REVIEW OF SOCIO-ECONOMIC PERSPECTIVES

VOLUME 7 ISSUE 4
DECEMBER 2022
ISSN (Print): 2149-9276
ISSN (Online): 2547-9385

ISSN: 2149-9276
e-ISSN: 2547-9385

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Vol.7 Issue.4 December 2022

RSEP Review of Socio - Economic Perspectives
ISSN: 2149 - 9276
E-ISSN: 2547-9385

Comparative analysis of economic productivity in Georgian regions 2010-2020[1]

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Article History

Received: 16 July 2022 Revised: 28 November 2022 Accepted: 2 December 2022 Available Online: 5 December 2022

Keywords: decentralisation, productivity, Georgian regions, economic development
JEL classification: F63; R11; R58

Citation: Gamtenadze, Z. & Khupenia, K. (2022). Comparative analysis of economic productivity in Georgian regions 2010-2020, *Review of Socio-Economic Perspectives*, 7(4), 1-7.

Abstract

Georgia has a challenging history of decentralisation. However, the main reforms have been enacted in 2014 and municipalities of Georgia has been given several major competencies and partial fiscal decentralisation has been achieved. Some other political transformations have been achieved, which indirectly have been impacting local economic development. The following analysis shows the economic productivity of Georgian regions, including Tbilisi. As the decentralisation process in Georgia is precisely related to municipalities, but statistical information is not sufficient to analyse, author and co-author empirically decided to analyse aggregated data and focus on regions, which consist of municipalities. Therefore, the sum of municipalities' economic productivity is reflected in regional terms. Economic productivity consists of multiple variables, however, according to the National Statistics Office of Georgia, all available data will be used for the comprehensive analysis of the proposed topic. Research methodology includes literature review, where researches of relevant studies of relevant countries will be examined, i.e. Baltic states and Poland. The following research is part of the Ph.D. research cycle, where the aim is to find the optimal model for developing financially self-sufficient municipalities and regions in Georgia. Main part of the analysis in the following is to find the strongest correlation between variables, which increase productivity, therefore can stimulate investment attractiveness and have a solid impact on economic development.

1. Introduction

In 2014, the Georgian parliament passed a code allowing Georgian local governments to take responsibility for major economic activities. Each municipality has its own major industrial sector, and municipalities generate more income. Measuring the economic performance of cities, municipalities or regions is important information for further strategic management on the part of decision makers. The strategic management process of these management units includes several key elements. One of the factors is analysing the most and least productive sectors and promoting further productivity gains through strategic development. The geographical concentration of economic activity leads to increased productivity, as it requires changes in infrastructure, society, cities, etc. These changes are controlled by city, rural, or regional decision makers (De la Fuente, 2010). In general, economic productivity is affected by several factors. In the paper below, only some of these factors are included in the analysis. Although it is important to analyse the economic performance of local governments for more efficient strategic management, the Georgia Office of National Statistics only provides regional data related to economic performance. Therefore, in this paper, we can assume that the local performance, the factors and variables that drive productivity, and the local outcomes are the sum of the municipal data.

[1] ***This research PHDF-21-446 has been supported by Shota Rustaveli National Science Foundation of Georgia (SRNSFG)***
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DOI: https://doi.org/10.19275/RSEP136
Article Type: Original Paper

Calculating a country's economic productivity is important for businesses and analysts to determine the efficiency of a country's economic system. Productivity data can provide information about how much a region's economic production can be expanded and how much additional production could be gained through efficiency gains (Böckerman & Maliranta, 2007). Gross Domestic Product (GDP) is a measure of a country's economic output and includes sales, income, and production of goods and services. An increase in GDP can lead directly to an improvement in the country's overall standard of living. However, high GDP alone is not enough to sustain a country's development. It is also necessary to increase economic productivity. It can be difficult to pinpoint exactly which factors influence regional economic productivity, but there are some obvious factors. for example: Differences in economic output between regions lead to different levels of economic productivity. Therefore, to improve the local economy, we need to improve the gross domestic product growth rate. In addition, infrastructure improvements can increase economic productivity by attracting new businesses and creating new employment opportunities. By improving these factors, regions with low GDP per capita can catch up with developed regions and achieve greater economic growth. Given the importance of boosting regional economic productivity, it makes sense that governments need to develop strategies to boost it. They do this, among other things, by investing money in improving the local infrastructure. Highways - accessible roads - are one of the missing elements in many developing countries, but they can be used to boost local growth and boost development (De la Fuente, 2010). In fact, many developing countries have no highways at all, making inland areas inaccessible except for major coastal areas. Improving highway accessibility will increase opportunities for growth outside coastal areas. It also allows for faster movement of goods and services between regions, increasing trade and spurring development efforts. Economic productivity is an important factor in evaluating a region's economy and determining how to improve it (Aarstad, Kvitastein, & Jakobsen, 2016). Increased productivity boosts local sales, income, production, and overall living standards. But productivity gains are difficult without the right infrastructure to enable businesses to grow and create new job opportunities. Therefore, businesses should strive to improve road access to improve economic productivity throughout Georgia.

This paper uses this new, reliable data to estimate production per worker in each region of Georgia. The paper analysis period from 2010 to 2020 shows the positive effects of decentralization reforms after 2014. However, central government policies also affect local productivity through tax cuts and the implementation of national projects. These factors were not considered in the analysis.

2. Methodology

Aggregate productivity level P in year t is defined as follows*:*

$$P_t = \frac{Y_t}{X_t} = \frac{\sum_i Y_{it}}{\sum_i X_{it}}$$

where Y is output, X is input and i denotes the whole economy. In order to measure economic productivity, input X is measured here by employment number or average salary and Y is value added. In the case of total factor productivity (TFP) input, X is an index of different types of inputs. We use the simple Cobb-Douglas formula:

$$X = \prod_j X_j^{\alpha_j}$$

where j denotes input type and a is a parameter. We require that $\sum_j \alpha_j = 1$ This means that constant returns to scale are imposed in the computation of TFP. Indeed, there is econometric evidence for the perspective that the assumption of constant returns to scale is not unreasonable at the macro level. An advantage of the labor productivity measure is that it is closely related to the most commonly used measure of living standards, which is gross national product divided by the number of inhabitants. In addition, measurement of labor productivity does not require information about other factors of production. However, TFP provides a more comprehensive measure of economic performance than labor productivity, because TFP takes into account the efficiency of capital input usage that is evidently an important element of competitiveness.

In this study we focus on the sources of productivity growth. We calculate the annual aggregate productivity growth rate in year t by using the following formula:

$$\frac{\Delta P_t}{P_t} = \frac{P_t - P_{t-1}}{(P_t + P_{t-1})/2}$$

The log-difference of aggregate productivity provides a very close approximation to the log-difference of aggregate output growth that is commonly used in the analysis of aggregate output growth. We focus on the specific factors that contribute to productivity growth among continuing sectors. We use pairs of balanced panels in our research. There are several factors that go into an analysis. The input part of the analysis is divided into two parts: the employment ratio and the average salary of employed people. The employment rate will determine the percentage of people who create the wealth of the entire economy and how it increases each year. Salary is a factor in determining how much currency is needed to create a certain amount of wealth. The annual increase analysis will also be applied. For the Output part, we will only use total real GDP data because it provides a more precise measure of wealth creation in this particular case.

3. Literature Review

Georgian and foreign literature was reviewed, studied and worked on in preparation for the work. Over the past decade, the Georgian economy has experienced significant growth, primarily due to inflows of foreign direct investment, rising external debt, and large remittances from immigrants (Gamtenadze, 2021). All those have impact on regional productivity. In their theoretical review, Duranton and Puga (2003) emphasize importance of the labour market, but classify differently into three fundamental theoretical mechanisms: sharing, matching and learning (Gilles & Puga, 2003). As Rosenthal and Strange make clear, there is little direct econometric evidence on the importance of the different sources, and of labour market issues in particular (Rosenthal & Strange, 2004). Attention has also been paid to the diversity of channels through which ICT can contribute to enhance productivity and promote economic growth (Cardona, Kretschmer, & Strobel, 2013).

Our approach is based on achieving short-term and long-term goals. This means implementing strategies that simultaneously address the challenges facing the country today while paying close attention to maintaining a stable and sustainable economic environment for future generations. Dynamic competition instantly stimulates innovation and implementation of new technologies. However, it will take time for the results of these measures to appear in productivity. (Falcıoğlu, 2011) In particular, this kind of competition involves resource selection and redistribution, which also takes time. Therefore, the consequences of increased dynamic competition are expected to be more gradual and long-lasting than increased competition in the static sense. These points mean that industry-wide productivity growth is often associated with significant external adjustments realized through productivity restructuring between factories. The acceleration and sustained period of economic growth in Georgia since 2004 can be attributed to the following four factors (Bartelsman & Doms, 2000). A change of government, financial liberalization, opening the country to foreign trade, economic reforms were implemented, most of which were maintained after 2012, and new ones were added (e.g. income tax reform and the transition to the so-called Estonian model, pension reform, etc.).

On the one hand, the country's international competitiveness and strategies for attracting foreign direct investment require maintaining existing achievements (competitive tax levels, attractive business environment, etc.). However, it is unlikely that the acceleration of economic growth through liberalization, privatization, and deregulation will be repeated, and the constraints associated with structural changes, technological spill overs, and the development of high value-added sectors cannot be overcome by these approaches alone. Kangasharju and Pekkala report that there was an increase in regional disparities in labour productivity across the Finnish regions during the 1990s (Kangasharju & Pekkala, 2001). In addition, they discover that the manufacturing industries have been the most important segment of the Finnish economy in the increase of regional disparities. In particular, this pattern provides the motivation to focus on manufacturing in decompositions of productivity growth.

It is also important that the country's geo-economic location provides a safe and stable business environment, which lead to improvement of working conditions. primary source of economic growth emphasized by the literature is human capital (Stokey, 1991). It is argued that the level of education drives growth because it increases the ability to adapt and implement existing technology or to create new technologies. Subsequent theoretical analyses have emphasized the strategic complementarities between human capital and R&D activities. Redding for instance, builds a model in which investment in human capital made by workers and R&D efforts made by firms are complementary and interdependent, so that they jointly determine the growth equilibrium (Redding, 1996). Economists and policy-makers have pointed to public sector infrastructure as a fundamental element in the strategy of regional development policies. According to Boarnet, public capital provided in a particular region raises the comparative advantage of that region over the others, and could therefore attract factors of production from other locations where output or productivity might decrease (Boarnet, 1998).

4. Data and Results

Data from the National Statistics Office of Georgia from 2010 to 2020 shows that the most productive region according to employment is Tbilisi (Figure 1). The second most productive region of Georgia is Racha-Lechkhumi and Kvemo Svaneti. Even though this region had and has less employment rate, than other regions, central governments investments in tourism industry and related sectors increased output of the region and generates more wealth per employed. However, as the region was mainly oriented on tourism, since the COVID19 pandemic outbreak, productivity decreased in 2020. Producing, agricultural and trade regions, such as Imereti, Kvemo-Kartli and Samegreli-Zemo Svaneti regions' productivity increased between 2019 and 2020 (Figure 1).

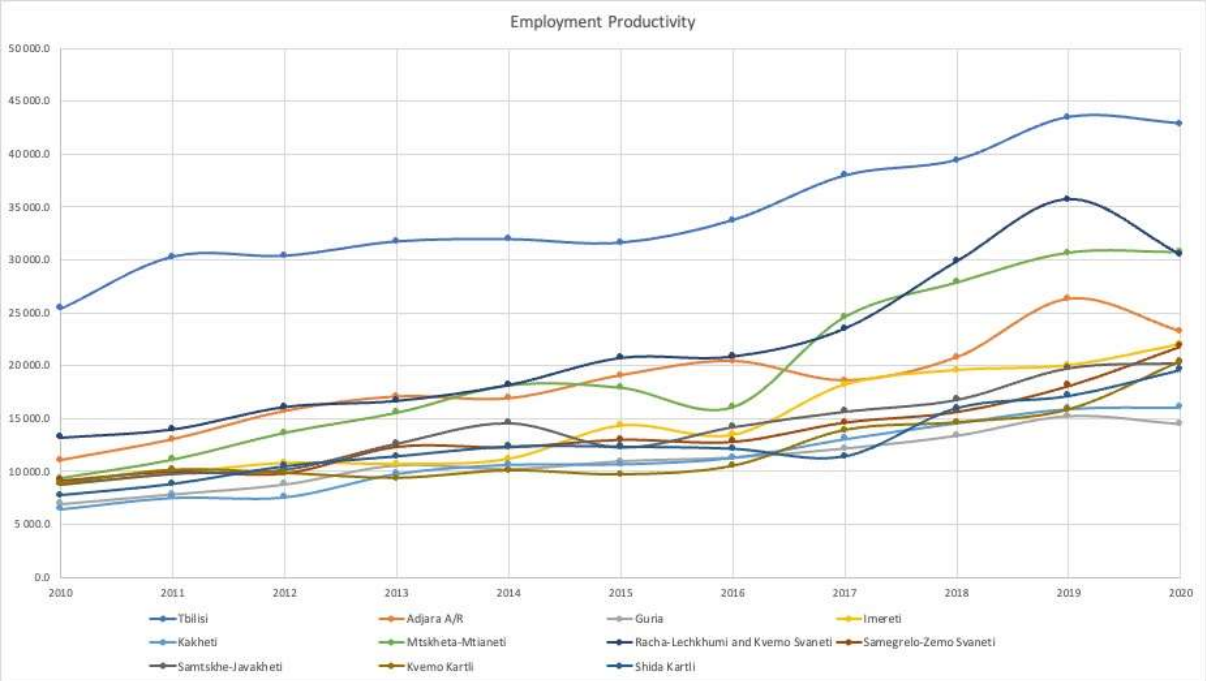

Figure 1. Productivity by Employment

Figure 2 shows changes in productivity. The most significant positive change occurred in Mtskheta-Mtianeti region between 2016 and 2017. In-depth analysis shows that the main reason is boost of economic activities due to the providing basic communal services and internet. Additionally, popularization of touristic sightseeing of the region increased number of tourists, therefore, their spending per employed in the tourism industry. The second most significant change happened in Shida Kartli region between 2017 and 2018, where territorial municipal reforms enacted, which gave possibility to manage more resources by municipal decision-makers. Moreover, the same factor, popularization of touristic sightseeing stimulated tourism industry. Besides pandemic, the huge negative change in productivity growth occurred in Samtskhe-Javakheti between 2014 and 2015. In-depth analysis shows, that migration in this region was highest in these specific years.

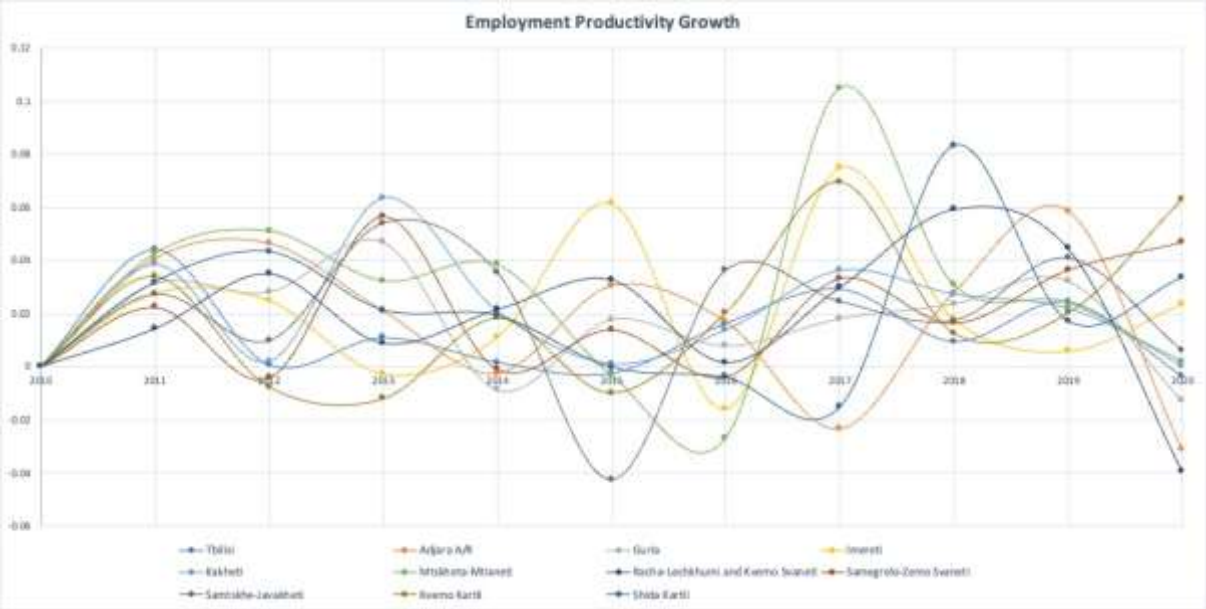

Figure 2. Productivity by Employment Growth Rate

Figure 3 shows productivity by Average Salary in regions. Average salary is not quite representative method to show labour market performance, however, the National Statistics Office of Georgia has been calculating average salary till 2022. In 2022 the Office added calculations of median salary. According to the Figure 3, the most wealth generated by one unit of Georgian currency (GEL) is in Tbilisi region. This can be explained by multiple factors and one of the most important one is competitiveness among employees for highly qualified applicants and the second, access to jobs. Both factors increase productivity. Additionally, almost all industries of Georgia is represented in Tbilisi. The second most productive region is Imereti, which has maintained the rank during the research timeframe. The factors impacting these results are industries in the region – production, tourism and retail. The least productive by average salary in Racha-Lechkhumi and Kvemo Svaneti region. Despite the fact that the lowest average salaries are in other regions, Racha-Lechkhumi and Kvemo Svaneti generates less wealth per unit of GEL.

