cycle. Statistical methods are based on the use of the information contained in the history of the series of GDP without reference to a particular economic model. Three categories of statistical methods to generates the long-term trend: Segmented trend method, linear trend method, and Filters method. This paper uses as in Singleton (1988), Cogley and Nason (1995) and King and Rebelo (1998), the Hodrick-Prescott filter¹ to decompose the series into trend and cyclical components. This method allows to measure the amplitude of the business cycles and the production gap between the potential and the actual GDP.

3.1. Hodrick Prescott Filter Methodology

The Hodrick Prescott (1981) filter is dedicated for business cycle and trend estimation. It is a moving average filter built using penalty-function method. Moving smoothly over time, this filter extracts optimally the unit root (stochastic trend). It is built as a response to the minimization problem of variability in the cyclical component subject to a penalty for the smoothness of the trend component or the variation in the second difference. To calculate the smoothness of cyclical component, the sum of squares of its second difference is considered. Consequently, to isolate the cycle component, the HP-Filter resolve the following minimization problem:

$$Min[\sum_{t=1}^T (x_t - g_t)^2 + \lambda \sum_{t=1}^T ((g_{t+1} - g_t) - (g_t - g_{t-1}))^2] \quad (2)$$

¹ Kalman Filter is an alternative filter method.

where x_t represents the real GDP time series, g_t the growth component (potential GDP or trend) of x_t , and c_t the cyclical component of x_t , for $t = 1$ to t .

The first term of equation (2) measures the fitness of the time series' and the second term measures its smoothness. A conflict may exist between "goodness of fit" and "smoothness". A trade-off parameter λ^2 is called to resolve this issue, if λ is 0, the trend component becomes equivalent to the original series while diverges to infinity, the trend component approaches a linear trend. Therefore, the business cycles c_t is the difference between the GDP time series x_t and the growth component g_t for $t=1$ to t .

$$C_T = X_T - G_T \tag{3}$$

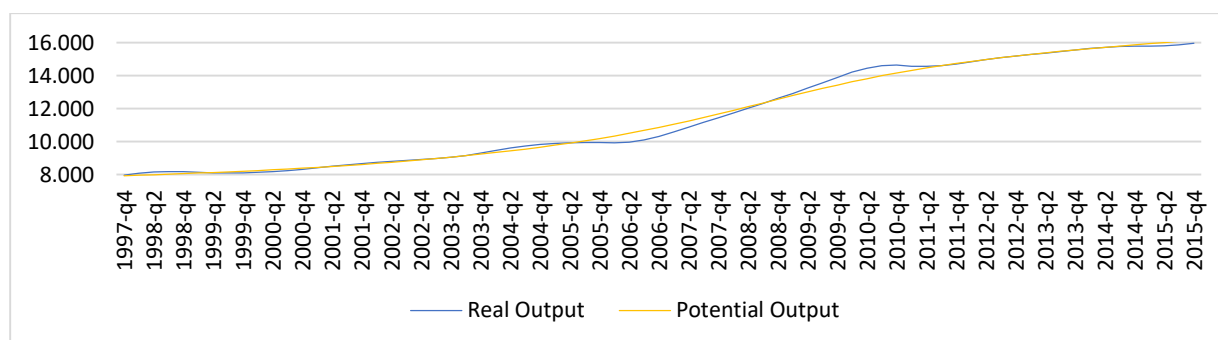
Although the severe discussions and heavy criticism, the HP filter stood remarkably. However, the main drawback of the HP filter is that it generates a biased trend estimation at the end of the sample. Thus, the potential GDP estimation at the end of the period may be unstable and subject to several updates and revisions when new data on the observed GDP are available.

3.2. Data Sources

Yearly time series data covering the period from 1998 through 2015 for the variables GDP, is collected from the database of the World Bank, more precisely, the World Development indicators (WDI) Database (<https://data.worldbank.org/indicator/NY.GDP.MKTP.KN>) visited in 09/03/2018. The yearly time series are then converted into quarterly time series using the Chow and Lin solution³.

3.3. HP Filter Application Results

The application of HP filter on quarterly time series of Lebanese GDP produces the potential output. The Output GAP is then derived using the equation (3). Fig 1 presents the HP filter results where the Lebanese GDP series is de-trended to derive the potential output over the studied period, from the year 1998 to the year 2015. While figure 2 shows the growth rate of the Lebanese actual and potential Output over the studied period.

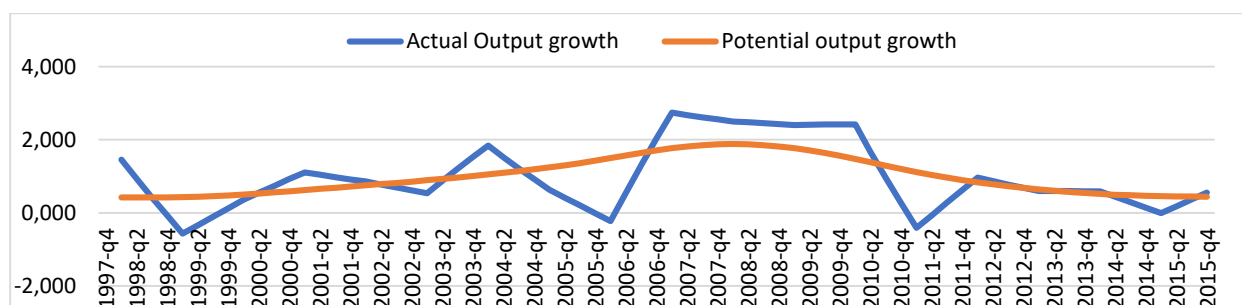


Source: Performed by author using the Hodrick Prescott filter based on data for Real GDP collected from World bank data.

Figure 1. Real and Potential output of the Lebanese Economy (QI-1998 to QIV-2015)

² The height of the value λ depends on the frequency of the data. In the literature the following values are suggested: 100 for yearly data, 1600 for quarterly data and 14400 for monthly data.

³The Chow and Lin solution (1971) approach to disaggregate annual time series into quarterly levels is employed for being widely used in The National Statistical Institutes. This method provides coherent and natural solution to the interpolation method, since its procedure is theoretically practical.



Source: Prepared by author using the Hodrick Prescott filter based on data for Real GDP collected from World bank data

Figure 2. Lebanese Potential and Actual GDP growth rate since QI-1998 - QIV-2015

4. Analyzing the Real and Potential Lebanese Output

Figure 1 shows that the Potential output trend is characterized by an ascendant on perpetual increase with a modest and weak growth rate since the logarithmic growth rate of this trend equal 0.975%⁴. More precisely, Figure 2 which represents the variation of the growth rate for the Lebanese Economy over the period 1998 to 2015, shows that since 1998 till the end of the studied period, a low average growth rate of the potential output trend is registered (0.995%). The actual output (0.973%) increases steadily with lower differences and higher amplitude relative to potential output. Actual output Growth started rebounding in 2007 (average growth is 0.68% from 1998 to 2006) after a decade of slow growth starting far before December 1997. Since the Lebanese economy suffered from several economic recessions economic crises, political assassinations, and Israelite's attacks combined with a sharp depreciation of the Lebanese pound and a decline in real wages value resulting from inflation of 600%. Also, the civil war and hostilities in industrial and prosperous areas of Lebanon had a dramatic and negative impact on production and exports, triggered massive outflows of capital and people, and created circumstances resulting in the "dollarization" of the economy.

Lebanon's growth performance was also remarkable in 2009 relative to the average in the MENA region, emerging and developing countries, which were feeling the effects of the global recession. The real GDP in Q4- 2011 continued growing at a fast pace equal to 0.43% for a third consecutive year on the back of renewed political stability and confidence in Lebanon's economic and financial situation.

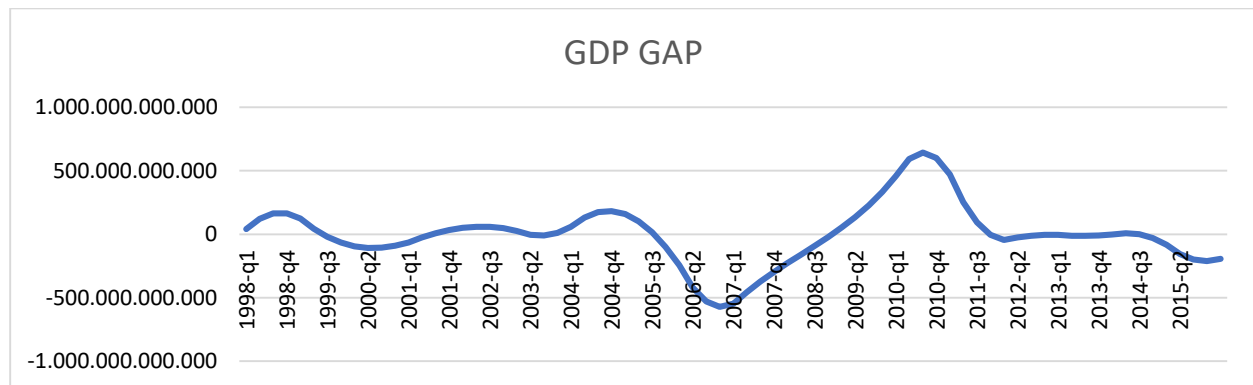
However, Wesley Mitchell (1927) states that the choice of production technology and the organizational innovation knowledge play a crucial role in productivity performance since they are the main drivers of firm-level of productivity. Therefore, the increase in economy's productive potential occurs when the economy undertakes investments in new technologies, improvements in technical efficiency as adopting new methods of production, arranging for Labor quality improvement, managing capital allocation and deepening and finally increasing returns to scale. Consequently, the weak progress of the potential output shown by HP results for the Lebanese economy over the studied period indicates a low level of investment in new technologies as well a slow effort to encourage innovation, promote investment in productive capital and counteract the negative impetus from aging. Thus, the deceleration of the potential GDP is due to sluggish productivity growth or Labor force demographics.