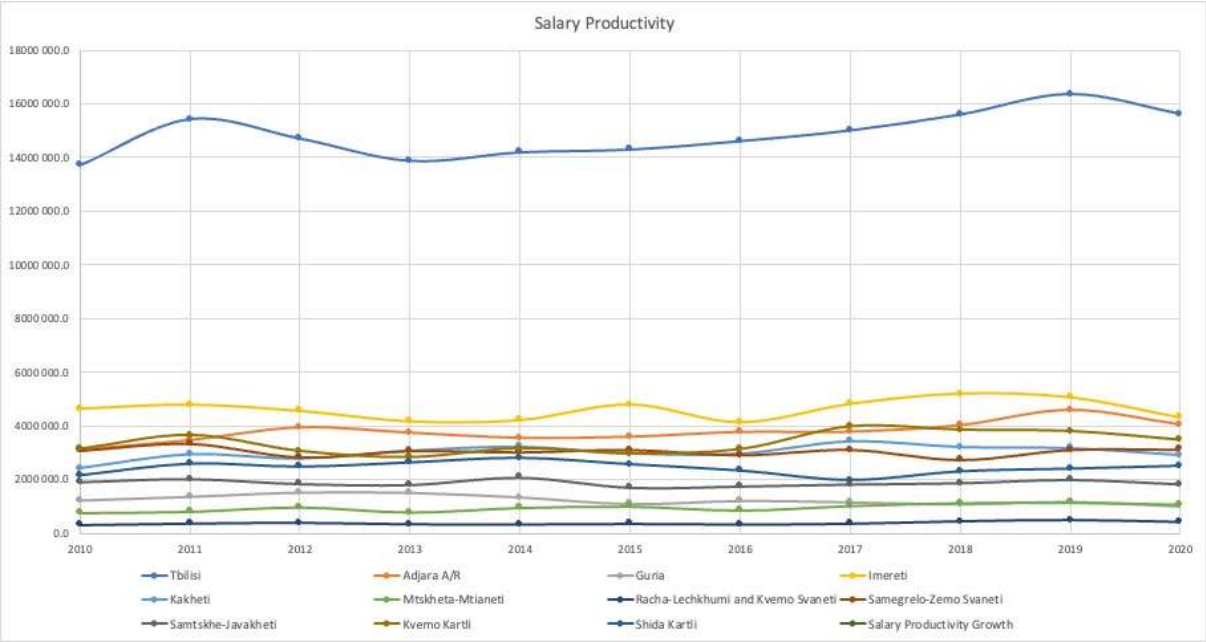

Figure 3. Productivity by Average Salary

Figure 4 shows the growth rate of productivity by average salary. The highest positive change rate occurred in Kvemo Kartli in 2017, in Kakheti in 2011 and in Mtskheta-Mtianeti in 2014. The 19.09% increase in Mtskheta-Mtianeti is response to the previous year's decrease by 21.15%. Changes in Kakheti and Kvemo Kartli regions

are caused by access to new markets of the regions' main industries – agriculture. Besides drastic decrease in Mtskheta-Mtianeti, Guria and Samtskhe-Javakheti also had negative changes in productivity, both in 2015. In Guria, in-depth analysis shows cash outflow in neighbouring region – Adjara A/R and in Samtkhe-Javakheti, still emigration in the main factor of productivity fall.

Figure 4 - Productivity by Average Salary Growth Rate

5. Conclusion

Our analysis has some shortcomings and limitations, which lay the groundwork for more detailed studies in this direction in the future. First and foremost, our analysis relies primarily on demographic data. Future research could use employment and firm distribution data, which are more relevant to economic development, to compare the economic impact of spatial structure as measured by different city attributes. On the other hand, although the economic scale of this study is mainly at the prefectural level, future research could focus on the economic impact of spatial structures within urban centres or at the regional level. Although our analysis mainly focuses on the economic impact of urban spatial structure, future research could also examine its impact on other aspects of socioeconomic development. Experience over the past decade has clearly shown that rolling dice is not the best option. Especially in a situation where Georgia's resources are scarce. In addition, it is necessary to formulate and pursue a consistent strategy without conflicting elements. To do this, we need to analyse individual sectors and their peculiarities in more detail. We need to know which industries have the potential to expand and which industries have the potential to increase productivity. Analysis should reflect national, regional and international conditions and experiences, as well as current and future global developments.

A country's economic development must be based on free market principles, a prerequisite for a strong private sector. Therefore, the government's economic policy based on the principle of free market aims at the further development of the private sector and the resolution of the problems of the private sector on the one hand, contributes to the strengthening of the private sector and contributes to the creation of jobs in the private sector. increase. On the one hand, it promotes the economic development of the country until it reaches the desired level, supporting the sections of the population that need it most. Georgia is a small, open economy. It is therefore inseparable from current events in the region and the global economy. However, a stable macroeconomic environment is important to mitigate the impact of external shocks.

Summarizing Georgia's strengths and weaknesses, the following picture emerges. Georgia stands out in comparison with developing institutions, infrastructure, labour market efficiency, low taxes and regulations, lack of exchange controls, low crime rate, and lack of bureaucratic procedures for starting and running businesses. competitiveness. I have a problem in the following areas: Protection of property rights, innovation, secondary and tertiary education, science and research production, level of competition in domestic markets, access to finance, skilled labour, public confidence in politicians, and political instability.

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Vol.7 Issue.4 December 2022

RSEP Review of Socio - Economic Perspectives
ISSN: 2149 - 9276
E-ISSN: 2547-9385

The impact of the south-to-north water diversion project on the usage of water-saving irrigation machinery

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Article History

Received: 29 June 2022 Revised: 25 November 2022 Accepted: 30 November 2022 Available Online: 5 December 2022

Keywords: South-to-North Diversion Project, water resources, water-saving irrigation machinery
JEL classification: C12; D24; Q15

Citation: Xu, H. & Yao, Z. (2022). The impact of the south-to-north water diversion project on the usage of water-saving irrigation machinery, *Review of Socio-Economic Perspectives*, 7(4), 9-19.

Abstract

Agricultural water-saving irrigation represents an important component of environmental protection with the potential to improve economic development and environmental protection of water-receiving areas, but little is known about the relationship between South-to-North Water Diversion Project and the usage of water-saving irrigation machinery. This paper exploits the 2013–2014 China South-to-North Water Diversion Project reforms which significantly alleviated the water shortage problem in north China. By linking administrative claims data to water-saving irrigation machinery numbers for water-receiving provinces and the control provinces, this paper finds that water-receiving provinces experienced a 19.6 percent post-reform decline in water-saving irrigation machinery usage, and a 7.3 percent drop in water-saving irrigation area relative to other provinces.

1. Introduction

As a critical grain-producing area in China, the North China Plain has a large population and a great demand for water. However, the problem of insufficient annual precipitation makes it one of the most water-scarce areas in China, which seriously restricts agricultural and economic development. To alleviate water scarcity, China has implemented a South-to-North Water Diversion Project (SNWDP).

China's South-to-North Water Diversion Project is a mega-engineering scheme with construction and maintenance spanning over six decades (Zhu et al., 2008). The project transfers water from humid Yangtze River basin to dry northern plains of the Yellow, Huai and Hai River basins to improve agriculture and to mitigate drought (Wei et al., 2016). It transfers water through three routes: Eastern Route (ER) is through the Grand Canal, Middle Route (MR) from Danjiangkou reservoir to Beijing, and the Western Route (WR) planned on the Tibet Plateau. Three provinces namely Jiangsu, Shandong and Hebei are located in the eastern route. Four provinces and municipalities namely Beijing, Tianjin, Hebei and Henan are located in the middle route, for which Tianjin and Hebei provinces suffer severe water shortage. Six provinces namely Qinghai, Gansu, Ningxia, Inner Mongolia, Shaanxi and Shanxi are located in the western route. The first phase of the ER was opened to water on November 15, 2013 and the MR was on December 12, 2014. The WR has not yet started.

The completed water transfer line will be over 1152 km long, equipped with 23 pumping stations with a power capacity of 454 megawatt. Due to the natural topography of the Yangtze and North China Plains, pumping stations will raise water from the Yangtze to Yellow River crossing further north, and water will flow downhill through an aqueduct. The amount of water to be diverted in the first, second and third stages are 9.07 billion cubic meters, 10.6 billion cubic meters and 14.8 billion cubic meters, respectively (Wei et al., 2016).

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DOI: https://doi.org/10.19275/RSEP137
Article Type: Original Paper

This water transfer scheme has effectively alleviated the shortage of water resources in the Northern areas, i.e., water-receiving areas changed their water supply pattern and supplemented the groundwater (Liu & Zheng, 2002). Besides, SNWDP promoted the sustainable development of the economy and agriculture in the water-receiving areas (Wilson et al., 2017). According to Sheng and Tang (2020), south water has improved the water guarantee rate of more than 40 cities in the water-receiving area, ensuring the safety of the water supply. Sufficient evidence has shown the influence of the SNWDP for water-receiving areas is effective. However, it remains to be seen whether the solution of the water shortage in water-receiving areas will inhibit the development of local water-saving industries and the popularization of water-saving agricultural machinery (such as drip irrigation and sprinkler irrigation technology).

From 1949 to 1990, China's irrigation water consumption continued to rise, and since then, it has begun to fluctuate and decline (Wu, Jin & Zhao, 2010). From 2003 to 2013, agricultural water use increased to a peak, of which irrigation accounted for 95% (Zhang et al., 2013). Nowadays, irrigation water consumption has reached 62.3% of the country's total water consumption (Han et al., 2020). The above arguments show that the water used for agricultural irrigation in China has reached the limit of our country. While the construction of the South-to-North Water Diversion Project has effectively alleviated the shortage of water resources in the northern water-affected areas and replenished groundwater.

This paper aims to analyze whether the water-saving industries and the popularization of water-saving agricultural machinery (drip irrigation and sprinkler irrigation) in water-receiving areas will be affected by the solution to the water shortage in water receiving areas. Since previous research has focused on the impact of the SNWDP on the economy, environment, and water resource utilization rate (water footprint) in a particular region, as well as articles using game theory for pricing analysis, but generally ignored water-saving agricultural irrigation machinery. This paper supplements the shortcomings of the previous literature and conducts an empirical analysis of economics to study whether the SNWDP has an inhibitory effect on water-saving irrigation machinery in the water-receiving area.

The article is organized as follows. Section 2 reviews relevant literature about this topic. Section 3 presents the data I use and describes motivating descriptive statistics. Section 4 is the empirical strategy and section 5 preliminary findings. In section 6, I provide additional results by carrying out robustness test. Section 7 concludes.

2. Literature Review

This section introduces the empirical knowledge regarding the research topic and is related to two streams of literature. First is the impact of SNWDP on economic, environmental and agricultural water use, second is previous works about the development trend of agricultural irrigation machinery.

2.1. The Impact of the SNWDP

Previous studies have proved that the SNWDP positively affects economic development. According to Pholner (2016), SNWDP has different levels of economic stakeholders, including national scale stakeholders, provincial and local scale stakeholders, and basin-scale stakeholders. Fang and other researchers used the WCGE Model to analyze the effect of the SNWDP in 2020. They found that compared with the scenario without SNWDP, the SNWDP could Increase GDP growth by 1% to 2.3%, equivalent to 89 billion yuan, and the chain reaction of SNWDP can increase household income by 2.5% to 4.1%, expand production scale, and provide more than 700,000 jobs. (Fang et al., 2010). By 2020, the SNWDP could create 527 billion yuan of GDP and more than 1 million jobs per year (Fang et al., 2010). Some researchers took Bei Jing as an example to analyze the macroeconomic impact of the increase in the water supply. The results also show the promoting effect of the SNWDP on economy. Miao and Gao (2017) found that from compared 2008 to 2013, the direct economic benefit has increased from 4.39 billion yuan to 53.99 billion yuan, and the estimated full value of economic benefits has increased from 14.07 billion yuan to 231.86 billion yuan. Moreover, the SNWDP could play an essential role in increasing productivity, maintaining water prices, and promoting the development of goods and services (Berrittella et al., 2007).

Even though the SNWDP will have substantial economic benefits, previous researchers have also found that it will have an impact on the environment. According to Pohlner (2016), in the short term, the SNWDP has a negative influence on the society and environment. Zhang (2009) stated that a large amount of water diversion would lead to changes in the hydrological environment in the upper reaches of the Yellow River, the lower reaches of the Han River, and the tributaries of the Yangtze River, and the water supply areas of the central line. Besides, the SNWDP affects both water supply areas and water-receiving areas. Secondary salinization of water-receiving areas of the North China Plain is inevitable, and the reduction of Yangtze River flow will lead to the intrusion of seawater in the Yangtze River Delta (Zhang, 2009). However, in the long run, the SNWDP can contribute to environmental sustainability such as reducing coal energy consumption and mitigating climate

change; it can also complete the construction of a sustainable water resources system (Kattel et al., 2019). Moreover, the effective combination of water supply and self-rescuing in water-receiving areas is expected to solve the problem of water shortage fundamentally and ultimately achieve sustainable economic, social and ecological environmental development (Xu et al., 2018).

In agriculture, the SNWDP has made northern cities aware of the importance of energy, irrigation, and sustainability of water use for agriculture (Kattel et al., 2019). Besides, according to Yao and other researchers (2019), the SNWDP will alleviate groundwater shortages in North China by allowing more surface water for agricultural irrigation and reducing the amount of groundwater used for agricultural irrigation. Berkoff (2003) stated that agricultural water use is an essential part, and the implementation of the SNWDP will reduce irrigation use from 115 to 108 km3. Moreover, even though the SNWDP cannot wholly solve the problem of water shortage in the North China Plain, the pressure on water supply can be significantly alleviated, and the output of grain farmers will increase significantly (more than 115 Tcal/year), and the economic benefits will exceed 51 billion yuan/year (Yin et al., 2020).

2.2. The development trend of agricultural irrigation machinery

Water-saving agriculture is the trend of future development (Hu et al., 2010). Due to the lack of water resources, the Chinese government attaches great importance to the development of water-saving agriculture. The scarcity of water will induce the development of water-saving agriculture and thus improving irrigation efficiency; Although more than 5 billion yuan is invested in water-saving agriculture each year, the effect is not significant, and the decline in agricultural water consumption is only 2.9% (Xu et al., 2021). In addition, according to Wu (1998), China has great potential in the field of irrigation water conservation. China's total agricultural water consumption is as high as 73%, but due to the backward irrigation methods, the effective irrigation coefficient is 20%-40% lower than that of developed countries; if effective irrigation equipment is adopted, more than 30 billion cubic meters of water can be saved every year (Wu, 1998). Therefore, agricultural irrigation equipment should be combined with water-saving agriculture to improve irrigation efficiency. Li (1993) stated that a combination of multiple irrigation technologies such as drip irrigation, sprinkler irrigation, low-pressure pipeline water transfer irrigation technology, and surface irrigation technology is used to achieve water-saving effects. Wu (1998) also stated that the application of water-saving measures and technologies in the middle process of farmland irrigation, such as water diversion, water transmission, water distribution, irrigation, etc., can reduce the leakage loss and ineffective evaporation of the water transmission process, and improve the utilization rate of water resources.

3. Conceptual Framework

In this article, micro-data of the water-receiving and water-supply provinces I use comes from the China Rural Statistical Yearbook (CRSY) from 2009 to 2017. This statistical Yearbook, which collects information from rural areas in the provinces in China for the purposes of calculating the number of water-saving irrigation agricultural machinery, is collected and counted by Department of Rural Socio-economic Survey, National Bureau of Statistics. Data on total water supply and other environmental conditions related to province levels are taken from National Data, collected and calculated by National Bureau of Statistics. More detailed data on the dependent variable comes from the China Environmental Statistical Yearbook (CESY), from year 2009 to 2017, including water-saving irrigated area by region, jetting and dropping irrigation area, tinny irrigation area, low-pressure pipe irrigation area, etc.

The CRSY data include information on the basic situation of rural areas and agricultural production conditions, agricultural ecology and environment, rural investment, total output value, intermediate consumption and added value of agriculture, forestry, animal husbandry and fishery, area and output of main agricultural products (cultivation), rural market and prices, cost of agricultural products and income, income and consumption of rural residents, rural culture, education, health and other undertakings, regional rural economy, major rural economic indicators in each region, etc.

The CESY data include information on the natural conditions, water environment, marine environment, atmospheric environment, solid waste, natural ecology, land use, forestry, natural disasters and emergencies, environmental investment, urban environment, rural environment, etc.

Table I presents the descriptive statistics on both outcome variables and control variables.

Table 1. Descriptive statistics of relevant variables

Variable	No. of obs. (1)	Mean (2)	Std. dev. (3)	Min (4)	Max (5)
No. of Water-saving Machinery residence	270	641116	98609	100	527000
Agricultural Water Consumption	270	126	106	5	562
Total Water Supply	270	189	120	22	590
Individual level					
Disposable Income	270	9769	4577	2980	27825
Consumption Level	270	9046	5053	2459	26755
Cultivated Land level					
Effective Irrigation Area	270	7.26	1.02	4.749	8.704
Characteristics on City level					
Hydro Fuel	270	101.56	3.65	91.2	115.4
Agricultural Oil	270	102.14	4.18	93.3	115.6
Semi-mechanized FT	270	101.10	2.22	96	115.7
Mechanized FT	270	101.24	2.23	95.5	114

Notes. This table presents summary statistics for samples used in the analyses. Control variables include characteristics on individual, household level, and characteristics of migrants' inflow cities. Effective irrigation area is calculated in natural log form.

3.1. Data on the Outcome: No. of water-saving irrigation machinery

The outcome variable is the natural log form of the number of water-saving irrigation machinery, mostly referred to drip irrigation machinery, sprinkler irrigation machinery, low-pressure pipeline water delivery irrigation machinery and surface irrigation machinery, including all 30 China provinces, autonomous regions and municipalities (exclude Hong Kong and Macau Special Administrative Regions, Taiwan Province and Tibet Autonomous Region for the lack of data). To further observe whether the SNWDP has an impact on local water-saving industries, I use the total amount of agricultural water used in the year to substitute the above outcome variable. In order to observe the fluctuation range of the dependent variable' log value more intuitively, I show it in the following line chart. See Figure I. The graph on the left shows the average annual ownership of water-saving irrigation machinery in the water-receiving provinces and other control provinces. We can roughly judge that the increase in the number of water-saving irrigation machinery in the water-receiving areas during 2013-2014 and 2014-2015 was slightly smaller than that in the control provinces. The graph on the right shows the net increase in the number of water-efficient irrigation machinery, which is the value of the following year minus the previous year. It's obvious to find that the increase in year 2013-2014 of water-receiving areas is slightly higher than that of control provinces, and in year 2014-2015 quite the opposite. According to this phenomenon, it can be speculated that the average agricultural water consumption in the receiving area may be higher than that in the control provinces.

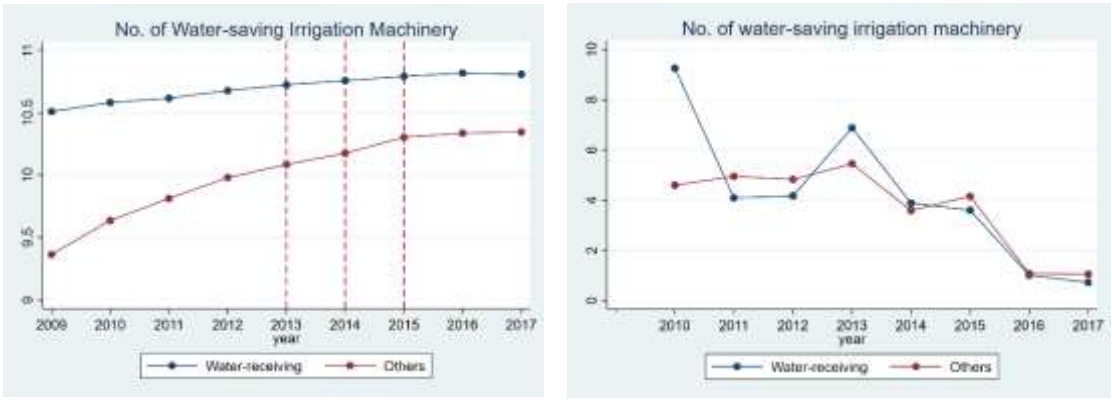

Figure 1. No. of Water-saving Irrigation Machinery

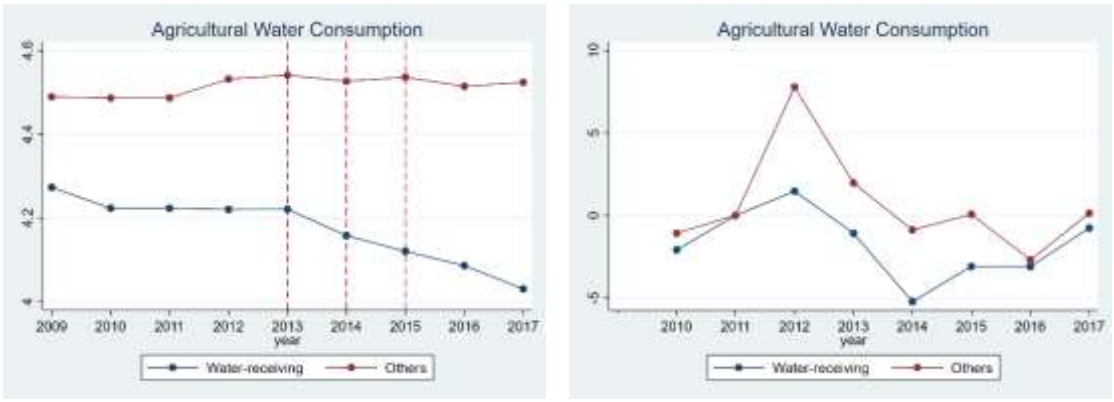

Figure 2. Agricultural water consumption

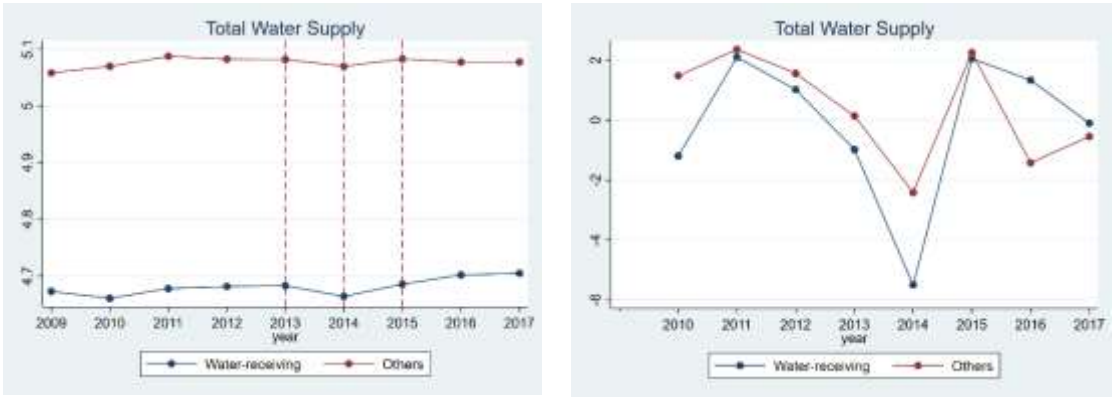

Figure 3. Total water supply

Figure II shows the instrument outcome variable, which is the average agricultural water consumption in both water-receiving areas and control provinces. Similarly, the number is also the log value. Average agricultural water consumption in control provinces is much higher than that of treated provinces. However, different from the above conjecture, there was a significant decrease in agricultural water consumption in the receiving area between 2013 and 2015 than control provinces. This result is quite puzzling for we can't infer what is causing the significant reduction in agricultural water use in the receiving area. And figure III presents the overall water supply. During 2013 to 2014, i.e., the year which ER of SNWDP is flooded, total water supply for both types of provinces reduced, while in the year which MR of SNWDP is flooded, total water supply for water-receiving areas is significantly increased.

3.2. Data on the Controls

The control variables include 3 different levels: income and consumption level, price index level and cultivated land irrigated area. For the income and consumption level, I controlled per capita disposable income of rural households and the average consumption level of rural residents. For cultivated land irrigated area, effective irrigation area is controlled. For price index level, there includes 4 variables, namely hydroelectric fuel consumer

price index, general price index of agricultural means of production, semi-mechanized farm tools price index and mechanized farm tools price index.

4. Identification Strategy

This paper exploits the differential effect of the 2013–2014 SNWDP, which is regarded as a reform on the North Plain for different provinces to implement a difference-in-differences empirical design. The SNWDP reforms reduced the usage and popularization of water-saving agricultural machinery for all water-receiving provinces. But when using the total amount of agricultural water used in the year as outcome variable, the empirical result is surprisingly different from that of the original outcome variable. After the SNWDP, i.e., year 2014, the total amount of agricultural water usage in water-receiving provinces is 9.69% lower than those of other provinces and is statistically significant at 99.9% level. I exclude 2013 for most of our analysis because this is a partially treated year.

Researchers study the differential impact of the SNWDP reform on both the penetration rate of water-saving irrigation machinery and total amount of agricultural water use, implementing a difference-in-differences design. The identifying assumption is that water-receiving provinces, in the absence of the 2013–2014 SNWDP reforms, would have experienced similar outcome changes as other non-treated provinces. This paper will test this assumption by studying pre-reform trends through event study analyses. Following this idea, a set of equations was estimated as:

$$Y_{it} = \beta_0 + \beta_1 \, ReceivingArea_i \times ReceivingYear_t + \sum \gamma^k {Z_{it}}^k + \alpha_i + \lambda_t + \varepsilon_{it} \qquad (1)$$

where Y_{it} is a measure of post water-saving irrigation machinery number for province i in year t. The number of water-saving irrigation machinery will be total numbers of drip irrigation, sprinkler irrigation, low-pressure pipeline water transfer irrigation, and surface irrigation machinery. The term $ReceivingYear_t$ is an indicator variable equal to 1 in years 2013 or 2014 and later, and $ReceivingArea_i$ is equal to 1 for those water-receiving provinces (0 otherwise). Here, β is the parameter of interest and represents the differential effect of the reforms for water-receiving provinces. For the other variables, $\alpha_i \; and \; \lambda_t$ stands for province-invariant and time-invariant cluster characteristics, which allows the specification above including fixed effects for each province and year. The year fixed effects account for common time trends in the outcomes and net out effects of the reforms that are common across water transfers, allowing us to isolate the differential impact of the changes in outcome variable. ε_{it} is the error term, which has zero mean and can be serially correlated; Z_{it} is a vector of predetermined characteristics of the province. While this set of control variables is not required in the specification because water-saving machinery variation should be orthogonal to these characteristics conditional on location, its addition is useful to improve the precision of the estimates. Therefore, researchers report results both including and excluding this vector.

This article models the outcomes as a log function because both total agricultural water use and number of water-saving machinery are highly skewed and it is common to assume they change in percentage terms. However, the limitation of a log-linear specification is clear: only under very specific conditions on the error term is the log linear representation of the constant-elasticity model useful as a device to estimate the parameters of interest (Silva and Tenreyro, 2006, p. 644). Despite this, the data do not contain observations where the potential two outcome variables are zero, so a log-linear specification seems appropriate. Furthermore, researchers adjust all standard errors for clustering at the province level.

5.Results

The identifying assumption when using DID model is that the post-reform water-saving irrigation machinery usage outcome in water-receiving provinces would have changed in a manner similar to the outcomes of other non-affected provinces in the absence of the relative change in water transfer and total water supply due to the reforms, i.e., there should be observed a parallel trend before SNWDP. Therefore, researchers test whether the parallel trend assumption is satisfied. See the figure below. The confidence interval for the two periods before the policy implementation includes zero, indicating that the parallel trend assumption is satisfied.

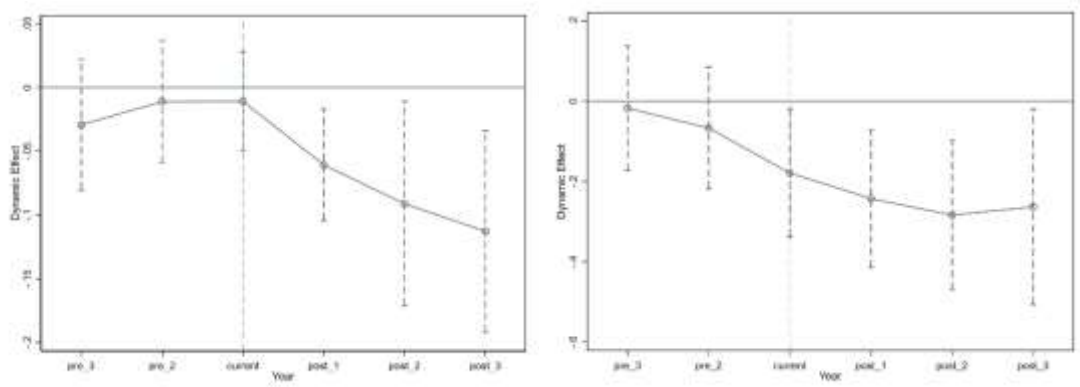

Figure 4. Parallel trend test

Table 2. Preliminary Results

Outcome	(1)	(2)	(3)	(4)	(5)
Panel A. ln(Number of Water-saving Irrigation Machinery)					
DID	-0.339***	-0.231**	-0.284**	-0.327***	-0.196**
	[0.123]	[0.094]	[0.113]	[0.116]	[0.089]
Panel B. ln(Agriculture Water Consumption)					
DID	-0.148**	-0.100**	-0.095**	-0.148**	-0.073**
	[0.069]	[0.051]	[0.036]	[0.070]	[0.033]
Individual Controls	No	Yes	No	No	Yes
Land Controls	No	No	Yes	No	Yes
CPI Controls	No	No	No	Yes	Yes
Province Fixed Effect	Yes	Yes	Yes	Yes	Yes
Year Fixed Effect	Yes	Yes	Yes	Yes	Yes
Obs.	270	270	270	270	270

Notes. DID term is the interaction term of ReceivingArea × ReceivingYear. Standard errors in parentheses adjusted for clustering at province level. Individual level control variables, i.e., the first two are defined as per capita disposable income of rural households (thousand yuan/person) and consumption level of rural residents (thousand yuan/person). Land Control refers to effective irrigation area, which is the area of arable land that has

a certain water source, the land is relatively flat, the irrigation projects or equipment have been matched, and normal irrigation can be carried out in the current year under normal years. In general, the effective irrigation area should be equal to the sum of the area of paddy fields and irrigated land that have been equipped with irrigation projects or equipment and can be irrigated normally. The CPI controls include price indexes of hydro fuel, agricultural means of production, semi-mechanized farm tools and mechanized farm tools. Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Then researchers provide OLS difference-in-differences estimates in Table II for the log number of water-saving irrigation machinery and the log of agricultural water consumption. Column 1 is the most parsimonious specification, regressing log number of water-saving irrigation machinery or log agricultural water consumption on interactive term for our sample. This column shows the difference-in-difference estimate without any control variables. The coefficient is -0.339 with a standard error of 0.123. This coefficient implies that a 34percentage point lower water-saving machinery usage is associated with water-receiving provinces after SNWDP. From column 2 to column four respectively add control variables on the individual level, land level, and price index level, namely per capita disposable income of rural households and consumption level of rural residents (thousand yuan/person); effective irrigation area; price indexes of hydro fuel, agricultural means of production, semi-mechanized farm tools, and mechanized farm tools. When adding individual controls and land controls the coefficient on interaction term significantly reduces to -0.231 and -0.284. Column 5 represents estimates of all control variables and the coefficient further downs to -0.196. All columns include both years fixed effect and province fixed effect.

As estimated shown in panel A, when controlling nothing, the coefficient of beta is negative 33.9%, which is larger enough than that of when controlling all relevant variables, which is negative 19.6% only. From panel A, we can conclude that water-receiving provinces incurred a relative decrease in the number of water-saving irrigation machinery of 19.6 percent reduction with respect to the control provinces. In panel B, I use the log of agricultural water consumption as the outcome and estimate larger reductions, which estimates a 7.3 percent reduction in water-receiving provinces relative to the control provinces. All estimates are statistically significant at the 5 percent level.

6. Robustness Test

The identifying assumption for DID method is that the post-reform water-saving irrigation machinery usage outcomes in water-receiving provinces would have changed in a manner similar to the outcomes of other non-affected provinces in the absence of the relative change in water transfer and total water supply due to the reforms. Although the result in figure I and figure II may seem like a conflict with parallel assumption, which causes the coefficients estimated in Table II not unbiased, the parallel trend hypothesis test tells us that both outcome variables satisfy the assumption. However, to ensure the robust results, a further difference-in-difference-in-difference (DDD) model or synthetic control method should be used to solve the potential problem. As a result, this section chooses an alternative method, namely DDD to solve the potential problem. Another possible threat to identification is that the reform systematically affected those provinces with lower average water-saving irrigation machinery utilization, which is calculated as effective irrigation area (hectare) divided by quantity of water-saving machinery.

6.1. Difference-in-Difference-in-Difference Estimate

The important assumption of the difference-in-difference method is that the time trend of the control group and the experimental group is the same, and when the time trend of the control group and the experimental group is different, the consistent experimental estimator cannot be obtained, and the estimator needs to be further improved. Another concern is in addition to the SNWDP, there may be other policies that have inconsistent effects on pilot and non-pilot areas, thereby skewing the estimates. It is necessary to use triple difference to overcome this problem, that is, it is necessary to find another pair of "treatment group" and "control group" that are not affected by the SNWDP policy, because inland cities are not affected by the SNWDP policy, at this time the second pair of treatment groups and the difference in the control groups is only derived from the influence of other policies. The difference between the first pair of treatment groups and the control group (including the difference between the SNWDP policy and other policies) is subtracted from the difference between the second pair of treatment groups and the control group. Net effect of SNWDP policy. Based on the above analysis, a triple difference model (DDD) is constructed:

$$Y_{it} = \beta_0 + \beta_1\, ReceivingArea_i \times ReceivingYear_t \times group + \beta_2\, ReceivingArea_i \times ReceivingYear_t + \beta_3\, group \times ReceivingYear_t + \beta_4\, ReceivingArea_i \times group + \sum \gamma^k Z_{it}{}^k + \alpha_i + \lambda_t + \varepsilon_{it} \quad (2)$$

Where group is a dummy variable, which equals to 1 when the province is a coastal city, otherwise is 0. When $ReceivingArea_i \times ReceivingYear_t \times group$ is 1, it represents coastal cities in water-receiving areas after implementing SNWDP policy, and the estimated coefficient β_1 is the triple-difference estimator represents the average treatment effect of the SNWDP policy on water-saving irrigation machinery usage. The regression results are as follows:

Table 3. Robust test

Dependent variable	Water-saving machinery usage	Agricultural water consumption
DDD	-0.138***	0.0647**
	[0.640]	[0.085]
	Yes	Yes
Province Fixed Effect	Yes	Yes
Year Fixed Effect	Yes	Yes
	Yes	Yes
Individual Controls	Yes	Yes
Land Controls		
CPI Controls	0.9616	0.9969
	270	270
R-square		
Obs.		