4.1. Lebanese Business Cycle Identification and Analysis

The deviation of output from trend, the Output GAP, referred to the Business cycle fluctuations. Each business cycle comprises four phases: Expansion, recession, depression and recovery. The output gap measures the amount by which the actual output of an economy falls short of its potential output. A positive Gap indicate an expansion phase occurring when the economy is growing faster than its full capacity. A negative GAP take place when the economy run a deteriorate situation. Figure 3 represents

⁴Average logarithmic growth = $\left(\frac{1}{n} \ln \left(\frac{\text{last value}}{\text{first value}}\right)\right) \times 100$

the GDP evolution over the studied period starting QI-1998 through QIV-2015 which reveals two cycles.



Source: Prepared by author using the Hodrick Prescott filter based on data for Real GDP collected from World bank data

Figure 3. GDP Gap Evolution Since Qi- 1998 till Qiv-2015

The first cycle endured three years, from QIV-1997 to Q1-2001 and is characterized by a slight amplitude. The expansion period continued one year from QIV-1997 to Q3-1998 with the adoption of the fixed exchange rate regime followed by the recession period from Q2-1999 to Q1-2000. The recovery phase started bounding in q2-2000 and continued to q1-2001.

The second cycle continued for 5 years, from QIII 2003 till QIII 2008. The expansion period was relatively smaller than the depression period which started QI-2005 and continued till QIII-2006. The depression period was marked by an economy's confidence loss resulted from the assassination of the Prime Minister Hariri, followed by difficulties caused by the Israeli's attack to Lebanon in 2006.

However, the productive capacities such as capital stock or human skills are unable to adjust to the fluctuations in demand in the short term but in the medium and long term. Therefore, the utilization of current production resources varies over the business cycle. Thus, a positive output gap indicates a high utilization of capacity in times of strong demand, while a negative output gap indicates that demand falls short of the production volume that can potentially be provided with existing production capacities.

On the other hand, Economic theories argue that the unused production factors imply competition among producers which holds prices down. While, when the full capacity utilization rate is reached, the economy assists to an increase in the competitive pressures leading to prices increase. Furthermore, supplier's facing excess demand pressure for their goods will automatically request higher prices. Therefore, both prices and industries' cost might rise in the sectors where the capacity constraints are reached. Consequently, the output gap is often seen as a key determinant of inflationary pressures in the short run. In other terms, the more increase in CUR (which means actual output exceeds its potential level), the more increase in prices. Nonetheless, the relation between CUR and inflation is not universally accepted, a contrary view is supported precisely by Mary Finn (1996).

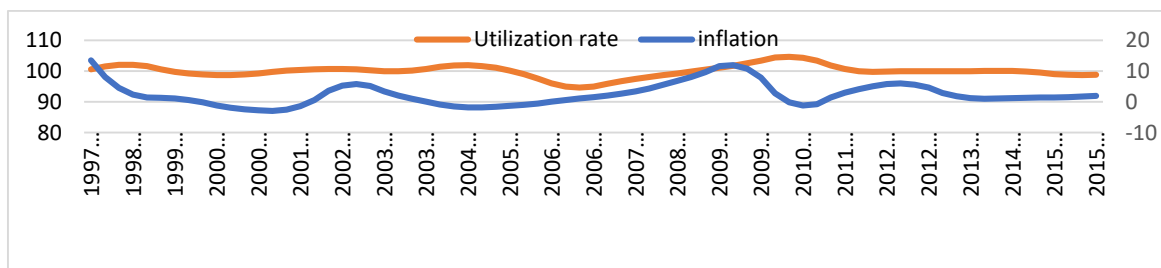
5. Capacity Utilization Rate and Inflation

The capacity of utilization rate (CUR) reveals the degree of usage of the Lebanese economy's production capacities. It is defined as the ratio of actual GDP over Potential GDP. Equation 4 states this relation:

$$CUR = \text{Actual GDP} / \text{Potential GDP} \quad (4)$$

Figure 3 compares the capacity utilization rate of the Lebanese economy and the inflation rate over the studied period from QI-1998 to QIV-2015. It reveals that the Lebanese economy, during the expansion of the both identified business cycles, was operating using more than its full capacity utilization rate, generating an inflation rate on average 5.0% for the first cycle, and 0.64% for the

second cycle. Thus, the fitted procedure of Hodrick Prescott's procedure (the HP filter), to the data suggest an active role of monetary policies. The next paragraph investigates the relationship between CUR an inflation in the short and in the long run to conclude on the impact of monetary factors on Business Cycle disturbances.



Source: Prepared by author based on data collected from WDI

Figure 4. Comparison between Capacity Utilization and Inflation Rates

5.1. The Short-Run Relationship: Granger Causality Test

The bidirectional Granger causality test investigates the short run relationship between CUR and inflation. Granger test verifies whether the past behavior of utilization rate helps to predict and forecast future rates of inflation or Inflation may be explained by Utilization rate. In other terms, this part tests the validity of the equation 5 and 6:

$$CUR_T = C_0 + \sum A_1 CUR_{T-1} + \sum B_1 \pi_{T-1} + E_T \quad (5)$$

$$\pi_T = C_0 + \sum A_1 \pi_{T-1} + \sum B_1 CUR_{T-1} + E_T \quad (6)$$

where CRU is the capacity utilization rate, π the inflation rate and ε is the stochastic term.

However, to perform Granger test a prior stationarity test is required. Three stationary tests are then executed to verify if the involved time series have a random walk process or they are stationary: Augmented Dickey Fuller (ADF) Philip Peron (PP) test and Kwiatkowski-Phillips-Schmidt-Shin (KPSS) test.

5.2. Stationary Tests Results

Table 1 shows the three unit root test results where inflation's time series (π_t) is stationary in level relatively to PP and KPSS test. Thus, according to PP and KPSS tests (π_t) is I(0). However the ADF test results reveal that (π_t) is stationary in the first difference which means that its integrated of order one (I(1)) for ADF test. Furthermore, results shows that the CUR's time series is I(0) relatively to KPSS and ADF tests and I(1) relatively to PP test. This part consider therefore, relatively to KPSS that the two time series are I(0).

Table 1. Unit Test Results for Quarterly Series Related to Inflation and from Q1 1998 to Q4 2015

ADF test	π_t	CUR
t-statistic in levels	-1.98	-3.29*
t statistic in first differences	-3.251*	
Phillips-Perron test		
Adj t statistic in level	-2.90*	-2.08
Adj t statistic in first differences		-3.36*
KPSS test		
LM stat in level	0.20*	0.07*

Note: * shows the statistical significance at the 1% level of significance.

Source: Calculated by the author.

5.3. Granger Causality Test Results

The granger causality test results presented in table 2 prove that a bi direction causality between the variables capacity utilization rate and inflation cannot be rejected for lag one. However, Utilization Rate no longer explain inflation a quarter ahead (lag (2)), while inflation still explaining the utilization rate considering lag (2). Therefore, the impact of monetary factors on Business cycle is empirically demonstrated for the Lebanese Economy in the short run.

However, to investigate how far the variable utilization rate predicts and forecasts the future rate of the inflation variable, the relationship of these two variables in the long run is therefore modeled in a linear regression considering the past behavior of inflation.

Table 2. Granger Causality Test Results between Utilization Rate and Inflation

<i>Null Hypothesis</i>	<i>Lag</i>	<i>Probability</i>
CUR does not Granger Cause π	1	0.0083
π does not Granger CUR	1	0.00004
CUR does not Granger Cause π	2	0.2318
π does not Granger CUR	2	0.0089

Source: Calculated by the author

5.4. Long Run Relationship: OLS Estimates

To confirm the causality results in the long run, this part implements two models with the current inflation rate as dependent variable. The past and current variables of CUR are the independent variables of model 1 (lag 3 as per AIC and SCI lag selection criteria). However, the model 2 includes the past quarterly inflation rates, and the past quarterly capacity utilization rate in lag 2 (relatively to the PAC correlogram).

Regression estimation is performed in two steps. In the first step the OLS method is applied to estimate the model parameters, since all variables are I (1). In the second step, the non-significant variables are eliminated from the model since they are not helpful to explain the dependent variable. The model including only the significant variables is then re-estimated.

5.4.1. Estimation Results of Model 1

The results of the first step estimation by OLS method presented in table 3 show that only the variables CUR at t=0 and t=-1 are significant. Therefore, the variables CUR at t=-2 and t=-3 are eliminated from the model to obtain equation 7:

$$\pi_{t0} = \alpha CUR_{t0} + \beta CUR_{t-1} + \varepsilon_t \quad (7)$$

Where CUR_t is the capacity utilization rate, π_t the inflation and ε_t , the error term.

Equation 7 is re-estimated in the second step estimation to obtain equation 8 which shows that the utilization rate explains current inflation (t=0), while the inflation (t=-1) is negatively affected by any positive output GAP.

$$\pi_{t0} = 2.06Ut_{rate_{t0}} - 2.03 Ut_{rate_{t-1}} \quad (8)$$

Table 3. First Step Model 1 Estimation

<i>Variables</i>	<i>Significance</i>
CUR (t = 0)	Significant P-values = 0.0107
CUR (t = -1)	significant P-values = 0.0409
CUR (t = -2)	Non-significant
CUR (t = -3)	Non-significant
constant	Non-significant

Source: Calculated by the author

5.4.2. Fitting and Residual Diagnostic Results

The low value of the determination coefficient R-squared (=0.1351), combined to the residual diagnostic results presented in table 4, indicate that the first model is not helpful to predict inflation.