Notes. DDD term is the interaction term of ReceivingArea × ReceivingYear × group. Standard errors in parentheses adjusted for clustering at province level. Outcome variable is the number of water-saving irrigation machinery, taking natural log form. Individual level control variables are defined as per capita disposable income of rural households (thousand yuan/person) and consumption level of rural residents (thousand yuan/person). Effective irrigation area refers to the area of arable land that has a certain water source, the land is relatively flat, the irrigation projects or equipment have been matched, and normal irrigation can be carried out in the current year under normal years. In general, the effective irrigation area should be equal to the sum of the area of paddy fields and irrigated land that have been equipped with irrigation projects or equipment and can be irrigated normally. The CPI controls include price indexes of hydro fuel, agricultural means of production, semi-mechanized farm tools and mechanized farm tools. Significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

The coefficient of interactive term DDD is -0.138, with p value of 0.007 and standard error of 0.640. This figure is close to that of in Table II. It verifies that after SNWDP, the water-saving irrigation machinery usage reduces about 13.8% in water-receiving provinces. The estimate is both economically and statistically significant. Surprisingly, the coefficient of agricultural water consumption turns positive, which means water consumption in water receiving provinces is 6.47% higher than that of control provinces.

7. Conclusion

This paper studies how China's South-to-North Water Diversion Project policy that tries to solve the water shortage in North China Plain causally affect water-saving irrigation machinery usage. Using a DID design, this paper finds consistent evidence that the SNWDP reduced water-saving irrigation machinery usage for water-receiving provinces. The results imply that water-saving irrigation machinery usage for water-receiving provinces decreased by 19.6 percent than other provinces. However, this paper also finds that agricultural water consumption associated with water-receiving provinces decreased by 7.3 percent relative to other provinces. This result may seem conflict with each other. Why water-saving irrigation machinery usage in water-receiving provinces decreases but agricultural water consumption also decreases? This may arise from inverse causality, that is decline in agricultural water consumption caused fewer water-saving irrigation machinery usage in water-receiving areas. Yet, this speculation is likely to be wrong. As I use a DDD method to do robust test, the coefficient of interactive term becomes positive, partly proves the incorrectness of the speculation.

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Vol.7 Issue.4 December 2022

RSEP Review of Socio - Economic Perspectives
ISSN: 2149 - 9276
E-ISSN: 2547-9385

Organic food products: An analysis of factors affecting the buying behaviour

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Article History

Received: 3 July 2022 Revised: 18 November 2022 Accepted: 25 November 2022 Available Online: 5 December 2022

Keywords: organic foods, consumer behavior, buying behavior, influence
JEL classification: M30; M31; M38

Citation: Kaur, G. & Rana, M. (2022). Organic food products: An analysis of factors affecting the buying behaviour, *Review of Socio-Economic Perspectives*, 7(4), 21-30.

Abstract

Consumer behavior being one of the most challenging areas in marketing focuses on the purchasing, consuming and using products and services. Consumer Behavior is largely impacted by social, psychological, cultural and personal factors. In the recent years the trend towards the consumption of organic foods has grown largely. Organic Foods have been long considered to be more nutritious, health and ecologically sound compared to ordinary foods. Although, Organic Foods come for a price which is expensive than any other conventional foods, people are ready to pay the extra amount. The study aims to analyze the factors that influence that buying behavior of a consumer when s/he purchases an organic food product. This study uses independent t-test, ANOVA techniques to confirm the results from the data that has been collected. According to this study, price, subjective norms, and understanding of health issues are some of the elements that have a significant impact on how consumers feel abo4ut buying organic food. Other than the confirmed factors 'availability' is another factor that affects the consumer attitude. One can infer from the obtained results that these factors not only influence buyers point of view towards the organic food but it also influences the buying behavior of the consumer. Additionally, age, education, and income are some of the key elements that affect real purchasing behaviour. This research also help to better understand how consumers feel about the organic food business as a whole and their purchasing habits and intentions. The findings of the study have their suggestions for the market's merchants, regulatory bodies, and organic food industry businesses. Towards the end, this research comes up with instructions and recommendations for marketers and merchants who work with organic goods and want to grow the organic food sector.

1. Introduction

The rise in environmental awareness, demand and willingness to pay for Organic Foods has given rise to corporate interest in organic food industry which has led to initiation of major changes and innovations. With the growth in organic product market, this enhanced awareness and willingness of the consumer amounts for a thoughtful effect and influences. His purchasing behavior in the market. When it comes to new marketing trends, the rise of the organic business is considered as a component since it encourages consumers to seek for the quality and other advantages of organic products before making a purchase.

The increase in population has led to major downfalls in the agriculture sector. It was very difficult to satisfy the needs and desires of the increasing population. To overcome this situation "green revolution" was launched to help the sector with technological advancements, rising agricultural output to fulfill the growing population's need for food. The Green Revolution although, being a positive reform had its negative impacts. Chemical pesticides and fertilizers are used to increase output, but they seriously harm the environment and public health.

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DOI: https://doi.org/10.19275/RSEP138
Article Type: Original Paper

A sizable portion of consumers worldwide are worried about environmental issues. The attitude or behavior of a consumer who is sensitive to the environment is influenced as to how a manufacturing, processing and brand of a product might affect the environment. Consumers are now aware of the environmental degradation and are now even more conscious towards purchasing what is said to be efficient and effective, in this case organic products, thus favoring the companies that comply with the environmental data. This study aims to investigate the elements that influence consumers' purchasing decisions. Understanding these variables is crucial for creating a marketing plan that will be successful in expanding India's domestic organic market.

2. Literature review

The results of the consensus of global study present a clear picture of the factors that influence people's decisions to purchase organic food items. Health, product quality, and concern for environmental degradation are some of the variables that emerge as most prevalent in the respective order of priority, even though there are some discrepancies in the order of preferences in a particular culture and demographic factors. These claims have been previously supported decades ago and have also been backed by numerous additional studies.

(ACNielsen, 2006) says that Indians are among the top 10 global consumers of foods with health supplements, but they cannot get organic food goods. (Chakrabarti and Baisya, 2007, 2009) further in his study provides that although Indian market of Organic Products is still in a nascent stage, the relevant personality components, related dimensions, and important buying motivations and attitudes have been found by a number of researchers, and they may be usefully employed in consumer surveys to explain purchase behavior in an environmentally friendly category like organic food.

Positivity toward organic products is significant because, as (Harper and Makatouni, 2002) and (Chinnici et al., 2002) have noted, consumers' belief that organic products are healthier than conventional alternatives influences their decision to purchase them. Similarly, (Vermeir and Verbeke, 2004) discovered that buying organic products was not solely motivated by environmental concerns; other factors that may have an impact on behaviour include health concerns, belonging to a social group, the desire to stand out from others, and the desire to experiment with newer technologies.

The Asia Pacific regions, especially in developing nations like India and China, have a persistently strong consumer belief that organic foods are healthier than conventional foods. Consumers in western, eastern market are well aware of numerous benefits that organic products have to offer. (Letourneau et al., 1996; Cayuela et al., 1997) shows that people believe that foods grown organically have lower levels of microbiological and chemical contamination than those farmed conventionally. This remains a perception as one can understand by the following example: sometimes interrogated factors include the potential for contamination during processing and the mixing of conventional and organic goods in the food supply chain. Due to the increased usage of agricultural manure, there may potentially be organic foods that are at a higher risk of microbial contamination than conventional foods. Salmonella and E. Coli. However, this situation can be managed with the help of proper management practices.

3. Research Methodology

3.1. Objectives of the study

1. To examine and acknowledge the actual buying behavior of consumers in the Organic Food Industry.

2. To discuss the challenges for the Indian Organic Food Market.

In order to attain the objectives of the study, empirical data by way of structured questionnaire has been collected; the questionnaire has been formulated taking into account previous studies such as Gil et al. (2000) Gracia and de Magistris (2007), Chen (2009), Chakrabarti (2010) and Effendi et al. (2015). Questions formulated for the purpose were based on the 5-point scale. The socio-demographic characteristics of the respondents were recorded while taking into account factors like gender, age, education level, occupation, and income.

3.2. Sample and data collection procedure

The locations of all one-to-one surveys were department stores and organic food outlets. that have sections for organic foods in the city of the Ludhiana, Punjab. Random sampling method has been used in order to conduct surveys i.e. by interacting with customers who were leaving grocery stores, malls, and food festivals. Only the respondents who were aware of organic foods were distributed the questionnaires. A total of 200 respondents out of the 250 questionnaires distributed participated in the survey.

3.3. Data analysis

In order to conduct statistical analysis all the responses given by the respondents were thoroughly check and coded. Statistical Package for Social Sciences (SPSS) version 24 has been used for analyzing the data. Cronbach's alpha method has been used to examine the scale reliability of the empirical data and consistency. The acquired data have been statistically analysed using methods including ANOVA, Factor Analysis, Independent T-test, Multiple Linear Regression, and Hierarchical Multiple Regression Analysis.

4. Results and Discussions

The description of the socio-demographics of the consumers were analysed and have been summarized in Table no. 1.1. The table indicates the results that around 53.5% of the consumers as per the survey were males while 46.5% were females. The majority of the responders were between the ages of 31 and 41; representing 29.5% of the sample respondents. As represented in the Table 1.1, Graduates (46.5%) and postgraduates (26.0%), as well as those with higher secondary education (12.50%), made up the bulk of the consumers.. The analysis of the sample provides that mostly respondents fall under the ₹ 30,000 to ₹50,000 per month income bracket and majority of respondents i.e. 51.39% belong to nuclear families (i.e. 3-4 members); closely followed by a further 40.0% living in one to two people households.

Table 1. Socio demographic profile of respondents

Variables	Non-Consumer/	Habitual Consume	Occasional Consumer	Total	Total
	Little Knowledge	Well - Informed	Well-Informed		Percentage
Gender					
Male	20	45	42	107	53.5
Female	15	50	28	93	46.5
Age(In Years)					
18-30	10	12	9	31	15.5
31-40	10	25	24	59	29.5
41-50	15	26	12	53	26.5
51-60	8	18	15	41	20.5
More than 60 years	7	4	5	16	8
Household Size					

1-2	10	55	15	80	40
3-4	35	46	22	103	51.5
More than equal to 5	4	8	5	17	8.5
Education					
High School	5	8	7	20	10
Secondary School	9	10	6	25	12.5
Graduation	21	55	17	93	46.5
Post Graduation	13	24	15	52	26
PHD	2	5	3	10	5
Family Income					
<10,000	4	11	5	20	10
10001-30000	9	15	7	31	15.5
30001-50000	7	27	8	42	21
50001-70000	8	11	14	33	16.5
70001-90000	10	16	12	38	19
More than 90000	9	21	6	36	18
Occupation					
Student	9	21	16	46	23

Employee	14	36	23	73	36.5
Professional	3	21	5	29	14.5
Self-Employed	3	23	3	29	14.5
Unemployed	5	14	4	23	11.5

4.1 Reasons for purchasing organic food

People who had heard of "organic" goods were questioned about whether they had ever purchased them. 65.3% responded favorably, additional inquiries regarding their purchasing behavior were made from buyers. 52.0 percent of them purchase organic goods every week, 22.5 percent do so at least once a month, and 24.9 percent less frequently than that. As the primary justification for buying organic food, respondents identified 'healthy content' as their response. However, the majority of respondents are of the opinion that advantages such as healthful ingredients, a lack of pesticides or low residual levels, freshness, and environmental friendliness are important factors in choosing organic foods over conventional meals. (Fig. 1.1). A total of 67 percent of people says that in making a purchasing decision, healthy content plays an important role. This confirms reaction to earlier results in which interviewers identified nutritious content as the top individual justification for buying organic food (52%). Principal Component Analysis (PCA) approach with Varimax Rotation was used to identify the variables influencing a consumer's perception of organic foods. Data suitability was checked using Kaiser-Mayer-Olin (KMO) and Bartlett's sphericity test before factor analysis. The KMO sampling adequacy measure is 0.78, which exceeds the 0.60 suggested cut-off value.23 The Bartlett's test of sphericity provided $\aleph! = 2068$, $df = 110$, $p = 0.00$) from which it can be inferred that the interitem correlations were sufficiently large for PCA. Thus, these statistical measures support the data factorability. Cronbach's alpha (a) values for each of the components were more than the cutoff point of 0.70, assuring the dependability of the scale. (Nunnally, 1978).

Table 2. Constructs, Observable items and Factor Loadings

Construct	Indicator	Factor Loading	Cronbach's	Variance Explained
Health Consciousness (HC)	HC1	0.82	0.78	38.3
	HC2	0.73		
	HC3	0.72		
Knowledge of Organic Food Products (KOF)	KOF1	0.81	0.76	7.23
	KOF2	0.75		
	KOF3	0.71		
Subjective Norm (SN)	SN1	0.85	0.81	6.61
	SN2	0.79		
	SN3	0.71		
Perceived Price (PP)	PP1	0.77	0.77	5.23
	PP2	0.74		
Availability(A)	AV1	0.86	0.81	4.89
	AV2	0.81		
Attitude (AT)	AT1	0.78	0.82	3.81
	AT2	0.75		
	AT3	0.71		
Purchase Intention (PI)	PI1	0.78	0.79	3.21
	PI2	0.81		
	PI3	0.69		
Actual Buying Behavior (ABB)	ABB1	0.86	0.76	1.78

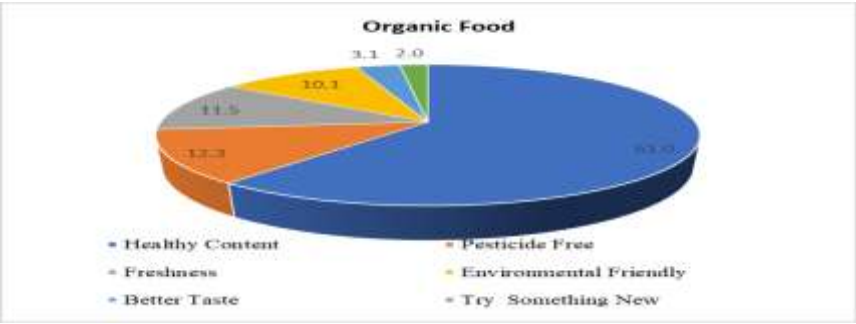

Figure 1. Organic Food

4.2 Differences in the actual buying behaviour with respect to demographic variables

The Independent T-Test was used in this study to identify significant gender differences in the actual purchasing behavior of organic food products. As per statistics, more than 0.05 was the P- value (0.141) of the Levene's Gender Test, indicating that the variance is homogeneous. Therefore, in this research, the t-test for equal variance was used. 2-tailed significance (0.078), which is greater than 0.05, suggests as a rule of thumb that the difference is not statistically significant. The differences between the mean of 3.70 and 3.85 with the standard deviation of0.58 and 0.47 for both sexes on actual buying behavior were not significant, according to the equal variance assumed. The findings confirm that both behaviors are directed at organic food products. The results of the One-Way ANOVA test show that the age of the respondent (F = 6.89, Sig. 0.000) had a major impact on the purchasing intent of organic food products. It's being supported. There was a statistically higher score on the purchasing behavior of organic food products compared to other age groups based on the results of the least significant difference (LSD) test for the respondent age group as shown in Table 1.3 in the age group 31- 40 years.

Table 3. Least Significant Difference (LSD)Test for Respondent's Age Group

Dependent Variable	Respondent's Age (in Years)		Mean Difference	Sig.
Actual Buying Behavior	31 – 40	18 – 30	0.37	0.012
		41 – 50	0.33	0.001
		51 – 60	0.39	0.000
		More than 60	0.42	0.001

Results show that the monthly income of the respondent (F=7.896, Sig. = 0.000) had a significant impact on the intention of purchasing organic food products. The results of the LSD test for monthly income of respondents (F = 8.932, Sig. = 0.000) showed that respondents with income levels higher than ₹ 50,000 per month had a statistically significant higher score on Actual purchase of organic food products from those lower than ~50,000 per month than respondents.

Statistical results show that the educational level of the respondent (F=8.124; Sig.=0.000) had a major impact on the purchasing intent of organic food products. In addition, the results of the LSD Test for the educational level of the respondent (F = 8,054; Sig = 0,000) showed that respondents holding a degree and master had a statistically significant higher score on the actual buying behavior of organic food products than respondents with a high school or intermediate qualification. The results of the LSD test show that holders of MPhil/PhD (Mean Difference = 0.601, Sig. = 0.001) had a statistically significant higher real purchase score than any other group of respondents.

5. Challenges in Indian Organic Food Market

There has been a sharp rise in demand for organic food products in the Indian market as a result of people's greater awareness of the benefits of eating quality and organic food. (Anamika Pandey, 2022)

People have innately recognized that health is the true form of wealth ever since the pandemic rocked the globe. In the Indian market, demand for organic food items has sharply increased due to people's growing awareness of the benefits of eating high-quality, organic foods.

We observe that consumers are choosing organic goods over conventional ones in favor of a better quality of life. However, the Indian market for organic food still has a ways to go. According to a survey, barely 1% of all organic produce is consumed in India, which is home to over 20% of the world's population. India, on the other hand, has the largest farmlands in the world. Given these facts and figures, it is clear that organic food items continue to encounter numerous obstacles on the Indian market.

5.1 Limited Knowledge: Organic food is still stigmatized in Indian society as a sign of luxury and status rather than as a standard. Many individuals believe it represents one's quality of life. Because of this, the word-of-mouth marketing strategy may have raised the profile of the phrase "organic," but more as a status symbol than as a sustainable solution. (www.businessworld)

5.2 Making Decisions: About a Lower Priced Product: Indian markets have price-sensitive clients with wide variations in their ability to spend their disposable cash. Therefore, even a small variation in food product costs

can cause someone to choose a less expensive alternative rather than one that is higher in quality and priced fairly. As a result, a sizable portion of the Indian diaspora chooses not to purchase organic food products.(Bezawada, R., & Pauwels, K. ,2013)

5.3 Unfriendly Retail Market: Instead of taking a chance on giving shelf space to a less well-known organic product, retailers will always prefer to stock the shelves with a fast-moving, cheaper product. On the other hand, organic keyword makes the store concerned about their return on investment. As a result, there is a significant disconnect between the buyer and the seller of organic food in the Indian market.(Arnold, C. 2009).

5.4 Traditional Farming Practices: Chemical fertilizers have become all too familiar to Indian farmers. The majority of farmers avoid switching to an organic farming method out of concern that they might not see the same outcomes as they do with chemical fertilizer-based farming.(Reddy, B. S. 2010)

5.5 Administrative Support: At the moment, the governing bodies' subsidies for chemical fertilizers make them more affordable and accessible for the farming industry. Therefore, it is crucial to raise farmers' awareness of the advantages of organic farming while also providing them with the necessary administrative support. Along with this, a safety net of crop loss reimbursement and subsidies for organic farming will also aid in expanding India's market for organic foods.(Mikkelsen, B. E., & Sylvest, J. ,2012)

5.6 Understanding Demand and Supply Gaps: There are times when the market has more organic food goods than there is demand, while the other, more in demand, organic food products has a shortage of supplies. For India's organic food industry to be balanced, this gap must be bridged and balanced. As an illustration, Uttar Pradesh has a higher demand than supply for jaggery powder. (Padel, S., & Foster, C,2005)

The Indian market for organic food products still has a ways to go. We cannot, however, ignore the reality that over the past few years, consumers have become more aware of and interested in organic food items. Rural areas are affected as well, partly because everyone now understands the advantages of organic farming and living a healthy lifestyle thanks to increased access to knowledge. If the key issues are resolved in a timely manner, there is hope that the Indian market would not only see an increase in organic food goods but also innovation. The organic food market in India seems to be advancing gradually despite all of these obstacles, particularly since covid.

6. Conclusion

The main objective of this study is to examine the mechanism behind consumers' actual buying behavior towards organic food products. First, the study explores the factors influencing consumers' attitude towards organic foods. Second, the study provides the understanding of how influencing factors and attitude affect the purchase intention of consumers towards organic food products. Prior studies have reported that consumers' intention to purchase may not always convert into actual buying of organic foods. Prior studies have reported that the intention of consumers to buy may not always translate into the actual purchase of organic foods. The impact of socio-demographic variables on actual buying behavior is therefore also examined. Four factors (health awareness, knowledge of organic foods, subjective norms and perceived prices) that influence consumer attitudes towards organic food products have been revealed in the results. However, these four variables affect the intention to buy organic foods, along with one additional factor (i.e., availability). While making purchase-related decisions, the store location matters to customers.

Results show that the influencing factors, i.e., health awareness, knowledge of organic foods, subjective standards, perceived price and availability, positively affect the actual purchasing behavior, but the relationship mediates attitude and purchasing intention. As mentioned earlier, positive attitudes and buying intentions may not always lead to the actual purchase of organic food products, using independent t-test and ANOVA techniques to test the impact of sociodemographic factors (gender, age, income and education). The LSD test was used to see which group had the greatest difference in a demographic variable. The independent t-test results show that gender does not affect the actual purchase of organic products. Nonetheless, three other socio-demographic factors (age, income and education) have a major impact on actual buying behavior. Results from the LSD test show that young consumers in the 31-40 age group purchase more organic food products than any other age group. Another potential factor influencing real behavior towards organic foods is income. The results of the study show that high-income consumers are more likely to buy organic food. The results also indicate that highly educated customers prefer to buy more organic foods than less educated ones.

Finding & Suggestions:

For organic product companies, retailers and market regulatory agencies, the results of this study have implications. Given consumer concerns about health and environmental concerns, an appropriate strategy needs to be developed. The strategy should focus on specific consumer segments, raising consumer awareness and

understanding of organic food products by preserving customer satisfaction and delight. Organic products are credential products, unless informed so, customers may not know whether a product is produced using organic or conventional methods.

The awareness and knowledge of consumers about organically produced food therefore plays a significant role in making purchasing-related decisions. This research provides guidance and suggestions for distributors who sell organic foods. In addition, the study may help organic food producers identify their target consumers by demonstrating the impact of socio- demographic factors on the purchase of organic foods. The study will provide insights for health and wellness companies to effectively reorient their production and marketing strategies to meet the growing demand for plans from customers. Findings indicate that organic food product marketers are carefully segmenting their market and framing their marketing planning and strategy to convince these potential customers of its benefits, such as healthy content, pesticide-free, freshness and environmentally friendly. Furthermore, consumers need to be informed about the availability of organic products, since consumers believe that the market for organic foods is limited.

Despite this study's significant results, there are some limitations that must be recognized when interpreting the results. First, only some selected factors were considered in the current study to examine the impact on consumer attitudes towards organic foods. Future research in this direction should incorporate factors such as advertising, regulation and distribution by the government while studying the attitude of consumers towards organic food products. Second, the study is being conducted in a vast country, India. In order to generalize the results, the sample size of 200 consumers may not be sufficient. Therefore, more studies with a high sample size should be conducted in this direction in order to extend the validity of the results.

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Vol.7 Issue.4 December 2022

RSEP Review of Socio - Economic Perspectives
ISSN: 2149 - 9276
E-ISSN: 2547-9385

Effects of R&D, innovation and investments on development in Türkiye: An empirical investigation for the 1990-2019 period[1]

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Article History

Received: 30 July 2022 Revised: 24 November 2022 Accepted: 29 November 2022 Available Online: 5 December 2022

Keywords: R&D, innovation, development, Türkiye, investment
JEL classification: C32; E22; O10; O31; O32

Citation: Aytekin, I. (2022). Effects of R&D, innovation and investments on development in Türkiye: An empirical investigation for the 1990-2019 period, *Review of Socio-Economic Perspectives*, 7(4), 31-41.

Abstract

This study aims to examine the effects of research and developmnet expenditures, innovation, and investments on development between 1990-2019 in Turkey. In the examination, the Auto-Regressive Distributed Lag (ARDL) model was used as a method. The reason for the use of this method in the analysis is that the variables are static at different levels. As a result of the analysis performed in this direction, it was found that there was a cointegration relationship between the variables. Then the error correction model was established and the long-term coefficients of the series were estimated. In the forecasts, a positive and statistically significant relationship was found between research and developmnet expenditures and development in the long term. Between innovation and development, there was a positive but statistically meaningless relationship. In the analysis, it was concluded that there was a negative and statistically meaningless relationship between development and investments.

1. Introduction

Development is an important indicator of whether a country has developed economic, social, cultural, political, educational, health, and many similar issues. Therefore, they aim to develop by improving indicators that improve the quality of life of their citizens such as increasing prosperity in each state country, developing health and education system, making innovations, and providing security and peace (Aytekin, 2021).

Investment is one of the basic dynamics necessary to achieve economic growth which is accepted as the locomotive of development. Therefore, while a country can grow economically by increasing its investments, the continuity of investments brings stability to economic growth in that country. This stability is an important driving force for development. Other important ways of capturing stability in economic growth, technology, human capital, specialization in certain areas, and many similar innovative policies, especially research & developmnet (R&D) and innovation, are to apply. Such policies to be implemented are the driving force for development as in investments (Aytekin, 2021).

Some of the studies dealing with innovation, R&D, investment, and development in the literature Crosby (2000), Lederman & Maloney (2003), Bilbao-Osorio & Rodríguez-Pose (2004), Sharma & Gani (2004), Ünlükaplan (2009), Samini & Alerasoul (2009), Wu (2011), Akbey (2014), Bujari & Martinez (2016), Firat et al. (2016), Gökmenoğlu et al. (2018), Jimenez & Zheng (2018), Nurpeisova et al. (2020), Özer & Ünlü (2020) and Aytekin (2021).

[1] **Acknowledgement:** This study is an extended and developed version of the oral summary declaration presented at the I. International Artuklu Economic and Political Sciences Congress 20-21 Now 2021 in Mardin-Türkye.
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DOI: https://doi.org/10.19275/RSEP139
Article Type: Original Paper

In this direction, the main purpose of this study is to examine the effects of R&D expenditures, innovation, and investments on development between 1990 and 2019 in Turkey. The econometric time series method used in the examination of these effects is the ARDL bound test approach by the results of Augmented Dickey-Fuller (ADF) and Phillips Perron (PP) unit root tests.

The study consists of introduction, investment and development, innovation and development, research-development (R&D) and development, literature review, data set and model, methodology, empirical findings, and result sections.

2. Investment and Development

Investment is the activity of reproduction of capital (Eğilmez, 2016). In other words, investment means connecting the capital to use capital or to make profits. Investment is the process of current that starts with expenditure and continues with the range of payments. In particular, the investment is the case of money to obtain future payments that will eliminate the uncertainty of inflation and future payments that are expected during the period in which the funds are attached to the investor for a certain time. This definition covers the investments made by companies in land, buildings, machines, and devices, as well as investments made by individual investors in investment instruments such as bonds, stocks, foreign exchange, gold, commodity, or real estate. Investments in the assets such as land, building, and machinery in the literature "Physical (Material) Investments"; investments in assets such as bonds, stocks, gold, and foreign currency are expressed as "financial asset investments". In other words, investments; it is divided into two physical (material) and financial investments (Tarhan-Mengi & Yılmaz-Türkmen, 2013).

One of the most important indicators affecting the development of a country is economic growth. Therefore, one of the main objectives for the development of countries is to grow economically. In economic growth, which is accepted as the locomotive of development, the way to achieve these goals is through investments (Aytekin, 2021). Therefore, investments are of great importance in terms of supporting the development of both countries and regions. Investments from the past to the present day are considered to be the motor of growth and development in almost the world. For this reason, countries take special measures to promote investments in specific regions and specific sectors. Countries compete with each other to attract international investments (Şahin & Uysal, 2011).

3. Innovation and Development

The concept of innovation was first defined by J. Schumpeter (1934) as a driving force of economic development. Innovation according to Schumpeter; is the introduction of a new feature of a new product or an existing product, putting new production techniques into practice, entering new markets, finding new sources of supply, and having a new organization of industry. According to Schumpeter, who settled entrepreneurs at the center of economic activities, he stated that the main task of an entrepreneur is not only to reorganize goods and resources but also to launch new ones of entrepreneurs' goods and resources. This task undertaken by entrepreneurs organizes the flow of economic activities on the one hand, while the extreme profit that emerges through innovations also encourages entrepreneurs' desire to carry out innovative activities. However, due to its nature, the imitation of invocations by other entrepreneurs over time produces positive externalities. These positive externalities make significant contributions to the economic growth and development process (Özer & Ünlü, 2020).

Today, the concept of innovation has become one of the important arguments in development debates. Innovation is no longer not only for developed countries but also in developing economies; the ability to introduce new technologies and organizations is seen as a very important element in the process of industrialization and modernization. In this process, many developing and rising economies from Eastern Europe to China, China to India, from India to Latin America; continues to make great efforts and research to introduce new products and processes, imitate pioneering innovators rapidly, to adopt new capital equipment and production technologies widely and to expand the use of new goods and services. The advantage of this ongoing innovation research is the multidimensional nature of technological change in complex and firms, inputs, outputs, resources, targets, and blocking factors (Bogliacino et al. 2012). Therefore, innovation systems innovative companies; Universities, research centers, regulators, competitors, customers, and suppliers (Bujari & Martinez, 2016). As a result of these relations, the innovations created are the driving force for growth, employment, development, and many similar economic and social development, especially production.

4. R&D and Development

R&D is defined as the use of scientific and technical knowledge in new applications. Today, the R&D subject is the subject of all economic study areas as well as the production and production method. R&D; is a tool that

provides more beneficial and good access to the economy by increasing efficiency and efficiency in terms of its purpose, scope, and quality. Expenditures on R&D provide an increased return on the scale during the production of new information. The reason why R&D provides an increasing return on the scale is that information has the basic input feature not only in a final element but also in terms of producing new information and is re-used at every stage of production due to its iridescence (Fırat et al. 2016).

Since 1980, technological advances have played a key role in promoting economic growth, and science and technology innovation. This encourages R&D investments to increase the economic growth and national competitiveness of many countries. For this reason, R&D investments in science, technology, and other issues are considered one of the key criteria for evaluating the economic development and competitiveness of a nation. R&D investments affect economic growth through multiple channels such as innovation, capital accumulation, and human resources development, and all of them gradually contribute to the general development and development of the economy (Bor et al. 2010). As a result, new products, new processes, and R&D investments that result in new information are important sources of technical change, efficiency, efficiency, and increase in production (Dominique & Potterie, 2001). The positive effects of such a source contribute to the economic growth of countries and their development with this growth (Bor et al. 2010).

5. Literature Review

As a result of the literature screening, among the studies examining the relationship between innovation, R&D, investment, and development; Crosby (2000), Lederman & Maloney (2003), Bilbao-Osorio & Rodríguez-Pose (2004), Sharma & Gani (2004), Ünlükaplan (2009), Samimi & Alerasoul (2009), Wu (2011), Akbey (2014), Bujari & Martinez (2016), Fırat et al. (2016), Gökmenoğlu et al. (2018), Jimenez & Zheng (2018), Nurpeisova et al. (2020), Özer & Ünlü (2020) and Aytekin (2021). In these studies, the studies reaching similar results are as well as studies reaching different results. Detailed analysis, classification, and examinations of these studies in the literature are given in chronological order of the following studies.

Crosby (2000) has explored the importance of innovation in the economic growth of Australia. In the study, it was found that the increases in innovation activities positively affect both labor efficiency and economic growth.

Lederman & Maloney (2003) concluded that there was a correct relationship between development and R&D activities in the study, which deals with the selected countries within the framework of the 1975-2000 period.

Bilbao-Osorio & Rodríguez-Pose (2004), the European Union (EU) linear regression analysis method, especially in the EU's surrounding areas of the EU's higher education R&D investments have positively affected innovations. In addition, it has been concluded that the capacity that transforms R&D investment into innovation and ultimately innovation into economic growth depends on the region-specific socioeconomic characteristics.

Sharma & Gani (2004) examined medium and low-income countries for the 1975-1999 periods by the fixed impact model method. In the examination, it was concluded that foreign direct investments have a positive effect on development for both groups of countries.

Ünlükaplan (2009) observed that there is a high relationship between economic development, competitiveness, and innovation among 27 members of the European Union.

Samimi & Alerasoul (2009) examined the R&D and economic growth variables of 30 developing countries for the 2000-2006 period by panel data method. In the examination, it was observed that R&D expenditures had no positive effect on economic growth.

Wu (2011) has examined the impact of R&D and innovation on regional economic growth in China. In the examination, R&D and innovation have a positive effect on regional economic growth.

Akbey (2014) stated that the economic dimension of the relations between R&D and innovation is of great importance. In this respect, the support of the private sector in the support of R&D and innovation processes stated that it is very important for sustainable development to support the process by governments.

Bujari & Martinez (2016), 12 Latin American countries, the effect of technological innovation on economic growth with a dynamic panel data model. As a result of the examination, technological innovation processes have shown a positive effect on economic growth in the region. In this direction; the investment in the export of R&D, patents, and high-tech products increases total factor efficiency in most Latin American countries and GDP per capita.

Fırat et al. (2016), Türkiye's R&D, innovation, and development variables within the framework of the 2004-2014 period by comparative analysis method examined. In the examination, it is seen that Türkiye's research and development studies, innovation, and development are different in every region. It is seen that human resources, technology, and information cannot be developed at the desired level among regions, and resources are not

effectively distributed. It has been concluded that there are differences in development between the regions causing innovation, development, and research and development studies to slow down.

Gökmenoğlu et al. (2018), Nigeria's 1972-2013 period of development and foreign direct investments Johansen examined by the cointegration method. In the examination, it has concluded that there is a long-term relationship between foreign direct investments and development.

Jimenez & Zheng (2018) should be considered as part of development. It is argued that innovation contributes to development in terms of both process and result and this should only be evaluated economically. For this reason, technology centers should be perceived as useful corporate mechanisms for human development and should be encouraged and supported by fund providers, international organizations, and local governments.

Nurpeisova et al. (2020) in the study, that deals with Kazakhstan within the framework of the 2000–2018 period; a positive relationship was found between innovations and development between GDP and R&D expenditures.

Özer & Ünlü (2020) have analyzed the development and innovation variables of upper and medium-income countries by panel data method within the framework of the 2000-2017 period limits. In the analysis, it is stated that there is a positive relationship between economic development and innovation.