Table 4. Residual Diagnostic Result of the First Model

Test and Residual Specification-Null hypothesis	Results
LM test: There are no serial correlations in the	We reject null hypothesis (P-value
Jarque Berra test: Residuals Are Normally	We accept null hypothesis (P-value
Breusch-Pagan-Godfrey: not Heteroskedastic	We reject null hypothesis (P-value

Source: Calculated by the author

5.4.3. Estimation Results of Model 2

The results of the first step estimation by OLS method presented in table 5, show that only the variables π at $t=-1$ and $t=-2$ are significant. Therefore, the variables CUR at $t=0$ and $t=-1$ are eliminated from the model to obtain equation 9:

$$\pi_{t0} = \beta \pi_{t-1} + \theta \pi_{t-2} + \varepsilon_t \quad (9)$$

Where, π_t is the inflation and ε_t the error term.

Equation 9 is then re-estimated to obtain equation 10.

$$\pi_{t0} = 1.72 \pi_{t-1} - 0.84 \pi_{t-2} \quad (10)$$

Table 5. First Step Model 2 Estimation

Variables	significance
CUR($t=0$)	Nonsignificant
CUR ($t=-1$)	Nonsignificant
π ($t=-1$)	Significant P-values = 0.000
π ($t=-2$)	Significant P-values = 0.000
constant	Nonsignificant

Source: Calculated by the author

5.4.4. Fitting and Residual Diagnostic Results

The determination coefficient R-squared is relatively high (= 96.84%). However, the residual diagnostic results presented in table 6 indicate that the model 2 is unable to predict inflation in the long run.

Table 6. Residual Diagnostic Result of the First Model

Test and Residual Specification-Null	Results
LM test: There are no serial correlations in	We reject null hypothesis (P-value = 0.0002)
Jarque Berra test: Residuals Are Normally	We reject null hypothesis (P-value = 0.0000)
Breusch-Pagan-Godfrey: not	We accept null hypothesis (P-value 0.0582)

Source: Calculated by the author

Estimation results for the two models fail to prove a long run relationship between capacity utilization rate and inflation. Therefore, as results fail to prove the impact of monetary factors on Business Cycle in the long run.

6. Conclusion

Hodrick Prescott filter applied on the quarterly time series of the Lebanese GDP over the period 1998-2015 shows a low average growth rate of the potential output trend (0.995%). This weakness in growth is attributed to politic disturbances but also the choice of production technology and the organizational innovation knowledge. Thus, monetary disturbances are not the source of Lebanese cycle but real shocks. To enhance economic growth, the Lebanese economy should economy undertake investments in new technologies, improvements in technical efficiency as adopting new methods of production, arranging for Labor quality improvement, managing capital allocation and deepening and finally increasing returns to scale.

However, studying the relationship between capacity utilization rate and inflation, results show as the economic theory predict, a bi-direction causality in the short run. However, since the low level of Lebanese economy utilization rate, findings fail to prove a long run relationship between utilization rate and inflation.

Thus, the role of monetary factors on business cycle disturbance is empirically proved for the Lebanese economy in the short run but the applied test results fail to prove a long run relationship between monetary factors and Business cycle fluctuations.

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**MEASURING TECHNOLOGICAL INTENSITY OF IMPORT, EXPORT AND
PRODUCTION AT DISAGGREGATED LEVEL: THE TURKISH AUTOMOTIVE
PARTS INDUSTRY**

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Abstract

The automotive industry is the largest exporting industry in Turkey but there is a question of how “large” and “sustainable” the economic contribution of this industry is to the Turkish economy. This study investigates this question by focusing on the technological intensity of import, export and production at automotive parts level. Current measures of technological intensity are at sector level, so they cannot capture high technological variations within sectors. This study develops a more accurate measure of technological intensity, namely patent counts for each individual automotive parts and applies this measure to the Turkish automotive parts industry. The use of patent counts this study makes is different from previous uses of patent counts as this study utilises patent counts at more disaggregated level, 6-digit Harmonized Commodity Description and Coding System (HS) level. This study utilises the Turkish Statistical Institute (TurkStat)’s datasets of Foreign Trade Statistics and Annual Industrial Products Statistics, and the World Intellectual Property Organization (WIPO)’s PATENTSCOPE Database. By using patent measure of technological intensity, this study finds that higher the technological intensity of an automotive part, greater the import of that automotive part becomes, whereas smaller the export of that automotive part becomes during the period of 2002-2013, while controlling for modularity and macroeconomic shocks. On the other hand, there is not clear technological intensity concentration on automotive parts produced in Turkey during the period of 2005-2012. These findings, to some extent, reflect the recent R&D efforts pursued by the motor vehicle assembling and automotive parts supplying enterprises in Turkey that have resulted in building up technological capability.

Keywords: Technological intensity measurement, Patent counts, Import, Export, Production, automotive parts, Turkey.

**ASSURING SUSTENANCE IN THE DISSIPATING REALPOLITIK:
ECONOMIC FEASIBILITY OF A MULTILATERAL SOCIAL SECURITY
SCHEME**

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Abstract

The growing realpolitik coupled with rising mobility had led to discussions on the need for a flexible and integrated social security system that could accommodate the dynamic globalization process. Financing and sustaining a similar projects requires understanding the political and economic nuances associated with the same. The arrangements in the EU and rest too have its issues including affordability and financing. Larger issues pertaining to portability of benefits and parameters for gauging the affordability, effectiveness and accessibility of the systems. The lack of well developed index for assessing social security also add to the woes as integration becomes more complex. The paper would look at issues involved in financing social security models involving multiple players. The paper would also point to indices that could be plausible to assess the models. The social security model need to equip the mobile labour force to be protected and ensure the benefits cycle into the right economy. The paper would look into the macroeconomic perspectives that could be viable in assessing the same. The political concerns at play with relation to the benefits transferred is also a bone in contention. The economic modelling of a multilateral social security system is a question of both political contestation and financial feasibility. The paper would analyse the existing parameters that are utilized to gauge individual systems and the ideal elements for a multilateral system to work out effectively. The paper would look also attempt to see through the intricacies involved in such a institutionalised financing model.

Keywords: Economic feasibility, Social security, Institutionalised financing model, Fiscal fairness.

1. Introduction

ILO dictates minimum social security for all workers irrespective of their level of work and origin. Globalization has brought the fragmented labour markets under one umbrella allowing enhanced flow of labour from one nation to another. The very possibility of a blue collar worker moving across more than 3 countries in his lifetime now is actually a reality. The IDL and the production specialization being informally reified has led to production hubs being concentrated in certain parts of the globe. The disparity in production climates and thereby gaps in demand for labour stands varied. Labour keeps moving towards greener pastures. However the pastures are greener in parts farther away and dictates a hard survival game. To ensure minimum security in such a zero sum game is necessary and is a role taken by most national governments. The coalesce of labour markets in one belt does not imply that the fragmentations have been transcended. The market remains fragmented as ever and labour mobility is still a pebble in the boots of globalization that is running at unprecedented speeds. Migrant labour is still fragile and clueless.

International migrant labour community has been both the beneficiaries as well as victims of massive globalization that shifts them to different places of work. The migrant life cycles get played out in nations they are rather unfamiliar with and unknown administrative systems. The migrant worker moved in with different aspirations and needs and to accommodate all in a system by a different nation is a quite complicated yet needed process. Migrant workers should be provided with the dignity of labour and minimum security for workers. The migrant workers are the most vulnerable as they have neither a solid local backing in the form of an indigenous support system and are often treated as second class citizens. This heightens the need to ensure that the workers are protected and yield the true results of their labour and carry it back as well. The lack of a central regulatory labour body with universal rules also create an issue as their no one stop fix for most migrant labour issues. Coming under the purview of two states, there is also the chance of 'double coverage' whereby the

worker ends up contributing to the social security nations of both countries. Most migrant workers come under bilateral systems that vary from country to country. Often these are formed after long drawn iterative processes. Hence the need for a solid multilateral arrangement that would address multiple issues of portability of benefits, totalization of finances etc.

The debates over social security dates way back even before the initiation of the social security in 1935. However the debate has only obviously grown through the years and taken more complex tones. And clearly as globalization grows to its ultimate canopy, this issue would only take newer forms. It exactly this situation of a complex interlinked web of issues that necessitate a multilateral approach to be adopted for such an issue. A multilateral system would also allow a uniform, standard procedure for issues. This would reduce multiple iterations the labour ministry of a country would need to be involved in case of bilateral agreements. The country rather than setting up multiple agreements would go by one agreement which has been drafted taking into account the varied socio-political situations. The international social security system still runs by bilateral systems. The plethora of systems clearly gives a direction of the difference in benefits that workers receive. The presence of multilateral systems would ease complications and bring in multiple nations of similar economic stanza and labour rules under one bracket. Mostly multilateral agreements are to be drawn amongst nations that sees heightened labour flux . The perfect example being the Caricom, which eventually paved a big role in stabilizing migrant labour forces in the Carribean. Social security agreements are based on multiple financial clauses and the presence of an institutionalized multilateral system would ensure smoother flow of finances and portability of finances. In particular, a multilateral agreement ensures equal treatment of all workers, irrespective of their countries of origin, in regard to their rights and entitlements under all the participating countries' social security systems. It is bringing together a wide gamut under a single belt to address its larger purpose more effectively.