Aytekin (2021) examined the relationship between the variables of development, innovation, R&D, education, and health expenditures of the period between 1990 and 2019 with the Vector Auto-Regressive model (VAR). In the examination in Türkiye; it has been observed that there are significant causality relations between development, innovation, R&D, education, and health expenditures. But effect-response functions; shows that educational expenditures in Türkiye cannot increase innovation to the desired level. In addition, the significant decrease in R&D expenditures on innovation (innovations) after the 10th semester shows that R&D expenditures cannot be used effectively in Türkiye.

6. Data and Model

In the econometric analysis of this study, 30 years of data between 1990-2019 were used. The reason why the analysis period was selected between these years is the data restriction due to the purpose of forming common data. Detailed information about the analysis variables is given in Table 1 shown below.

Table 1. Analysis variables and source

Variable Name	Short Name of the Variable	Source
Human Development Index	Development	United Nations Development Program (UNDP)
R&D expenditures	R&D	Turkish Statistical Institute and (Sungur, Aydın & Eren, 2016)
Number of Patents	Innovation	Turkish Statistical Institute and (Sungur, Aydın & Eren, 2016)
Investment	Investment	The International Monetary Fund (IMF)

The functional relationship between the variables that make up the model of the study is expressed as follows:

$$\text{Development} = f(\text{R\&D}, \text{Innovation}, \text{Investment})$$

Econometric analyzes are estimated by the regression model shown in Equation 1:

$$\text{Development}_t = \beta_0 + \beta_1 \text{R\&D}_t + \beta_2 \text{Innovation}_t + \beta_3 \text{Investment}_t + e_t \quad (1)$$

Here it refers to the β parameter coefficients, t time dimension, and e error term.

7. Methodology

In this study, which examines the effect of investment, R&D, and innovation on development in Türkiye, the time series analysis method was used. In the first stage of the econometric analysis of the study, the statistical summary and correlation matrix of the variables used in the analysis was created. Then, whether the variables are

stationary, the Augmented Dickey-Fuller (ADF) and Philips-Perron (PP) unit root tests were examined. In the third stage, it was decided to apply the ARDL bound test to variables based on the results of the unit root tests. The cointegration relationship between the ARDL bound test and variables was examined. In the final stage of the analysis, the long and short-term coefficients of variables were estimated through the ARDL bound test. In this section, the theoretical foundations of these models used in the analysis are briefly mentioned.

7.1. The Augmented Dickey-Fuller (ADF) Unit Root Test

In time series analysis, unit root tests are the tests where the variables are controlled whether the variables contain unit root (Aytekin, 2022). To prevent the emergence of counterfeit regression in time series analysis, the variables used in the analysis should not contain a unit root, ie a static stationary (Gujarati, 2011). For this reason, unit root tests are of great importance in time series analysis (Aytekin, 2022).

In this study, one of the models used to test the stationary structures of the variables is the ADF unit root test. The ADF unit root test was developed by adding delayed values to the dependent variables of the regression equations of the Dickey-Fuller (DF) unit root test in 1981. The regression equations of the ADF unit root test are estimated as three models given below (Dickey & Fuller, 1981);

$$\Delta Y_t = \rho Y_{t-1} + \sum_{i=1}^{n} \Theta_i \Delta Y_{t-i} + e_t \quad \text{(Without Constant \& Trend)} \quad (2)$$

$$\Delta Y_t = \alpha + \rho Y_{t-1} + \sum_{i=1}^{n} \Theta_i \Delta Y_{t-i} + e_t \quad \text{(With Constant)} \quad (3)$$

$$\Delta Y_t = \alpha + \beta T + \rho Y_{t-1} + \sum_{i=1}^{n} \Theta_i \Delta Y_{t-i} + e_t \quad \text{(With Constant \& Trend)} \quad (4)$$

7.2. Philips-Perron (PP) Unit Root Test

In this study, another unit root test used to test the stationary structures of the variables is PP (1988) unit root test. The PP unit root test was developed by making several corrections to the error terms of the ADF unit root test. This unit root test explains how to deal with autocorrelation and changing variance problems that are not explained in the errors in the equations of the ADF unit root test. The regression equations of the PP unit root test are estimated as three models given below (Phillips & Perron, 1988);

$$Y_t = \alpha Y_{t-1} + e_t \quad (t = 1,2,\ldots..) \text{ ve } \alpha = 1 \quad (5)$$

$$Y_t = \mu + \alpha Y_{t-1} + e_t \quad \text{(With Constant)} \quad (6)$$

$$Y_t = \mu + \alpha Y_{t-1} + \beta\left(t - \frac{T}{2}\right) + e_t \quad \text{(With Constant \& Trend)} \quad (7)$$

The critical values of the test statistics used in the tests of the ADF unit root test and PP unit root test consist of critical values converted into a table by Mackinnon (1996). Therefore, the same hypothesis tests are used for the regression equations of these two units of root tests, these tests are formed as shown below (Mackinnon, 1996);

H_0: $\alpha=0$ There is unit root (serial is not stationary).

H_1: $\alpha<0$ There is not unit root (serial is stationary).

7.3. The Auto-Regressive Distributed Lag (ARDL) Bound Test

ARDL bound test is a boundary test where the variables are tested whether they are coordinated. This test Pesaran & Shin, (1995) and Pesaran et al. (2001) developed by. The most important advantage of this test is that all of the variables are at the same level stationary (all of them I (0) or all I (1)) as well as when the variables are stationary (some of the variables I (0) and some of them I (1)) is also applicable. In this model, two bound test values were created, one I (0) and one I (1) to determine the cointegration relationship between the variables. According to these limit tests; the lower limit value I (0), in which all variables are considered stationary at the level; where all variables are considered stationary in the first difference I(1), have been calculated as two critical limit values (Pesaran & Shin, 1995; Pesaran, et al., 2001). In this direction, the estimated ARDL bound test in this study is modeled as the equation given below.

$$\Delta Development_t = \beta_0 + \sum_{i=1}^{n} \beta_{1i} \Delta Development_{t-i} + \sum_{i=0}^{n} \beta_{2i} \Delta R\&D_{t-i} + \sum_{i=0}^{n} \beta_{3i} \Delta Innovation_{t-i} + \sum_{i=0}^{n} \beta_{4i} \Delta Investment_{t-i} + \beta_5 Development_{t-1} + \beta_6 R\&D_{t-1} + \beta_7 Innovation_{t-1} + \beta_8 Investment_{t-1} + e_t \quad (8)$$

Here it refers to β_0 constant coefficient, β_1, β_2, and β_3 short-term coefficients, β_4, β_5, and β_6 long-term coefficients, Δ difference processor, t time, and e the error term.

8. Empirical Findings

In this study, the first stage of econometric analysis is descriptive statistics. The descriptive statistical summary calculated in this direction is given in Table 2 shown below.

Table 2. Descriptive statistics

Variable Name	Number of Observations	Minimum Value	Maximum Value	Mean	Standard Deviation	Skewness	Kurtosis
R&D	30	0.330	1.063	0.645	0.208	0.408	1.969
Innovation	30	902	8.343	2.628	2.078	1.558	4.195
Investment	30	18.025	31.003	25.499	3.329	-0.117	2.109
Development	30	0.671	0.806	0.751	0.034	-0.483	2.812

When the descriptive statistics given in Table 2 are examined, the average of R&D was calculated as 0.645 and the standard deviation was calculated as 0.208. The average of the innovation variable was calculated as 2.628, while the standard deviation was calculated as 2.078. The average of the investment variable was calculated as 25.499 and the standard deviation was calculated as 3.329. The average of the development variable was calculated as 0.751 and the standard deviation was calculated as 0.034. On the other hand, according to Table 2, the distribution of R&D and Innovation variables receive positive values and the distribution is distorted to the left. The distribution of investment and development variables is distorted to the right because the distortion coefficients receive negative values. Finally, it is understood that the distribution of all of the variables in Table 2 received positive values of the substitution values are pointed compared to normal distribution. These results confirmed that the variables are suitable for the analysis. In the next stage of the analysis, the correlation matrix was created for the variables, and this matrix is given in Table 3 shown below.

Table 3. Correlation matrix

Variable Name	R&D	Innovation	Investment	Development
R&D	1.000			
Innovation	0.136	1.000		
Investment	0.618	0.093	1.000	
Development	0.516	0.205	0.323	1.000

When the correlation matrix given in Table 2 is examined, it is understood that there is a positive correlation relationship between R&D, innovation, investment, and development variables. After the correlation matrix, unit root tests of the variables were performed and the findings obtained are given in Table 4 shown below.

Table 4. ADF and PP unit root test findings

Level	Variable Name	ADF		PP	
		With Constant	With Constant & Trend	With Constant	With Constant & Trend
		t-Statistic (Probability)	t-Statistic (Probability)	t-Statistic (Probabilit)	t-Statistic (Probability)
	R&D	-0.936	-1.467	-0.070	-2.400
		(0.994)	(0.811)	(0.944)	(0.372)
	Innovation	-2.109	-2.019	-2.109	-2.019
		(0.243)	(0.567)	(0.243)	(0.567)

At Level	Investment	-2.410	-3.360	-2. 317	-3. 360
		(0.148)	(0.077)	(0.174)	(0.077)
	Development	-3.224**	-4.789*	-3.220**	-4.804*
		(0.029)	(0.003)	(0.029)	(0.003)
At First Difference	Δ(R&D)	-3.583**	-3.796**	-7.390*	-8.088*
		(0.014)	(0.035)	(0.000)	(0.000)
	Δ(Innovation)	-5.227*	-5.168*	-5.228*	-9.530*
		(0.000)	(0.001)	(0.000)	(0.000)
	Δ(Investment)	-7.179*	-7.024*	-8.427*	-8.122*
		(0.000)	(0.000)	(0.000)	(0.000)

* indicates statistical significance at the 1% significance level, ** indicates statistical significance at the 5% significance level, while the Δ symbol represents the difference operator.

According to the results of the constant and constant & trend models of the ADF and PP unit root tests given in Table 4, it is understood that only the development variable is stationary at the level. In other words, according to the results of the ADF and PP unit root test, the development change is I(0). The R&D, innovation, and investment variables in Table 4 were found to be stationary in the first difference according to the results of constant and constant & trend models of ADF and PP unit root tests. In other words, according to the results of the ADF and PP unit root test, R&D, innovation, and investment variables are I(1). As a result, according to the results of the ADF and PP unit root tests, it was observed that the variables were stationary at different levels (I(0) and I(1)).

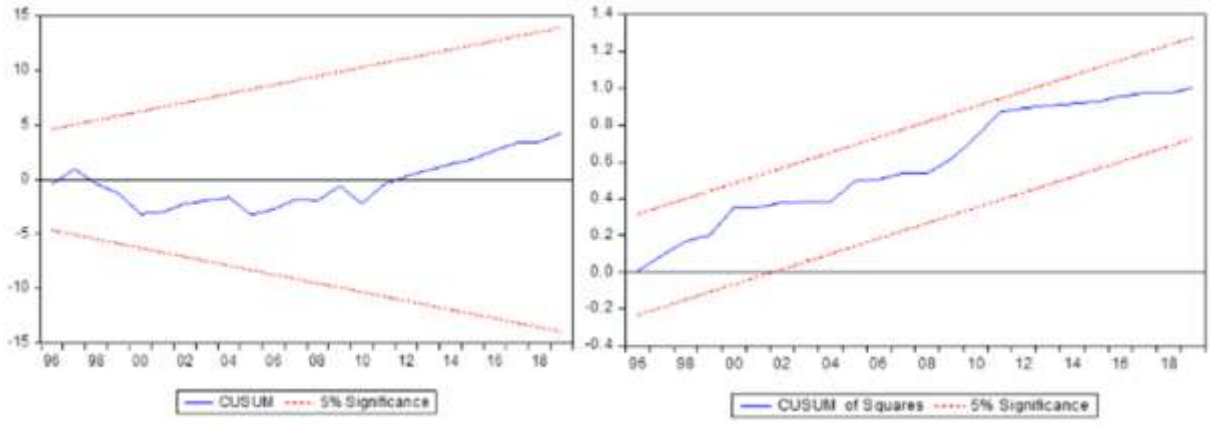
Determining that the variables are stationary at different levels shows that the most suitable model for the cointegration test is the ARDL bound test approach (Pesaran & Shin, 1995; Pesaran, et al., 2001). For this reason, the ARDL (1, 0, 0, 0) bound test was estimated in which development is considered a dependent variable, and R&D, innovation, and investments are considered independent variables. In this direction, the tests of this model, which are estimated, and the ARDL bound test results are given in Table 5.

Table 5. ARDL bound (cointegration) test findings

F-statistics Value: 19.581	**Critical Values**	
	I(0) Bound	**I(1) Bound**
%1	4.29	5.61
%5	3.23	4.35
%10	2.72	3.77
Model Information		
Model	ARDL(1, 0, 0,0)	
Information Criterion	Schwarz Information Criterion (SIC)	
Lag Length	1	
Diagnostic Tests		
	F-statistics	**Probability (P)**

Serial Correlation LM Test (Breusch-Godfrey)	0.676	0.518
Heteroskedasticity Test (Breusch-Pagan-Godfrey)	1.001	0.426
Ramsey Reset Test (Ramsey Reset)	1.942	0.176
	Jarqua-Bera	**Probability (P)**
Normality Test	0.398	0.819

CUSUM and CUSUM Square Tests



According to the estimates of the ARDL bound test performed as shown in Table 5, F statistical value was calculated as 4.47. This calculated F statistics value is a large value from the upper limit value of the 5 % level (F = 4.47> 4.35). The calculation of 5% of the statistical value as a value greater than I (1), which is the upper limit value of 5%, means that a long-term relationship (cointegration relationship) is between variables. In addition, the results of the CUSUM tests with the diagnostic tests given in Table 1 show that the estimated ARDL model is established healthily and the stability requirement is achieved in the model. Following the encountering relationship between the variables, the error correction coefficient and short-term coefficients were estimated and the results obtained are given in Table 6 shown below.

Table 6. Error correction model (ECM) and short-term test results

Variable	**Coefficient**	**Standard Error**	**t-Statistic**	**Probability (P)**
D(R&D)	0.085	0.047	1.799	0.084
D(Innovation)	0.000	0.000	0.801	0.430
D(Investment)	-0.000	0.002	-0.045	0.964
CointEq(-1)	-0.956	0.242	-3.951	0.000

In Table 6, when the error correction coefficient of the model is first considered, it is seen that this coefficient is calculated as -0.956. The fact that the t statistics of this coefficient and the probability value is significant and that this coefficient is between 0 and 1 and a negative value confirms that the error correction mechanism works smoothly in the model. This result shows that the deviations from the average in the short-term balance will reach approximately [1/(|-0.956 |) = 1,05] 1,1-year (1 year 1 month).

In Table 6, when the short-term coefficients of the variables are taken into consideration, it is understood that there is a statistically significant relationship between R&D and development in the short term. Accordingly, it is understood that a 1% increase seen in R&D expenditures in Türkiye in the short term made a positive contribution to development by 0.08%. According to the other short-term results given in Table 6, there was no

significant relationship between investment and development in Türkiye, and no significant relationship was found between innovation and development. In the next and final stage of the analysis, the long-term coefficients of the model are calculated and the results are given in Table 7 shown below.

Table 7. Long term test results

Variable	Coefficient	Standard Error	t-Statistic	Probability (P)
R&D	0.088	0.039	2.266	0.032
Innovation	0.000	0.000	0.834	0.412
Investment	-0.000	0.002	-0.045	0.964
C	0.689	0.049	13.990	0.000

When the long-term coefficients given in Table 7 are examined, it is seen that the long-term results in Türkiye are similar to the short-term results. Therefore, when the results in Table 7 are evaluated, it is understood that there is a statistically significant relationship between long-term R&D expenditures and development in Türkiye. Accordingly, it is understood that a 1% increase in R&D expenditures in Türkiye has made a positive contribution to development by 0.08% on development. In addition, according to the other long-term results given in Table 7, there was no significant relationship between long-term investment and development in Türkiye, and no significant relationship was found between innovation and development.

9. Conclusion

In this study, which examines the 30-year process of Türkiye between 1990 and 2019; it has been concluded that there is a cooperative relationship between R&D, innovation, investment, and development. In this period, it was concluded that the relationship between R&D expenditures and development in Türkiye was statistically significant in the short and long term. However, during this period, there was no statistically significant relationship between short and long-term investment and development in Türkiye, and there was no statistically significant relationship between innovation and development.

The result of the relationship between R&D expenditures and development in the 1990-2019 period in Türkiye shows that R&D expenditures in Türkiye affect development positively. Therefore, it is possible to say that R&D expenditures are an important driving force for development in Türkiye. This result is that R&D expenditures are not a sufficient factor for the development of Türkiye alone, and it is possible to increase the share of R&D expenditures in this process as well as to make development sustainable by activating other factors.

To conclude that the relationship between investment and development in the 1990-2019 period in Türkiye is statistically meaningless; it shows that some investments in Türkiye cannot be directed to the right regions or areas, and therefore the desired success and results in national and regional development policies cannot be achieved. In addition, it can be included in the main reasons between the failures in which the incentives and support processes for investments cannot be well managed and enough inspections cannot be performed. Such negative developments may interfere with cumulative development in Türkiye.

Finally, as in investments, it was concluded that the relationship between innovation and development in Turkey in the 1990-2019 period was statistically meaningless. During this period, most of the innovations in Turkey are removed from the shelves without being put into practice as in the projects. The main reasons for this situation are possible to list the human power difference between the regions, technological development, education and transportation opportunities, difference between regions at the level of development, imbalance in resource and income distribution, and similar reasons. For these reasons, it is an important indication that innovation cannot make a serious contribution to development.

The results achieved in this study are included in the literature and Lederman & Maloney (2003), Bilbao-Osorio & Rodríguez-Pose (2004), Samimi & Alerasoul (2009), Wu (2011), Akbey (2014), Fırat et al. (2016), Gökmenoğlu et al. (2018), Nurpeisova et al. (2020), and Aytekin (2021), while supporting the results of the studies conducted by; Crosby (2000), Sharma & Gani (2004), Ünlükaplan (2009), and Özer & Ünlü (2020) do not support the results of the studies carried out by.

Based on these results, it is useful to review the policies and practices for these issues to create positive effects on innovation and investments in Türkiye. In addition, the revenue enlargement and employment creative of investments, as well as innovation or patents that can create significant added value in production, and the functioning of patents from the shelves can have a serious impact on Türkiye's development. In addition, it is

possible to increase the development of R&D expenditures in Türkiye as well as to make development by being activated in other factors. In addition to the variables used in this study, the study can be developed by including human capital, export, import, employment, unemployment, technology, and similar variables.

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Vol.7 Issue.4 December 2022

RSEP Review of Socio - Economic Perspectives
ISSN: 2149 - 9276
E-ISSN: 2547-9385

Determinants of financial inclusion in Algeria: An ARDL Bounds Test approach

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Article History

Received: 3 June 2022 Revised: 15 November 2022 Accepted: 28 November 2022 Available Online: 5 December 2022

Keywords: financial inclusion index, financial dimensions, determinants, ARDL approach, Algeria
JEL classification: G21; C33

Citation: Benaini, R. & Metair, S. (2022). Determinants of financial inclusion in Algeria: An ARDL Bounds Test Approach, *Review of Socio-Economic Perspectives*, 7(4), 43-54.

Abstract

Our study aims to afford an empirical insight on the factors that have a great impact on financial inclusion levels in Algeria during the period $Q_1$2004-$Q_4$2019, using ARDL approach. Using the dataset provided by the World Bank, our empirical results found that the composite index of financial inclusion (FII) based on three dimensions following Sarma (2008) approach is bounded from 0.08 to 0.51, which is proportionally small. Farther, the estimation findings revealed a positive relationship between financial inclusion index and GDP per capita as a proxy of incomes, population, oil rent, interest rate, while, money supply is not significant factor. However, the strong positive relationship is found between FII and corruption, fixed phone subscriptions as a measure of internet access, which means there are the most important determinant of FII in Algeria.

1. Introduction

In recent years, a rapidly growing of literature continues to devote the critical role of financial access through reducing extreme poverty, boosting shared prosperity and reducing income inequality (World Bank, 2020). Financial inclusion from the process of providing access to financial products and services to individuals and small businesses, it could serve not only as a tool to support economic growth, but also as a means to boost social development through the reduction of poverty and inequality .Besides, financial inclusion as the proportion of individuals and firms that use financial services has increasingly become a policy priority at international and national levels, especially after the 2008 global financial crisis. Currently, financial inclusion has received much attention from policymakers, researchers, and international financial institutions as a promising source of benefits to the economy (IMF, 2020).

Moreover, Financial inclusion has become an attractive topic at the global level with governments, financial institutions, and policymakers, developing interest in understanding it more deeply (Amoah, A., Korle, K. and Asiama, R.K, 2020), The existence of high level financial exclusion has been acknowledged by many developed and developing nations as one of the socio-economic challenges on the agenda (Sarma, M., & Pais, J., 2011); (WentzeL, J. P., Diatha, K. S. & Yadavalli, V. S. S., 2016). The World Bank in its 2020 targets placed universal financial access as one of its objective (Demirguç-kant & al, 2018), (WBG,W,B,G, 2018), which indicates how financial inclusion has become an attractive topic globally and more than 50 countries made headline financial inclusion commitments as of the end of 2014 (Louis, L. & Chartier, F, 2017.) (Demirguç-kant & al, 2018). In 2017, the World Bank Group (WBG) clearly highlighted that many countries are developing National Financial

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DOI: https://doi.org/10.19275/RSEP140
Article Type: Original Paper

Inclusion Strategies (NFIS) to ensure that resources and actions are put in place to achieve financial inclusion commitments. (WBG, . 2017.)

In Algeria, the Central Bank of Algeria has defined financial inclusion as the availability and use of all financial services by different segments of society including institutions and individuals through official channels, including current and savings accounts, payment and transfer services, insurance services, financing and credit services with competitive and reasonable prices. It also targets to protect the rights of consumers of financial services so that they can properly manage their funds and savings and prevent some consumers from using informal channels, which are not subjected to any supervision and which charge relatively high prices, inducing the non-satisfaction of the needs for financial and banking services (CBA, 2015)

In February 2018, the governor of the Algerian central bank, Mohamed Loukal, has emphasize the importance of encouraging role of Algerian banks to do more in order to boost financial inclusion, while recalling efforts undertaken by the authorities to tackle the problem in recent years. Notably, he pointed out to the 2012 declaration that all citizens had the right to a bank account and to Article 43 of the 2015 Finance Law, which permitted new actors to enter the financial sector. He went on to suggest that the arbitrary application of procedures by the banks to tackle money laundering and the financing of terrorism was undermining financial inclusion. He called on banks henceforward to halt requiring documentary proof of, for example, a source of funds beyond the regulatory requirement for proof of identity. In June 2018 the governor followed up with a similar direction to the banks, urging them not to require additional documentation from clients setting up or making transactions with foreign currency accounts beyond what is explicitly required by law.

The general objective of our research paper is to investigate most important determinants factors that affect financial inclusion level in Algeria during the period $Q_1$2004-$Q_4$2019 using the ARDL model. More specifically, our paper constructs a composite index of financial inclusion based on four variables following Sarma (2008) approach.

Based on the above, the remainder of the paper is structured as follows: Section 2 provides a special focus on the factors determine the financial inclusion in the literature review. Section 3 describes our data and methodology. Meanwhile, Section 4 discusses empirical results. Finally, Section 5 concludes this paper and provide some recommendations for future directions.

2. Literature Review

Number of studies have examined the determinants of financial inclusion (Sarma and Pais, 2008, 2011; Evans And Adeoye (2016); Oshora, Betgilu, Goshu Desalegn, Eva Gorgenyi-Hegyes, Maria Fekete-Farkas,And Zoltan Zeman. (2021); David MHLANGA; Varaidzo Denhere(2020); Dar Et Al., (2020) ; Gebrehiwot Et Al, (2019); Rakhrour Youssef , Daham Said Redouane 2021; Sanderson Abel1, Learnmore Mutandwa, Pierre Le Roux(2019); Vicroria Wanjiku Wokabi, Olanrewaju Isola Fatoki (2019); Kaur Et Al., (2020)), where they are found different results.

- Sarma and Pais (2008, 2011) examined country-specific factors associated with the level of financial inclusion by using a classical OLS method for the sample year of 2004. Among possible variables, income measured by per capita GDP, adult literacy, rural population, income inequality, physical connectivity indicated by road network, electronic connectivity indicated by phone subscriptions, information availability indicated by internet usage, bank soundness measured by non-performing assets and capital asset ratio, and foreign ownership in the banking sector were significantly associated with the level of financial inclusion (Sarma, 2008); (Sarma, M., & Pais, J., 2011).

- Evans and Adeoye (2016) evaluated the determinants of financial inclusion in Africa by using a dynamic panel data approach for 15 countries over the period of 2005–2014. The results show that lagged financial inclusion (implies a "catch-up effect"), GDP per capita, money supply as a percentage of GDP, adult literacy rate, internet access, and Islamic banking activities have great significance in explaining the level of financial inclusion in Africa (Adeoye & Evans, 2016).

- The study of **(**Oshora, Desalegn, Gorgenyi-Hegyes, Fekete-Farkas, & Zeman, 2021) examines the determinant factors that influence financial inclusion among small and medium enterprises (SMEs) in Ethiopia. The study uses an explanatory research design and a mixed research approach with both primary and secondary sources of data. More specifically, the study adopts a multiple linear regression model. The finding of the study reveals that; supply-side factors, demand-side factors, market opportunity, and collateral requirements have a positive effect on the firm's access to finance. On the other hand, institutional framework factors, and the costs of borrowing negatively affect the firm's access to finance. This study suggests concerned bodies sustain rapid and inclusive economic growth and hence eradicate extreme poverty and hunger, the policymakers must build an efficient, strong, and

well-functioning financial market system that provides affordable and sustainable financial service to SMEs.

- Mhlanga & Denhere (2020), The study sought to establish the drivers of financial inclusion in Southern Africa with a specific focus on South Africa. Financial inclusion has been a topic of global interest due to the negative impact of financial exclusion in addressing socio-economic issues like poverty. Using the logit model, the study discovered that financial inclusion is driven by age, education level, the total salary proxy of income, race, gender, and marital status. The variable gender was the only factor with a negative influence on financial inclusion all other significant variables had a positive influence on financial inclusion (MHLANGA, D. ;DENHERE, V., 2020)

- Dar et al., (2020) also sought to investigate the determinants and barriers of financial inclusion in India. Using the Global Findex Database (Findex) of 2017, the study found out that gender, age, education and income influence financial inclusion with a significant influence on the informal saving and borrowing (Dar, A.B.; Ahmed, F., 2020).

- Gebrehiwot & Makina (2019) also examined the determinants of financial inclusion across 27 Africa countries using the GMM dynamic panel data analysis. The study discovered that the lagged value of GDP per capita and mobile infrastructure positively influences financial inclusion while government borrowing had a negative influence on financial inclusion. (Gebrehiwot, K.G. and Makina, D, 2019)

- Rakhrour& Redouane (2021), conducted a study in which the importance of financial inclusion and the evolution of its main indicators in Algeria are analyzed. Their study concluded that an improvement in financial inclusion allows people to make many financial transactions more efficiently and to help the poor people to out of poverty by promoting education, health and business. The analysis of financial inclusion in Algeria showed that there are colossal efforts to be deployed: only 43% of adults have a current account with a gender gap of 27% which remains higher compared to the world average (7%), just 5% of account owners used the internet to pay bills or to buy something online. Moreover, family and friends remain the main source of borrowing money or to come up with emergency funds. (Rakhrour, Y.; Redouane, D. S., 2021)

- Sanderson Abel1, Learnmore Mutandwa, Pierre Le Roux (2019) **;** where the objective of their study is to evaluate determinants of financial inclusion in Zimbabwe. Their findings showed that age, education, financial literacy, income, and internet connectivity are positively related to financial inclusion. On the other hand, the documentation required to open bank accounts and the distance to the nearest access point are negatively related to financial inclusion. (Sanderson Abel, Learnmore Mutandwa, Pierre Le Roux, 2018)

- In the study of Wokabi & Fatok (2019) which sought to analyze the determinants of financial inclusion among five East African countries- Kenya, Uganda, Tanzania, Rwanda and Burundi over the period of 2000-2016. In order to determine the factors affected financial inclusion in East Africa, the authors used rural population, unemployment rates, income level and interest rates as independent variables, while domestic credit to private sector by banks used as a measure of financial inclusion. The empirical results of fixed effect model found that rural population and income are significant determinants of financial inclusion with rural population being negatively related with financial inclusion. This means that the higher the rural population of a country, the less inclusive their financial system is. Unemployment though statistically insignificant had a negative relationship with financial inclusion. Interest rates had a positive but insignificant relationship with financial inclusion. Finally, the authors recommended that focused financial literacy efforts be increased in the rural areas within East Africa to promote inclusion efforts, where Interest rates can be a powerful policy tool to encourage both savings and credit facility sourcing from the banking sector. (Wokabi, V. W.; Fatok, O. I., 2019)

- Kaur & Kapuria (2020) also examined the determinants of accessing institutional and non-institutional finance across male and female-headed households in rural India. Using the multinomial logistic regression, the study also discovered that education level is one of the important factors influencing financial inclusion. Other factors that were discovered were monthly household consumption expenditure, land size holding, access to irrigation land and the levels of scheduled penetration of commercial banks influenced financial inclusion (Kaur, S. ; Kapuria, C., 2020; Kaur, S. ; Kapuria, C., 2020)

3. Data and Methodology

3.1. Financial inclusion index in Algeria

For financial inclusion, dimension such as automated teller machines (ATMs) per 100,000 adult, commercial bank branches per 100, 000 adults, borrowers from commercial banks per 1,000 adults, domestic credit to GDP ratio, and depositors of commercial banks per 1,000 adults were used. The first two measurement criteria relate to accessibility of banking products/services and the last three relates to usage of banking services, as dimensions of financial inclusion. These financial inclusion dimensions were then used to construct the financial inclusion index as postulated by Sarma (2008),

Table 1: dementions of financial inclusion

Dimensions	Indices	Average
Availability of banking	automated teller machines (ATMs) per 100,000 adult	50%
	commercial bank branches per 100, 000 adults	50%
Penetration	Deposit Accounts with Commercial Banks Per 1000 Adults	100%
Usage	depositors of commercial banks (% GDP)	50%
	borowerrs of commercial banks (% GDP	50%

Source: (Sarma, 2008, p. 2)

3.2. Methodology for the computation of IFI :

Based on the financial inclusion indicators presented in the Financial Access Survey of the International World Bank (IWB), the Index of Financial Inclusion (IFI) has been computed for the present purpose. The indicators have been further classified into three categories viz., Banking Penetration (d1), Availability of Banking Services (d2) and Usage of Banking Services (d3) that have been used as dimensions for the computation of IFI (Sarma, 2008). In order to determine the Index of Financial Inclusion (IFI) for Algeria for period during 2004-2019, first, the respective dimension indices have been calculated using the UNDP's methodology of index computation (equation 1). Such computed values for each dimension have subsequently been multiplied by the respective dimension weights to arrive at the final dimension score. The final Index of Financial Inclusion (equation 2) has been arrived at by averaging the normalized inverse nuclide a distance from the ideal dimension points, and the normalized worst point distance in a three dimensional Cartesian space (Sarma, 2008)

$$Di = \mathrm{W}i\,\frac{\mathrm{A}i-\mathrm{m}i}{\mathrm{M}i-\mathrm{m}i} \qquad (1)$$

$$\mathrm{FII} = 1 - \frac{\sqrt{(1-\mathrm{P}i)^2+(1-\mathrm{A}i)^2+(1-\mathrm{U}i)^2}}{3} \qquad (2)$$

Where: *Di* is the dimension index; w_i: is the dimension weight; *Mi* is the maximum dimension value; m_i is the minimum dimension value; *Pi*, *Ai*, *Ui* represent the dimension indices on penetration, availability and usage; In the three dimensional Cartesian space, the point (0,0,0) will indicate the worst situation (complete financial exclusion) and the point (1,1,1) will indicate the best or ideal situation (complete financial inclusion) (Sarma, 2008). In addition, the countries are listed into three categories depending on the value of IFI, as follow:

- ✓ 1. $0.5 < \mathrm{IFI} \leq 1$: high financial inclusion.
- ✓ 2. $0.3 \leq \mathrm{IFI} < 0.5$: medium financial inclusion.
- ✓ 3. $0 \leq \mathrm{IFI} < 0.3$: low financial inclusión.

For financial (banking) penetration dimension, we have used the data on "Bank Deposit Accounts with Commercial Banks Per 1000 Adults. For the availability dimension, we have taken the data on automated teller machines (ATMs) per 100,000 adult and commercial bank branches per 100, 000 adults; For the usage dimension, we have used just the data on borrowers of commercial banks (% GDP) because we haven't data on depositors of commercial banks (% GDP); However, since the third dimension had a weight of 50%, we will divide by 2.5 instead of 3.

As a result, the IFI values computed for Algeria during the period 2004-2019 are presented in figure1 (3-dimensional IFI):

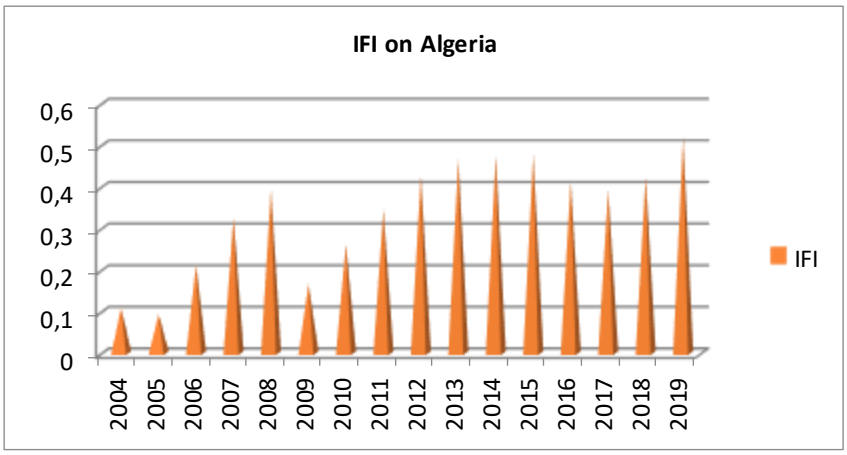

Figure 1. The trend of Financial Inclusion Index in Algeria (2004-2019)

Source: Author's calculations using Excel

Figure (1) shows that the values of the financial inclusion index that was compute in Algeria range between 0.08 and 0.5, and based on Table No. 2, it can be said that it is an average indicator as it did not exceed the threshold of 0.5, and this corresponds to the report of the World Bank Group, which classified Algeria in the region Medium Financial Inclusion (Demirguç-kant & al, 2018, p. 17).