2. Equality of Treatment

Equality of treatment has been the primary debating point and riling principle of the multilateral systems. A basic assumption would be that host countries treat all workers from whatever nationalities equally, subject to no restriction. Though historical precedence of the same has been systematically dismantled by ILO rulings and growing sensitivity, this needs to be in place to ensure a well-meaning system. The integrity of work needs to be upheld above all socio-political differences at an international level. Starting from the equal remunerations Convention in 1951, ILO has been pointing to the need for equal pay and dignity for labour. It's the universal desire to have work as an equalizer that impedes the same. Multilateral agreements need to ensure the same. However, from the provider's end there are larger implications on this. It has often been the financing parameters and models that have raised questions on the same and that so is the major point of discussion of this paper

Portability of benefits has been the major contestation point that has raised questions of on the feasibility of multilateral systems. The available mechanisms and financing models that can ensure that the worker can rally back his benefits to his home country and family on retirement or injury is a major point of concern and one where most discussion on multilateral systems have fell apart. There are predominantly 2 major questions pertaining the same: the institutionalized financing mechanism for the process and how the nations split benefit and contributions. The major issue underlying the same is exactly the fact that nations follow different rules on social security and varied financing models. This is also extended to the very social security programmes they follow. There are nations which extend only certain domains of social security to their international workers and skip out on others like disability, health etc. There has been mainly two approaches in figuring out a solution to the same, Coordination or Harmonization. The larger debates between the two is too drawn out to capture in this paper, but we shall skim through the major points. Coordination would involve interlinking different social security systems of nations to work and favour workers subject to multiple nations. As name suggests, it a pragmatic approach of coordinating the mechanisms of multiple nations in a manner that loops in workers of both nations and at the same time not compromising on the intricacies of one. It is a more country sensitive method and accommodates specificities as well. However the Harmonization approach is a more levelling mechanism. As stated in the ILO convention, Harmonization means standardizing the social security rules of nations to work as one homogenous function. Harmonization would require substituting common rules and definitions for

those found in national legislation and would preclude a country from subsequently making unilateral changes to those common rules and definitions. In most cases this would result in changes to a country's social security system, and a loss of a country's ability to modify that system in the future, that most sovereign states would be unwilling to accept (Tamagno, 2008). However, like all harmonizing systems it faces similar criticism of how sensitive the system is to the economic dynamisms of the countries involved. The harmonization systems could be further divided along two lines. One, being 'approximation' where a common legal standard is set and the systems then converge to a eventual common measure. Other, being an approach where the minimum universal standards are set for the participant nations to follow. The former being a more rigid form of harmonizing which doesn't necessarily incorporate economic sensitivities (Robert, 2009) This system too finally reverts back to how migrant workers could retain and rally back their benefits. One of the fundamental principles of social security coordination is that of portability, which is the ability to preserve, maintain, and transfer vested social security rights or rights in the process of being vested, independent of nationality and country of residence (Dupper, 2014). Here the portability constitutes both spatial portability of taking it back to their origin country and social portability, of transferring benefits to their family in their home country in case of any hazard to the worker. As Robert

Holzman clearly dictates on the social aspect of having portability, 'From a social policy point of view, such acquired rights are a critical element of an individual's (or family's) lifecycle planning and social risk management. Denying portability – particularly once the mobility decision has been made and cannot be reversed – risks upsetting the lifecycle planning of individuals and families, creating substantial welfare losses' (Holzmann, 2018).

3. Fiscal Fairness

Fiscal fairness and the mechanism of sharing the burden amongst the nations involved has been the most important point of discussion when it comes to multilateral systems. A major counterargument raised by nations against the exportability of benefits has been that it is unfair to spend their national income over an individual who eventually spends it in another country. It calls out the unfairness in another country being recipient to a windfall benefit through them. Another case of exception they point out is for means tested social insurance scheme which have been actually planned only for the benefit of the domestic country and cannot be shared for nationals of another country (ibid 22) Proper coverage provisions that loop in all qualified workers under the system at the same time avoiding double coverage is imperative. The importance of portability lies in the fact that it has obviously become a crucial deciding factor when the worker takes the call on whether to come back to home country or not. In a situation of non-exportability, the worker will obviously stay back especially since culturally too he has been accustomed to the country by that time. The major contestations are over how the benefits get transferred and to what extent the benefits would be shared. Especially in cases where the worker's labour period is split across more than 2 nations. Clearly it should not pertain any benefit disadvantage for the worker. This has necessitated the principle of Totalization to be followed in social security regimes. Totalization involves bracketing all the contribution periods of the workers and determining the benefits and replacement rates based on this collective labour period rather than shorter periods undertaken in multiple nations. All most all nations have provided a basic period of time for which the worker needs to operate in the country to avail benefits. However, the tempestuous labour climate coupled with volatile labour –wage regimes may not allow individual workers to settle down to an individual system and have to keep moving across systems. The contributions need to be totalized to ensure that the worker gets optimum insurance in case of transfer to another country. It is clearly the responsibility of the system to ensure that the worker doesn't get underinsured while moving from one country to another. Empirical evidences like that of CARICOM where workers moved back to original country due to varying labour climate shows the need for the same. Countries like Hong Kong allow the worker to tie up with only one social security system. This implies that the worker keeps contributing to only one system which provides remittances or a lump sum at the end of the period. However, for cases where the multiple payment criteria is involved especially with the host country, there is the looming issue of difference in purchasing powers of the contributions between the host and home country (Robert Holzmann, 2005).

How the benefits get totalized and how it ensures proper burden sharing needs to be the first point to be agreed upon for any multilateral system. The most common method is to proportionally decide the benefit that would have been paid by the host countries then summing up the benefits from individual countries based their respective replacement rates and then fixing on a totalized amount. Integration is another significant method being used especially involving short term benefits. For longer run, they tend to resort to only proportional methods unless there is an equal flow of migrants across the two nations. Most schemes have totalization schemes to take into account the cumulated period a worker has spent under labour in multiple countries. A minimum base period has been fixed and a cumulative limit as well. Anything above that gets availed for benefits. The social security contributions to one country can be counted as eligible to another

The apprehensiveness of exported benefits triggering microeconomic cycles in the home country is a problem of contention that still often strikes up. Technical reasons for limited portability are largely linked to the pseudo insurance nature of benefit determination, which does not allow a straightforward split of acquired rights into (i) a contemporaneous insurance component that is consumed in any period and hence incurs no portability issue; (ii) a pre-savings component that all benefits have to some extent and that could be made portable if its value could be easily established; and (iii) a redistributive component within and between benefit cohorts that can be huge (as in pension and health care schemes) (Holzmann, 2018). Analysing fiscal fairness at the individual level depict how the person should also be treated with horizontal equality especially when it comes to aligning taxation of the benefits received and purchasing power calculated as per replacement rates. At the country level, different, inconsistent, and uncoordinated taxation rules for retirement income create fiscal unfairness between countries and motivate tax competition. (Robert Holzzman, 2016) The policies should ensure that double taxation is avoided at cost and countries don't go on board for tax arbitrages.

Now, on a pragmatic level we need to look up at the major multilateral schemes that are currently in action. There have been multiple systems working rather efficiently in different parts of the globe, be it EU which has a rather uniform system that now also extends to Non-EU members, CARICOM with centralized administrative body and covers all labourers who have been under any member state, Unified Law on Insurance Protection Extension of the GCC (Gulf Cooperation Council) and the recent Ibero-American system covering 22 countries. All these though with faults have been rather successful in at least upholding the basic tenets of the system. Individual countries would need to work out a system where they tie up different schemes of social security and would need to integrate with all the other member states. However the choice of programmes to be incorporated to be selected is based on the cost on the countries. Not all countries being in the same economic condition and hence the mix of programs need to be decided upon based on the dominant work profiles of the host countries. Also to be kept in mind that most countries at the end of the day would emphasize more on their domestic social security plan than the international obligation. Holzmann provides a stimulating look at portability considerations in the broader context of social insurance benefits. They suggest an analytical framework to separate the risk pooling, pre-funding and distributive elements of the various social insurance benefits with their work careers being across different places, there is the necessity to ensure that at an individual level, there are correlated systems. Furthermore, policies can encourage long-term enhancement of welfare by facilitating asset accumulation, as well as seek to reduce structural vulnerability by challenging power relations and working to increase the status of those who are marginalised.

The administrative and bureaucratic complexities are another major issue to be dealt with. Administrative issues get magnified as the social security systems of multiple nations get mingled. The lack of a centralized system to rally back finances and grievances also create issue. There is a clear absence of feedback loops in most systems and often endemic faults get stuck and deep rooted within the system. Red tapism along with rather illogical demands including the beneficiary/ family physically presenting proof in every 2-3 years makes in rather complicated especially the beneficiaries are old parents and wives post the worker's death. It is also the issues of such decentralized financing and administrative structures that led to some countries outsourcing processes to private companies as corporate agents. However a complete corporate middle player in a multilateral system needs to be a well thought of decision.

4. Conclusion

Now the final leg of the paper seeks to discuss major parameters that need to be assessed while setting up such systems. Most important issues of coverage and optimum replacement rates have already been discussed in detail in this paper. Other major parameters which are often used at the individual level are with regard to which all domains the system covers. However this is a very ambitious demand on newly formed multilateral systems. But in any case, it needs to be kept in mind that translating bilateral agreements to accommodate other countries and an eventual multilateral system is a viable option. Moving from individual systems to multilateral also requires newer assessment patterns to gauge the process and have an effective feedback loop as parameters would clearly change now and should include ones like fiscal fairness and administrative efficiency both at individual and country level

Coursing through realpolitik trajectories to set up a well-meaning multilateral system is by no chance a light weighted task and requires well drawn out processes. However, the labour climate is truly in need for the same to ensure that this basis for increased globalization stays put. It is imperative to stabilize the social security system to ensure that workers are free to move across nations and are not in fear of moving away from their domestic social net. Countries with larger shared migrant pool needs to cluster and work out systems that align with ISSA and ILO goals while sensitive to their cluster concerns. A multilateral system that is sensitive to not only economic concerns, but also social and human concerns should be the need of the hour.

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**TOWARDS A NEW GENERATION OF ALTERNATIVE WATER SUPPLY
SOURCES THROUGH TECHNOLOGY ADOPTION: LESSONS FOR GREY
WATER IN SOUTH AFRICA**

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Abstract

Water scarcity is one of the biggest challenges faced by some cities in South Africa. Current initiatives taken in such cities support development of alternative water supply sources that limit the volume of water extracted from surface and groundwater sources. The purpose of this paper is to investigate the factors that drive adoption of water conservation measures in South Africa. This research is applied to the city of Cape Town- one of the most water stressed city in South Africa. Targeted water conservation measures are grey water treatment technologies that are not only expected to promote alternative water supply sources and therefore water security, but also to induce on-site water treatment options that reduce investment allocated to centralized wastewater treatment plants. We use a choice experiment approach and investigate households' preferences and estimate the mean willingness to pay for each grey water treatment technology attributes. Our methodology highlights also the household-specific features as well as current institutional factors that affect adoption of wastewater treatment technologies. Both Multinomial Logit (MNL) and Scaled MNL models are applied to newly data collected from 300 households in the city of Cape Town. Our preliminary results show that easiness of use, externalities (smell), and costs remain important attributes for households' choice of wastewater treatment technologies. Our results show also that households are willing to invest in more costly grey water treatment technologies to reduce their likelihood of facing severe water scarcity. Additionally, factors such as years of schooling, geographical location and income are influential factors that drive willingness to pay. Our results provide a platform that can support design and an implementation of important public policies that mitigate water scarcity and ensure water security in the city of Cape Town.

Keywords: Technology adoption, Water conservation, Public policy, South Africa.

FORECASTING GRAPE PRODUCTION IN SOUTH AFRICA 1980-2024: BOX AND JENKINS (ARIMA) APPROACH

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Abstract

Econometric forecasting of crop production is significant in supporting policy decisions regarding unemployment, economic growth as well as balance of payment of a nation. The South African economic growth has dipped in three consecutive quarters in 2018 and the country at the moment is in a technical recession. Apart from the declining economic growth rate, unemployment rate has risen to 28.5%, the highest in 24 years. In the Western Cape Province of South Africa, approximately 300 000 people were employed directly or indirectly in the supply chain of the wine industry during the period 2014/2015. During the financial year 2013/2014, R36.1 billion gross domestic product (GDP) was contributed by the wine industry through local and export consumption. This is the wine industry is highly dependent on grape production and given the current political, economic and social challenges in South Africa, it is important to develop a forecasting framework for grape production. The framework if properly implemented will predict future trends in grape production and overall value chain contribution by the wine industry to economic growth, employment and balance of payment. The study utilises time-series data for GDP, grape and wine production extracted from DAFF Abstract of agricultural statistics from 1980-2015. Eviews 8 software was used to perform the analysis. The Pearson product – moment correlation was employed to determine the strength (Correlation) of association amongst variables. The Autoregressive Integrated Moving Average (ARIMA) (p, d, q) linear time series model developed for forecasting by Box and Jenkins was employed in this study. The Pearson product – moment correlation results revealed a strong, positive and significant association between annual rainfall, grape production and wine production. The study further revealed that, the best-fitted model for grape production forecasting is ARMA (2, 1, 3). The model revealed a good performance in explaining, forecasting and variability capabilities. The annual production series of grapes from 1980 to 2015 showed an increasing trend while forecasting of grape production between 2017 and 2024 showed a decreasing trend. The study further reveals grape production could decline due to structural policy reforms thereby resulting in declining economic growth, wine exports and increase unemployment in the grapes and wine industry of South Africa.

Keywords: Grape production, forecasting, Box and Jenkins, South Africa, Time Series.

STANDARD FORM CONTRACTS AND THE HOUSING MARKET IN INDIA FROM THE PERSPECTIVES OF EFFICIENT BREACH OF CONTRACT*

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Abstract

Standard Form Contracts (SFCs) promote trade conduct. It is useful in a regime of mass production of goods and services and market integration under information communications technology to reduce transaction costs of trade. The industries, however, uses the SFCs as an instrument to build their industrial empire. The disclaimer clauses and implied terms and conditions in SFCs will provide an opportunity to the manufacturers of goods and services to escape from liabilities in the case of defective goods and deficiencies in services. Moreover, the consumers will not read SFCs, even if they read, will not understand the terms and conditions, and even if they understand, the industrialists will offer goods and services on the basis of *take-it or leave-it*. In the cases of concentrated markets and centralised warranty contracts, the consumers may not have a choice for better terms of agreements. Thus, courts void the contracts that are abusive in nature under the unconscionable principle.

The housing sector has contributed 7.19 per cent to the GDP in India (2014-2015 at 2011-2012 prices) and is the second largest employer after agriculture in India. The conflict between developers and the home buyers on SFCs in India will reach to the Consumer Disputes Redressal Agencies (CDRAs) for speedy, simple and affordable redressal under the Consumer Protection Act, 1986. Our paper focuses on the analysis of the disposed of cases (Original) of housing disputes by the National Consumer Disputes Redressal Commission (NCDRC) during 2009-2015. Our case analysis is limited to breach decision.

Our preliminary data analysis reveals that the National Commission has disposed of 314 out of 983 housing-related cases in favour of consumers. The application of expectation damage remedy to the incompletely specified contracts' claims over awards indicates that the Commission provides under, over and equal compensation to the aggrieved party. The study offers insights on the calculation of damage compensation by the breached-against the party and consumer courts, and provide incentives to the parties for efficient contract design.

Keywords: Consumer protection, Efficient breach of contract, Housing market, Standard form contracts.

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**DETERMINANTS OF MARKET CHANNEL CHOICE UTILIZED BY
HORTICULTURAL FARMERS IN THE NORTH WEST PROVINCE,
SOUTH AFRICA**

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Abstract

The fundamental objective of this study was to assess determinants of the choices of Market Channel Utilized by Horticultural farmers with specific reference to Maize and Sunflower in the North West Province, South Africa. The specific objectives of the study were to: Describe the socio economic profile of Horticultural farmers; examine determinants of market channel choices utilized by Horticultural farmers; Data collected were sorted, coded and analysed using STATA 14.0 computer software. The sample size of the study was 163 respondents which were categorized according to those who were financially assisted (n=101) and those who were not (n=62) and were interviewed using structured questionnaire. The choice of Market channels utilized by respondents were then analysed using Multinomial Logit Regression Model with Non-market participation as reference category. Overall, the finding designated that most (65%) respondents were utilizing Informal markets, followed by Non-market participation and Formal markets with 20% and 15% respectively. The findings emanating from Multinomial Logit Regression revealed that factors such as: age; marital status; gender; education and farming experience does influence market channel choice among respondents.

Keywords: Market channels, Demographic, Socio-economic and constraints.

SOCIAL MARKETING AT THE SERVICE OF HEALTH ISSUES IN ALGERIA

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Abstract

This research paper aimed at focusing on the importance of social marketing in achieving health-related sustainable development goals (SDGs) in Algeria. It serves to promote productive ideas based on human behavior.

For all public health topics; whether prevention, vaccination, screening or care, social marketing is every day demonstrating its effectiveness, as it is one of the fundamental instruments of health promotion, able to fight against several risk factors namely: combating risky sexual behavior, poor nutrition, obesity, smoking, alcohol, drugs, violence, speeding and road accidents... etc.

An effective social marketing approach can benefit the merit of many lives saved. Social marketing can be used not only to motivate people to adopt healthy attitudes, but also to have a humanitarian spirit such as motivating a population to become an organ donor.

Given the inefficiencies in public health spending, Algeria would gain a lot by developing a marketing approach at the heart of its health policy, because if it invests enough in the preventive, it could save huge expenditures on curative care.

The 47 targets of the SDGs on health can be grouped into three categories: the reduction of the direct causes of death and diseases (cancer, cardiovascular diseases, infections ...), the reduction of the risk factors (smoking, violence, pollution, malnutrition, poor hygiene conditions ...) and the improvement of the factors that indirectly influence health (poverty, unemployment, gender inequalities ...). Most of these targets require actions that go beyond the health sector to involve, for example, employment, transport, laws, or the economy. SDGs require multisectoral efforts and multidisciplinary collaborations.

In order to advance towards their achievements, the Algerian Ministry of Health, Population and Hospital Reform have established already three national plans for the period 2015-2019, which are the national cancer plan, national plan for the reduction of maternal mortality, and the national multisectoral strategic plan for non-communicable disease risk factors.

Keywords: Algeria, Social marketing, Public health, Risk factors, SDGs.

SELECTED ASPECTS OF SUSTAINABLE AND ECOLOGICAL AGRICULTURE

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Abstract

The aim of the study is to present the most important elements, components and aspects of agricultural development with particular emphasis on sustainable and ecological agriculture. Changes in agriculture, ecological importance and sustainable development are factors which has influence on current economic situation. The main methodology of the research was secondary research based on critical analyses of national and international literature.

In the paper is presented the situation of sustainability in European Union as well as in Polish agriculture.

Keywords: Sustainable agriculture, ecological agriculture, overshoot day.

1. Introduction

This paper focuses on agricultural issues and describes the current situation in the agriculture sector in the light of global trends concerning the sustainable and ecological agriculture. Organic (ecological) agriculture can contribute to significant socio-economic and ecologically sustainable development in many countries all over the world, but especially in poorer ones.

The reason for the focus on organic agriculture and undertake the research is the rapid development of the organic sector in European countries. This development has resulted in an EU average of 2.2% of agricultural land as organic.

The concept of organic agriculture builds on the efficient use of locally available resources, and on the use of adapted technologies. Natural resources are limited, therefore it is important to use them properly. Every countries all over the world is exploring more resources than ecosystems within their borders can be regenerated, so the burning problem is to limit the overexploitation of earth's natural resources.

The importance of organic agriculture on the one hand lies in the demand of satisfying consumer demand for high-quality products; on the other hand, it plays an important role in securing certain public goods.

2. Overshoot Day (Debt Day)

Changes in agriculture are forced by food security in the world and sustainable development based on the growth of agricultural food production and the reduction of so-called *ecological debt*, *overshoot day* [the day on which humanity used resources (soil, fossil fuels, forests, raw materials, water) for the whole year to produce goods and services, thus exceeding the Earth's ability to renew them]. Ecological debt is a concept arising from and corresponding to unsustainable realities faced by “real people in real places” (Goeminne, Paredis 2009). Food security and sustainable development depend on free access to the world goods. Without sufficient access to natural resources, people cannot survive and indeed cannot thrive. Meeting our basic human needs requires water, food, shelter, clothing, and other goods derived from nature (Ohn, Wolf, Anderson 2008).

Due to those factors that influence food security, current global trends are sustainable agriculture and - more restrictive – ecological agriculture.

3. World Overshoot Day

We are using 1.7 Earths. We use more ecological riches (natural riches) and services than nature can recuperate through overharvesting forests, overfishing and emitting more CO₂ into the atmosphere than ecosystems can imbibe.

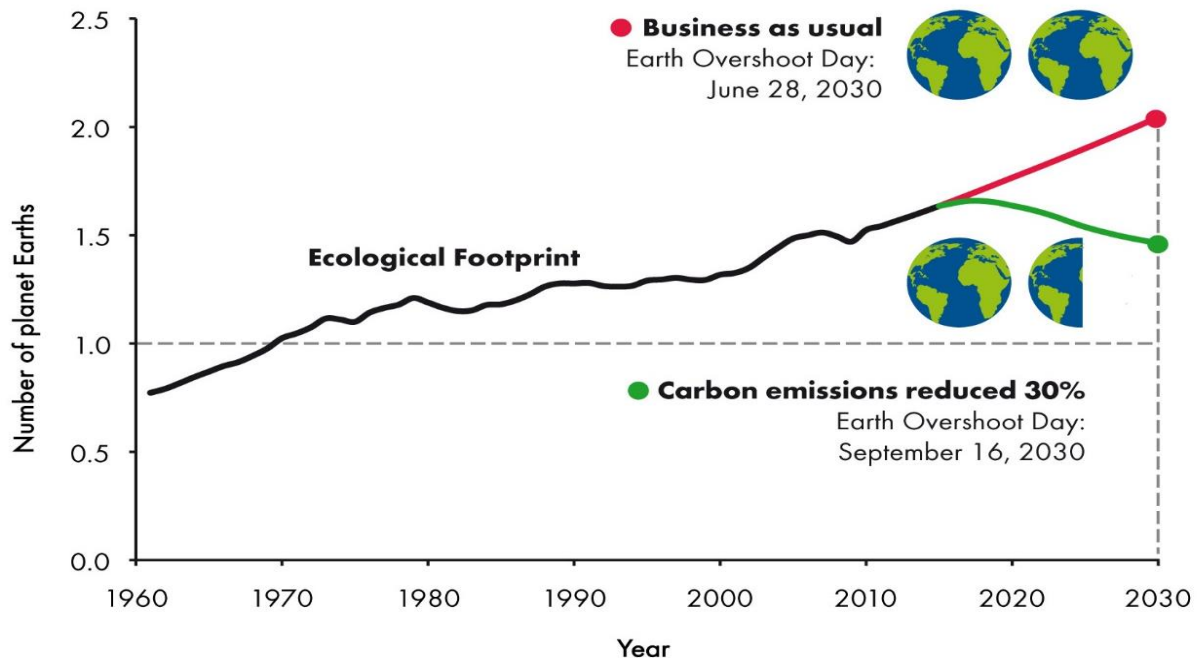


Figure 1. How Many Earths Does it Take to Support Humanity?

Source: <https://ec.europa.eu>

According to the Global Footprint Network, today, the majority of countries on the globe are running ecological deficits, exploring more resources than ecosystems within their borders can regenerate. Others depend tightly on resources from elsewhere, which are under increasing pressure. In some areas of the world, the implications of ecological deficits can be devastating, leading to resource loss, ecosystem collapse, debt, poverty, famine, and war.

In 2018, Earth Overshoot Day for the world lands on August 1. Earth Overshoot Day marks the date when humanity has exhausted nature's budget for the year. For the rest of the year, we are maintaining our ecological deficit by drawing down local resource stocks and accumulating carbon dioxide in the atmosphere. However, for individual countries, this day falls on other dates (Global Footprint Network 2018).

4. Countries Overshoot Days

A country's overshoot day is the date on which Earth Overshoot Day would fall if all of humanity consumed like the people in this country.

We are overshooting the carrying capacity of the planet by 50%, but for example the quantity of nitrogen used in agriculture alone would already require 2.5 planets to be fixed (repaired) by natural processes (Galli et al. 2016). Global demand began outpacing supply only recently, beginning in the 1980s. In 1961, for example, it took only 0.5 years worth of planetary production to regenerate what was used in that year. Overshoot causes the liquidation of natural capital: carbon, CO₂ and greenhouse gases accumulates in the atmosphere, fisheries collapse, deforestation spreads, biodiversity is lost and freshwater becomes scarce (Wackernagel et al. 2006).



Figure 2. Countries Overshoot Day in 2018

Source: Global Footprint Network 2018.

One of the ways to reduce fuels and CO₂emission in agriculture is using energy crops, engines with a higher level of effectiveness and application of hybrid systems. In order to achieve a satisfactory level of energy independence, we can use differentiated sources production or supply. Innovations focus on refining conventional engine technologies, improving the aerodynamics of vehicles, reducing rolling resistance and decreasing the weight of cars (Evrenosoglu, Borowski 2014).

5. Ecological Agriculture

The practice of ecological agriculture involves creating the strengths of natural ecosystems into agroecosystems. The general strategies include using practices that (a) grow healthy plants with good defense powers, (b) stressing plague and pestilence, and (c) enhancing populations of beneficial organisms (Magdoff 2007). Organic farming can count on fast-growing demand and fast growing support infrastructure. As a result, it is a leading technology in the activities of many public and private organizations. Organic farming is defined as a management system with sustainable crop and animal production. Organic production should combine environmentally friendly farming practices, support a high degree of biodiversity, use natural processes and ensure proper animal welfare. Europe has the largest market for organic foods, but also the most competitive. This part of the world has a very large number of brands and producers of organic foods (Sahota 2010). EU legislation ensures that “organic” means the same for consumers and producers all over the EU. Legislation concerning organic produce is developed with the participation of the Member States and the assistance of advisory and technical committees and expert bodies.



New logo after 2010



Old logo before 2010

Figure 3. Logo of Organic Agriculture

Organic farmers, traders and processors, must meet with strict EU requirements if they want to avail the EU organic logo or etiquette their products as organic. Organic production respects natural systems and cycles. Mechanical and biological production processes and land-related production should be used to reach sustainability, without having recourse to genetically modified organisms (GMOs).

The dual nature of the organic farming system is very often emphasized. First of all, it is a system that positively influences the natural environment, which also contributes to achieving broadly understood agro-environmental benefits. On the other hand, organic farming is a response to the changing structure of market demand. Consumers lean towards organic products, want to buy them and usually pay a higher price for them than for products made in mass production. According to this approach, the organic farming system is a market system.

The rapid development of the organic farming sector is reflected in the increase in the supply of high-quality organic farming products. In 2004, the number of organic farms was 3,760, with an area of 82,730 ha, and in 2015, the number of organic farms was 22,991, with an area of almost 580,731 ha. The number of organic processing plants also increased from 55 in 2004 to 540 in 2015. Currently, the share of the organic area in Poland constitutes nearly 3.4% of the total area of farms in the country.

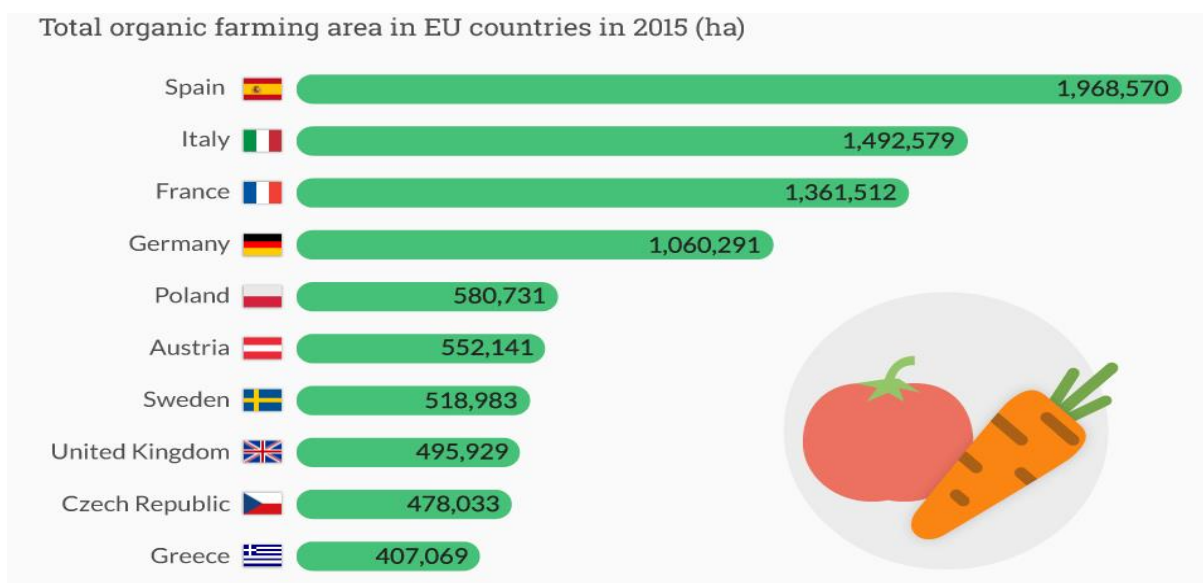


Figure 4. Europe's Top Nations for Organic Farming

Source: www.statista.com

A derivative of the growth of this agriculture sector is the increase in the number of certification bodies authorized to carry out controls and issuing and revoking certificates of conformity in organic farming. In 2015, 10 authorized certification bodies carried out the above activities.

Every Member State must define/nominate one or more authority/ies responsible for controls (the qualified authority: generally, it can be department of the Ministry of Agriculture or Public Health). This competent authority, while retaining overall responsibility for organic controls, may

- A. Delegate all or part of its control tasks to one or more private control company that it shall approve and supervise, or
- B. Admit all or part of its control responsibility to one or more public control authority/ies.
- C. A mixed system (public control authority/ies and private control company) is also possible.

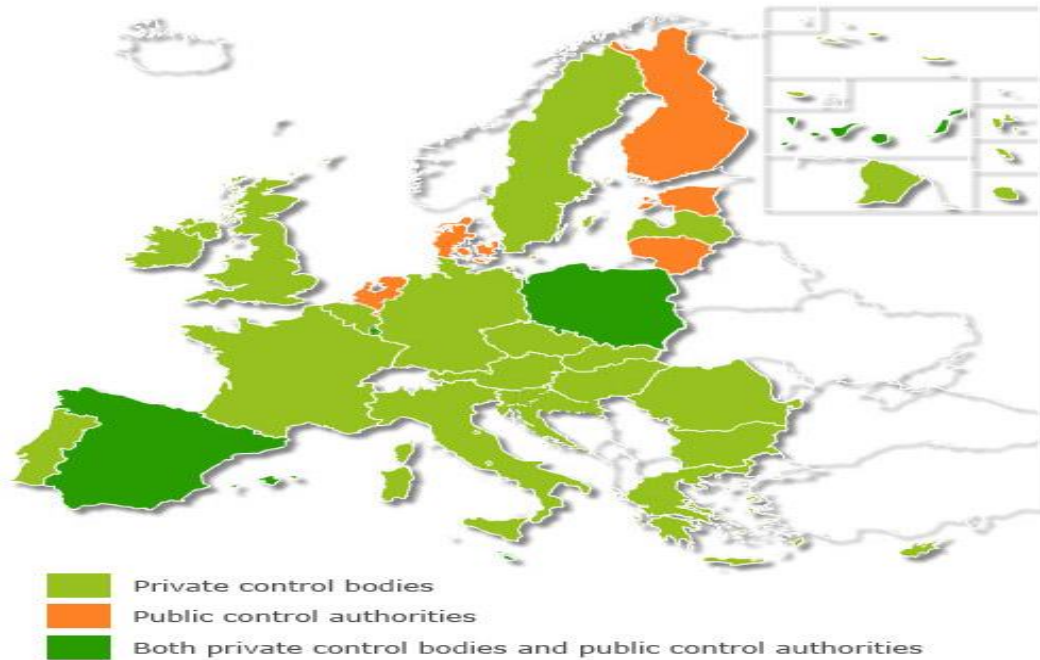


Figure 5. Types of Authorities Responsible for Control

Source: <https://ec.europa.eu>

6. Polish Organic Products

The number of organic farms in Poland and their areas has dynamically increased in the last several years. This tendency fits well with the concept of development of sustainable agriculture. The area structure of organic farms in Poland is characterized by a specific pattern, as the highest number of ecological farms can be found within the range not exceeding 5 ha and it shows a tendency to decrease and from 5 to 10 ha, with a tendency to increase (Golinowska 2012). Polish organic products are mainly cereals, fruits, vegetables, and dairy products. In 2014, the largest share (35.8%) in the area of agricultural crops had plants for fodder, the second place was occupied by meadows and pastures (they occupied 31.5% of agricultural land), and then cereals, which constituted 16.9% Ecological farmland. The remaining crop groups occupied 15.8% agricultural land, including fruit growing about 9 percent, and vegetables - 4 percent.

There is a growing interest in organic food from both consumers and distributors. Today's customers place increasing demands on food producers, but consumers of organic foods are not homogeneous in demographics or beliefs (Hughner R.S., et al 2007). In the face of diet-dependent diseases, consumers have limited their trust in foods produced by intensive production methods. As a result of increased consumer awareness about the relationship between lifestyle and nutrition and good health and well-being, the factor taken into consideration when choosing food is not only the price but also its health quality.

7. Conclusion

Ecological agriculture has an enormous perspective for development, but some barriers slow down the growth of this sector. The production and distribution of good quality food products are of course subject to numerous standards and regulations. Organic product legislation, standardization, certification and infrastructure in such development are also significant issues of policy concerns. Among Polish farms certified for organic farming, the main barriers to growth are relatively low yields and high costs compared to conventional production. The current distribution system is a barrier to the development of the market for organic products; ecological products are more difficult to sell from conventional ones. With a better-developed distribution system - more intermediaries or shops interested in organic products, it would be possible to increase the production volume.

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IS MEASUREMENT OF BIOLOGICAL ASSETS AT FAIR VALUE CONSISTENT WITH THE PRINCIPLES OF PRUDENCE AND NEUTRALITY?

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Abstract

The purpose of this research is to conduct a case study based on analytical data from agricultural enterprises and to estimate how the measurement of biological assets at fair value consistent with the principles of prudence and neutrality.

The analysis of scientific literature and practical experience allows for the conclusion that there is no unanimity either among scientists or practitioners on the selection of the measuring model for biological assets cultivated by agricultural enterprises or used for harvesting agricultural produce. Both biological asset measuring methods, the fair value less costs to sell model and the cost model, have advantages and disadvantages. The main advantage of the fair value less cost model is that the fair value of biological assets reflects the processes of biological transformation.

The case study aimed at answering the following questions:

- What effect does the change in the measuring method from the cost model to the fair value less costs to sell model have on the financial standing and the overall performance of an undertaking?
- What factors influence the change in the biological asset value over a reporting period when the assets are measured at fair value less costs to sell?
- What effect does the change in the biological asset measuring method have on the key financial ratios, which reflect the financial attractiveness of the business concerned?

The research used analytical data and information on biological assets supplied in financial statements of three agricultural enterprises. The agricultural enterprises chosen for the research are specializing in different areas. All those undertakings use the historical cost approach to measure biological assets.

The research outlines advantages and disadvantages of both methods used to measure biological assets, reveals changes in reflecting information on biological assets in financial statements following a change in the measuring method, and demonstrates effect of the change in the measuring method on the financial standing, overall performance and financial attractiveness. The research reveal specific issues related to the application of the method of fair value less costs to sell for measuring of biological assets. The problems identified by the research undermine confidence in the objectivity of the fair value less costs to sell model for biological asset measurement and suggest a conclusion that the cost model is more relevant for measuring those assets. If biological assets are chosen to be measured at fair value less costs to sell, the cost of produce sold and the general and administrative expenses were decreased, and the performance, profitability and asset turnover ratios were improved.

The research results show that if biological assets are chosen to be measured at fair value less costs to sell, there is a risk to breach the principles of prudence and neutrality and to window-dress the financial statements.

Keywords: Biological assets, Cost, Fair value, Prudence and neutrality.

CORPORATE SOCIAL RESPONSIBILITY AND THE VALUE CHAIN IN THE DAIRY INDUSTRY IN POLAND

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Abstract

The Polish economy is increasingly involved in globalization processes in many fronts, and the dairy industry is one sector that has played a significant role in achieving that feat .

Gaining competitive advantage in the dairy industry comes from many angles such as healthy animals, quality feed etc, however, inspiration from the environment and cooperation with various groups of stakeholders are also vital in driving forward the value chain in that industry. Increasingly, there is added value to the areas of CSR as a development concept and competitive advantage. Currently, companies consciously implement socially responsible business, remodel strategies, and put CSR as a development concept related to innovations (Porter, 2011).

The growing role of social responsibility as key element in the valuation of the company's value and especially in the evaluation of development potential cannot be overemphasised. Many innovative approaches can contribute to sustainable development by creating new business models (Bocken, Short, Rana, Evans, 2014). This approach to the value chain does not only concern the added value focused on the economic and financial analysis, but the values for the stakeholder and the client (creation by the added value of a specific advantage). This may be based on the advantages of mobilizing talent for organization, creating innovations, introducing pro-ecological solutions, and quality management. All activities are more and more often evidence of social responsibility as well as contribute to profound changes in the way companies operate, while at the same time creating awareness changes of stakeholders, leading to the improvement of competitiveness in the long run.

The article seeks to analyse the optimal combination of social responsibility and sustainable development in terms of creating eco-innovation and eco-efficiency in the dairy industry. The aim of the article is to present the activities of Polish companies from the dairy industry in creating their own business models based on sustainable development. Is the dairy industry on the Polish market creating specific business models in the direction of creating an advantage in a very competitive milk market. The analysis covered dairy plants, which are at the top of the list of the top 20.

Keywords: Sustainable development, Model, Business, Dairy plants.

THE ROLE OF INDEPENDENT AUDIT IN REDUCING INFORMATION ASYMMETRY IN MARKET

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Abstract

Some errors and fraud occurred in the accounting may distort the information provided in the financial statements. Therefore, it is important to carry out independent audit of the financial statements before presenting them to the users of information. The audited financial statements are one of the most reliable sources of the information for economic entities when making economic decisions. It is very important that the auditor, expressing his opinion on the financial statements, were impartial and would represent public interest.

The information of the financial statements often is not equally understood by investors, lenders and other different users. There is a gap in knowing and understanding of information among the professional auditors and clients. This paper deals with the issues of the asymmetry of information in market.

The research problem is: how to minimize the limitations of the influence of the users on information, and the quality of market participants who use the information provided in the financial statements, awareness; does an independent audit add credibility to publish financial information and provide better protection of shareholders, investors, creditors and other interested parties?

The aim of the research is to reveal the independent audit role in reducing information asymmetry in market. This objective was achieved by analyzing the theories of economics: information asymmetry, signaling and agency theories. Based on the analysis of the economic theories and using a logical method of analysis it was concluded that independent audit would help reveal a true and fair view of the financial statements and ensure disclosure of equally reliable and full information for all the market participants, would raise reliability of alert the information about the company's performance results and would reduce partially the information asymmetry and thus influence on the efficiency of the capital market. The information asymmetry in market can be reduced applying a strategic tool for the independent audit.

Keywords: Financial statements, Independent audit, Information asymmetry, Information users.

IPA IN THE CLASSIFICATION OF FARMS IMPLEMENTING THE BIODIVERSITY PROGRAMME: POLISH CASE¹

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Abstract

Biodiversity is an area of global interest. The rapidly increasing demand for products of animal origin requires a stable and sustainable genetic base for animal production development. In 1996, Poland officially joined the FAO Global Strategy for the Management of Animal Genetic Resources. On the basis of the Programme of Conservation of Animal Genetic Resources, the Minister of Agriculture approved 32 programmes of genetic resources conservation including 75 breeds. Farmers who received premiums for breeding the above conservative breeds are obliged to meet a set of criteria, which encourage them to exchange knowledge and cooperation. Knowledge supports the development of the biodiversity processes and entities involved in it. The research focuses on the identification of four strategies of knowledge exchange.

The aim of the study is to introduce a classification of farms with conservative breeds (of cows, pigs, and sheep) according to the scope of the perception of validity and the intensity of the exchange process with institutions. The questionnaire (for 145 farms in south-eastern Poland) presented opinions on a scale of 1–5 points. The Importance-Performance-Analysis (IPA) was used to identify the knowledge exchange strategy. Farmers took on the capacity of assessors and the relations with the most important institutions (sectoral, advisory and local government) were assessed.

The conducted analysis indicated the smallest gap between the validity and intensity in the exchange of knowledge in agricultural holdings implementing the low priority strategy with low importance and frequency of knowledge exchange (73.10%). In the group of agricultural holdings from the “trivial” low priority field were the oldest entities, most recently having conservative breed animals, having a low percentage of contracting and at the same time bearing the lowest direct production costs.

In turn, the strategy of the “keep up to good work” relationship of high importance and frequency of knowledge exchange (12.42% of the total) was implemented by agricultural holdings with the highest percentage of contracting and the best financial results.

The development of biodiversity requires the greater involvement of farmers in the exchange of knowledge. A small share in the surveyed group of highly rated farmers and practitioners of knowledge exchange is not good for biodiversity. Knowledge about markets, financial sources, preventive measures in relation to serious viral diseases of animals is necessary. Research shows that neither the age of the farmer nor the time of introducing breeds diversify the approach to knowledge exchange. The way to such a change is to supplement traditional training with specialist IT platforms for information exchange. In Poland, there are no systemic (information) solutions where breeders not only read information or find knowledge but also create knowledge for the development of biodiversity processes.

Keywords: Classifications of farms, Biodiversity, Importance performance analysis.

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THE ADVANTAGES AND LIMITATIONS OF COST-BENEFIT ANALYSIS FOR PUBLIC INVESTMENT PROJECT EVALUATION

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Abstract

Public investment projects do not generate sufficient net income to be effective in terms of finance, but provide social benefits to the public. Their goals are oriented to public welfare rather than to a direct financial outcome and are intended to satisfy public needs that are ensured by the State through its institutions, non-profit organizations and associations. The goals of public investment projects are related to the implementation of State's functions, such as health promotion, social security improvement, children and youth education and occupation, unemployment reduction, the internal and external security of the State, environmental protection, the development of national engineering networks, etc. They help reduce social exclusion, encourage regional development and promote economic development.

The evaluation of public investment projects is a relevant topic for scientific discussions. Scientists keep discussion about methods for expressing and evaluating financial, economic and social benefits derived from public investment projects. The relevance of the topic is reflected by the importance of public investment project implementation and the need and necessity to evaluate them before making the investment decision.

During the evaluation of public investment project the most important thing is to evaluate social benefits the project creates, but this kind of evaluation is very complicated due to uncertainty of social benefits and the method cost-benefit analysis can only allow evaluating social benefits which are measurable in monetary units. A question arises – whether such evaluation of public projects is suitable and whether the decisions made are correct?

Object of research – evaluation of public investment projects using the method of cost - benefit analysis.

Goal of research – after revealing the differences of public and private investments, to analyze the evaluation of public investment projects using the method of cost – benefit analysis and to explore the advantages and limitations of this method.

In order to explore the advantages and limitations of the method cost-benefit analysis the empirical research were carried out. The research analyses four public investment projects which were evaluated using cost- benefit analysis before making an investment decision.

The cost-benefit analysis is a common method for public investment projects evaluation, but this method does not fully comply with the basic concept of public investment projects. This theoretical and empirical research disclosed limitations of the cost-benefit analysis, used for public investment projects evaluation and identified the problem field for improving the cost-benefit analysis or creating new methods for public investment projects evaluation.

Keywords: Public investment project, Social benefits, Cost-benefit analysis.

**METHODOLOGY OF ASSESSMENT OF FAMILY FARM
CHARACTERISTICS AND ASSIGNMENT TO A SUSTAINABLE ECONOMIC
DEVELOPMENT TYPE: LITHUANIAN CASE**

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Abstract

The main objective of agri-business is to produce high quality food, to anticipate increasing demand for food security and to meet the growing demand in a sustainable way so as to avoid disturbing the balance, to protect nature and to continue profitable business.

Both globally and in the EU, family farms are by far the biggest group of food producers. Trends of sustainable development of agriculture are directly related to the prospects of such farm business. Therefore, in order to anticipate the development trends it is essential to evaluate the economic, social and environmental sustainability of such farms.

The purpose of the methodology for assessment of family farm characteristics and farm assignment to a sustainable economic development type is to empirically identify Lithuanian family farms by established farm sustainable economic development types and type interactions.

The performed analysis of the typological models of the characteristics of the farm condition and family farm sustainable economic development indicators in Lithuanian farms designated nine farm types, which, for the purpose of a more accurate farm comparison, were classified into three FSED-FEE assessment levels: the first with the same FSED-FEE (farms sustainable economic development – farms economic efficiency) assessment level, the second with the maximum difference in the FSED-FEE levels, and the third with the minimum difference in the FSED-FEE levels.

In the typological FSED-FEE model, there are three farm types with the same FSED-FEE levels. Those farm types account for 71 percent of analysed farms, where most of the farms in the sample are Type 2 farms with a moderate sustainable economic development level and average economic efficiency. There are 2590 farms in this type and they account for 66.12 percent of all analysed farms. The key identifying feature of this type of farms is that their FSED level is on a par with the FEE level irrespective of the FSED and FEE level combination. It was expected that the comparative analysis of these groups would answer the question how farm indicators are affected by situations when the FSED and FEE are on the same level, whether it is weak, moderate or strong.

A comparison of all farm types classified into three FSED and FEE levels revealed the dominance of mixed production farms. However, it was observed that with a moderate or strong FSED and a high farm economic efficiency *Types 3 and 6* are dominated by horticultural farms. The findings by specialisation reveal another type group with weak FSED levels and low, average or high farm economic efficiency (*Types 1, 5, 9*), which is dominated by crop production farms.

Keywords: Family farms, Sustainable economic development, Family farm sustainable economic development.

LEADER PROGRAM IN FINANCING OF LOCAL ACTION GROUPS' ACTIVITIES IN POLAND

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Abstract

The Leader¹ approach has been an important part of EU Rural Development Policy to its replenishment and effective implementation. Since 2007 it has been funded by the European Agricultural Fund for Rural Development (EAFRD). In the period 2007-2013 it was successfully applied in fisheries areas as Axis IV of the European Fisheries Fund. In the 2014-2020 programming period, the LEADER method has been extended under the broader term Community-Led Local Development (CLLD) to three additional EU Funds: the European Maritime and Fisheries Fund (EMFF); the European Regional Development Fund (ERDF); and the European Social Fund (ESF).

The aim of research was to evaluate rural development support through sources from Leader program on the example of Local Action Group (LAG). Analyses, carried out in the paper, cover the period of 2007–2013 and 2014-2020. Research period and selection of indices were also determined by the time of the financial perspective of PROW. The data about theoretical and financial issues of the Leader programme were taken from the official sources the applicable literatures, legal acts, the Ministry of Agricultural and Rural Development (MARD), Agency for Restructuring and Modernisation of Agriculture (ARMA) and the European Commission Data. The descriptive and comparative methods were used in the research paper, as well as the simple mathematical statistical method in order to analyse the problem from the economic point of view.

In Poland there are the largest number local action groups among all the European Union countries - initially functioned 338 LAGs, there are now 324. The total amount that has the Rural Development Programme for 2007-2013 in Poland amounts to about 17.2 billion euros, including the Axis IV Leader has been allocated about 787 million euro this including the Implementation of the local development strategy, Inter-territorial and transnational cooperation functioning of Local Action Group. Total CLLD budget for 2014-2020 amounts to about 900 million euros, including EAFRD (LEADER) – ca. 735 million euro, EMFF - ca. 19 million euro, ESF – ca. 75 million euro and ERDF – ca. 70 million euro.

The strategies by the LAGs cover more than 90% of rural areas, which indicates a high potential villagers who saw the value prepared of the resources available in their areas and set themselves goals that they want to realize through their use. In Poland in the rural area live 38.6% of the total population – they constitute a huge social, political and economic potential in micro and macro scale. In the rural areas of Poland, the LEADER system has gradually gained a position as a central place for learning the principles of endogenous development and local governance. It has helped build more partnerships among stakeholders in local economic and social life. It has encouraged experiments with the participatory approach within cooperation networks set up to drive local development on the basis of intervention programmes – development strategies – defined by consultation.

The bottom-up implementation of rural development policies has apparently gone along with convergence in the management practices for socio-economic development in rural areas to such an extent that there has been a degree of formalisation of the participatory approach. Implementation of leader methodology allowed local communities to participate in regional development but also use the knowledge and experience of different social groups (such as local authorities, farmers, business sector, NGO) to improve quality of life and put forward economic development in rural areas.

Keywords: Local action groups, Rural networks, Rural development.

¹LEADER ("Liaison Entre Actions de Développement de l'Économie Rurale", meaning 'Links between the rural economy and development actions') is a local development method which allows local actors to develop an area by using its endogenous development potential.