We note that the Algerian government's is making great efforts to promoting financial inclusion during the study period, as the financial inclusion index reached its highest level in 2019 (0.51).

4. Materials & Methods

4.1. Data

The main series in our study are : IFI is financial inclusion index ;GDPC is GDP per capita; M2GDP is money supply (% of GDP) and ITNACC is the number of fixed phone subscriptions, and POPGRO is the percentage of population; CORUPTION; oil rent(% of GDP); Deposite Interest Rates (DIR%). For This reason , we used quietly data with 64 observations for each variable from Q12004 to Q42019 .

Data for the analysis is collected from the International World Bank (IWB). The IWB is the most appropriate source of macro-economic data of Algeria. Also, IWB was chosen because it provides an extensive range of information on the variables, better than what is obtainable in the Global Financial The main series in our study are index database on financial inclusion

Consistent with the literature, the proxy for financial inclusion is the Index of Financial Inclusion (IFI) (sarma2008) , As well, the selected determinants of financial inclusion, consistent with the literature ((Osei-Assibey, E., 2009); (Sarma, M., & Pais, J., 2011); (Clamara, N., X. Pena, and D. Tuesta, . 2014.); (Adeoye & Evans, 2016) (Bakari & Ibrahim, 2018), (Adil & Jalil, 2020); (Esmail Abdo, mohammed Adem, 2021), which are :GDPC is GDP per capita; M2GDP is money supply (% of GDP) and ITNACC is the number of fixed phone subscriptions as a proxy of internet access, and POPGRO is the growth of population; Corruption; Oil Rent(% of GDP); Deposite Interest Rates (DIR%),

4.2. Model specification

The study applied a well-known approach by (Pesaran, M. H;Shin, Y. ;Smith, R., 2001) called the autoregressive distributed lag (ARDL) approach. For determine the determinants of financial inclusion in Algeria. The ARDL model is considered as the best econometric method compared to others in a case when the variables are stationary at I(0) or integrated of order I(1). Based on the study objectives, it is a better model than others to capture the short-run and long-run impact of independent variables on financial inclusion index.

The ARDL approach is appropriate for generating short-run and long-run elasticities for a small sample size at the same time and follow the ordinary least square (OLS) approach for cointegration between variables (Jarita Duasa, 2007). ARDL affords flexibility about the order of integration of the variables. ARDL is suitable for the

independent variable in the model which is I(0), I(1), or mutually cointegrated (Frimpong, J.M. Oteng-Abayie, E.F, (2006)), but it fails in the presence I(2) in any variables.

4.3. Co-integration: ARDL and Bounds Testing Approach

On the basis of unit root test, we test for cointegration using ARDL bounds test approach modeled by (Pesaran, M. H;Shin, Y. ;Smith, R., 2001). ARDL bound test is widely used because it addresses issues that may arise because of autocorrelation and endogeneity; As a results, the ARDL model can be specified as:

$$\Delta FII_t = \beta 0 + \sum_{i=1}^{\rho} \alpha_1 \Delta FII_{t-i} + \sum_{i=1}^{m} \alpha_2 \Delta LCORRUPTION_{t-i} + \sum_{i=1}^{n} \alpha_3 \Delta DIR_{t=i} + \sum_{i=1}^{n} \alpha_4 \Delta GDPC_{t=i} + \sum_{i=1}^{n} \alpha_5 \Delta M2GDP_{t=i} + \sum_{i=1}^{n} \alpha_6 \Delta LOILRENT_{t=i} + \sum_{i=1}^{n} \alpha_7 \Delta LPOPGRO_{t=i} + \sum_{i=1}^{q} \alpha_8 \Delta LITNACC_{t-i} + \lambda_1 FII_{t-1} + \lambda_2 CORRUPTION_{t-1} + \lambda_3 DIR_{t-1} + \lambda_4 GDPC_{t-1} + \lambda_5 M2GDP_{t-1} + \lambda_6 RENT_{t-1} + \lambda_7 POPGRO_{t-1} + \lambda_8 ITNACC + \mu_t$$

.

(3)

Where Δ is lag operator, β_0 is the intercept, $\mu_t$is thedisturbance term, while t is the time period and L shows that the variable has been transferred in its natural log. The first part of the Equation 3 with α_i correspond the short-run parameters and the rest with λ_1 to the long-run parameters. In this ARDL framework, the H0 of no co-integration is that all long run coefficients are simultaneously zero .The number of lags is chosen utilizing Akaike's Information Criteria and Schwarz- Bayesian criterion. Whenever bound testing approach shows the cointegrating relationship, at that point we get the short run dynamic parameters by evaluating an error correction model (ECM) with the long run approximations. Thus, the Error Correction Model can be specified as:

$$\Delta FII_t = \beta 0 + \sum_{i=1}^{\rho} \alpha_i \Delta FII_{t-i} + \sum_{i=1}^{m} \alpha_2 \Delta LCORRUPTION_{t-i} + \sum_{i=1}^{n} \alpha_3 \Delta DIR_{t=i} + \sum_{i=1}^{n} \alpha_4 \Delta GDPC_{t=i} + \sum_{i=1}^{n} \alpha_5 \Delta M2GDP_{t=i} + \sum_{i=1}^{n} \alpha_6 \Delta LOILRENT_{t=i} + \sum_{i=1}^{n} \alpha_7 \Delta LPOPGRO_{t=i} + \sum_{i=1}^{q} \alpha_8 \Delta \text{LITNACC}_{,t-i} + \theta ECTt - 1 + \mu t$$

(4)

$\theta ECTt - 1$ represents the error correction term which specifies the adjustment speed to the equilibrium after a short run shock.

5. Empirical Results and Discussion:

5.1. ARDL Estimation

5.1.1. Unit Root Test Results

We tested for stationarity of variables by unit root tests. We used ADF (Dickey & Fuller, 1979) unit root test. The unit root tests show that DIR and M2gdp are stationary at order I(0) while FII, CORUPTION, ITNACC, OILRENT, POPGRO and GDPC are stationary at I(1). As the considered variables are combination of order zero integration and order one integration, the ARDL model is used.

Table 1. Unit Root Test Results

Variables	**ADF**	**Decision**	
	Statistic	**probability**	
D(FII)	-3.385159	0.0158	I(1)
D(logcorr)	-2.916566	0.0039	I(1)
DIR	-3.493692	0.0001	I(0)
M2gdp	-3.493692	0.0016	I(0)

D(logoilrent)	-3.495295	0.0292	I(1)
D(logpopgr)	-3.495295	0.0038	I(1)
d(log ITNACC)	-3.495295	0.0059	I(1)
D(gdpc)	-4.638329	0.0025	I(1)

Source: Author's calculations using Eviews10

5.1.2. Co-integration Analysis

Since all the variables are I(1) and I(0) series, we can run co-integration tests. This model is the most suitable with the sample size used in this study of 64 views and the co-integration . Before we can estimate short and long run effects, we need to run a bounds test to see if there is a long-term relationship between the variables in the model.

Co-integrated variables imply that they observe long run relationship. The result of the ARDL bounds test of co-integration is reported in Table 2. According to the F-statistics (28.9409) we reject the H0 of no co-integration at 1% significance level as it is greater than the critical value of upper bound, I(1) of 3.9 at 1% level of significance. Thus, the co-integration test confirms the long run association between FII and independent variables.

Table 2. Bounds Test Results

Test statistic	**Model**		
	Significance	**I(0)**	**I(1)**
28.9409	10%	1.92	2.89
	5%	2.17	3.21
	1%	2.73	3.9

Source: Author's calculations using Eviews 10

5.1.3. Long Run Estimation

Once cointegration is confirmed, we estimated the ARDL model given equation 3 to obtain the long run coefficients. Estimation results are reported in Tables 3., The coefficient of $M2GDP$ is negative which is contrary to the economic theory however, these coefficients are not statistically significant (P-values are very high, i.e0.32), i.e. changes in $M2GDP$ does not stimulate financial inclusion in Algeria in the long run. Thus monetary authorities should clarify policies in order to stimulate transactions in the monetary bloc in its broad sense by relying on digitization.

- The $GDPC$ are significant in the 0.05 level and has a positive relationship with financial inclusion , i.e. changes in $GDPC$ does with 1point stimulate financial inclusion with 3.4202% in Algeria in the long run , this may support the result obtained by (Demirguç-kant & al, 2018); (Ndanshau, Michal O.A., 2021.); (Bassam Al- Own, Tariq Bani Khalid, 2021); (J Kebede, A Naranpanawa, S Selvanathan, 2021)
- The $ITNACC$ are significant in the 0.05 level and has a positives relationship with financial inclusion , i.e. changes in $USERS$ with 1point does stimulate financial inclusion with 51.3390% in Algeria in the long run , we can say that this variable is the main importants determinant of financial inclusion and that is confirmed by (Adeoye & Evans, 2016)
- The $POPGRO$ are significant in the 0.05 level and has a positives relation ship with financial inclusion , i.e. changes in $POPGRO$ with 1point does stimulate financial inclusion with 13.8208% in Algeria in the long run.

- The DIR are significant in the 0.05 level and has a positives relation ship with financial inclusion , i.e. changes in DIR with 1point does stimulate financial inclusion with 4.9402% in Algeria in the long run, so that increased rates deposits will encourage saving and this reflect financial inclusion.
- The $OIL\ RENT$ are significant in the 0.10 level and has a positives relation ship with financial inclusion , i.e. changes in $OIL\ RENT$ with 1 point does stimulate financial inclusion with 3.4202% in Algeria in the long run
- The $CORRUPTION$ are significant in the 0.05 level and has a positives relation ship with financial inclusion , i.e. changes in $CORRUPTION$ with 1 point does stimulate financial inclusion with 47.8406% in Algeria in the long run.

Table 3. Long Run Estimation Results

Model			
Variables	**Coefficients**	**t- statistic**	**Probability**
Log(corruption1)	0.478406*	9.997380	0.0000
M2GDP1	-1.47E-06	-0.995953	0.3259
GDPC1	0.035066*	10.11992	0.0000
DIR	0.049402*	2.763260	0.0090
LOG(OILRENT1)	0.034202**	1.756770	0.0875
LOG(POPGRO1)	0.138208*	9.307809	0.0000
LOG(ITNACC)	0.513390*	12.00839	0.0000
c	-8.163458*	-13.04725	0.0000

Source: Author's calculations using Eviews 10.

** represents the significance at the 10% level, * represents the significance at the 5% level

5.1.4. Short Run Estimation:

After the long-run estimation we get short-run estimation using ECM as given result in Table 3. It is found that the independent variables are significantly affects IFI with lag of one year. The error correction term is also statistically significant with expected negative sign. The coefficient of ECT(t-1) is -0.2376 (P-value is 0.00). This shows the speed of adjustment towards the long-run equilibrium is very low. The diversion from short run in IFI is corrected by 23.76% within a year.

Table 4. Short Run Estimation Results

Model 1			
Variables	**Coefficients**	**t- statistic**	**Probability**
D(IFI1(-1))	0.895656	104.7075	0.0000
DLOG(corruption1)	0.335206	19.30370	0.0000
DLOG(corruption1(-1))	-0.208688	-12.08945	0.0000
D(M2GDP1)	5.58E-06	7.441285	0.0000

D(M2GDP1(-1))	-1.26E-05	-17.99361	0.0000
D(GDPC1)	0.001601	2.163608	0.0372
D(GDPC1(-1))	0.006212	10.76208	0.0000
D(DIR1)	-0.0101207	-10.31429	0.0000
D(DIR1(-1))	0.199299	20.64690	0.0000
DLOG(POPGRO1)	0.375241	16.19944	0.0000
DLOG(POPGRO1(-1))	-0.557550	-22.76813	0.0000
DLOG(ITNACC1)	0.661690	31..39122	0.0000
DLOG(ITNACC1(-1))	-0.824681	-33.68293	0.0000
ECT	-0.237658	-50.18317	0.0000

Source: Author's calculations using Eviews 10

5.1.5. Quality Tests.

To verify the appropriateness and validity of abovementioned results, we run some diagnostic tests like serial correlation test, Heteroscedasticity and Normality tests. The diagnostics show that there is no issue of serial correlation and heteroskedasticity in the model and residuals are normally distributed. The results are reported in table 5

Table 5: Diagnostic Tests Results

Tests	**Normality Test JarqueBera**	**Heteroskedasticity :Breusch-Pagan-Godfrey**	**Breusch-Godfrey Serial-correlation LM Test**
Model	0.891	1.177	17.047
	(0.640)	(0.324)	(0.000)

Notes: p-values are given in parenthesis for each test

To confirm that the model met the stability test, the cumulative sum of recursive residuals (CUSUM) and CUSUM of squares (CUSUMSQ) test proposed by (R. L. Brown et al., 1975)is used. Plotsof both CUSUM and CUSUMSQ test statistics that fall inside the critical bounds of 5% significance. This means that the estimated parameters are stable over the study period.

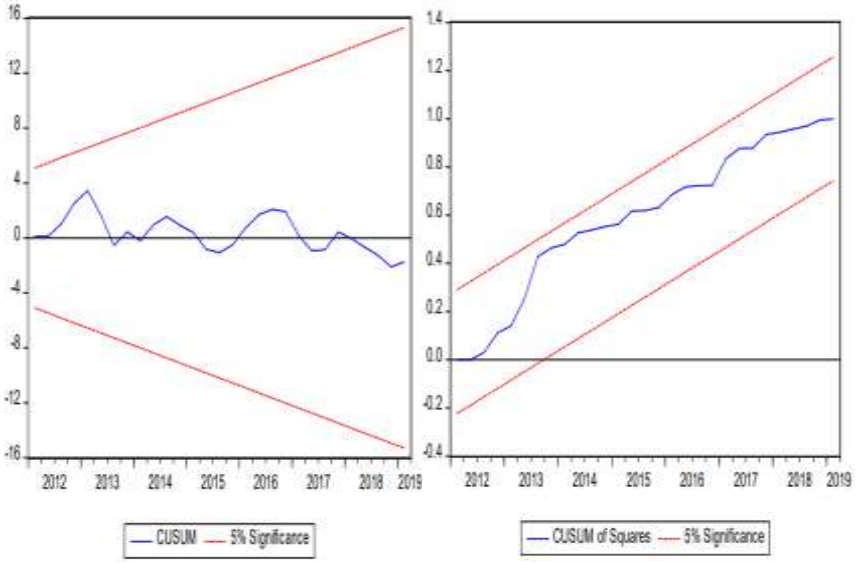

Figure 2. CUSUM and CUSUMSQ Graphs

Source: Author's calculations using Eviews 10

The results show that the graph of CUSUM and CUSUMQ statistics remains within the range of critical values at the 5% threshold, which implies that the coefficients of the model are stable.

6. Conclusion

The main aim of this study is to examine the determinant factors that influence the financial inclusion index in Algeria; for the period Q12004- Q42019 , when we measured FI index by Sarma, 2008 approach .we used ARDL Bounds test approach to find cointegration ,as IFI and indepandant variable ere cointegrate we employed ECM .

The results affirm the significant influence of a few factors to IFI .Particulary , GDP per capita; internet access, the growth of population; corruption; Oil Rent(% of GDP); Deposite Interest Rates (DIR%) have direct effect on financial inclusion , while the coefficient of $M2GDP$ is negative and not significant on financial inclusion (P-values are very high, i.e0.32), i.e. changes in $M2GDP$ does not stimulate financial inclusion in Algeria in the long run. which is contrary to the economic theory however, Thus the monetary authorities must develop policies in order to stimulate transactions in the monetary mass in its expanded concept M3, and that is by relying on digitization and this is consistent with the approved hypothesis in research.

Hence, based on the study finding, it is possible to conclude that factors like ; corruption; number of internet users have a high impact on determining financial inclusion index, where Confirming the validity of the hypothesis that indicated that the most important determinant is the use of the Internet; and we can be explained economically hight positive effect of corruption factor that is contributes to an increase in the number of loans obtained through bribery and favoritism, while increasing the number of accounts The deposit is due to money laundering operations.

Recommendations:

- The authorities should invest in rent income and direct part of it to develop the infrastructure for financial inclusion.

- Rebuilding trust in the financial system: by providing financial protection to customers who demand transparency, quality, advice, cost reduction, information and clarity regarding the opportunities and risks associated with each product or service, not to mention maintaining confidentiality, protecting data and accounts, and responding to the preferences and tastes of financial consumers.

- Expanding the scope of the use of electronic money, with the extensive use of financial technology, which is one of the most important aspects of progress in the provision of banking services, which Algerian banks must keep pace with, in order to achieve speed in the performance of services and reduce bureaucratic burdens.

- Increasing the spread of various banking branches in various regions, especially rural ones;

- Adopting financial and digital technology that helps to easily deliver financial services and

products to all individuals and in all regions;

- Spreading financial literacy among the Algerian public;

- Speeding up the launch of Islamic financial products to suit the religious belief of the

Algerian Muslim individual

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Vol.7 Issue.4 December 2022

RSEP Review of Socio - Economic Perspectives
ISSN: 2149 - 9276
E-ISSN: 2547-9385

Reinvestments in dentistry and differences between western or central and eastern European countries

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Article History

Received: 5 September 2022 Revised: 30 November 2022 Accepted: 1 December 2022 Available Online: 5 December 2022

Keywords: reinvestment of profit, Management of earnings, Dentistry, GMM with panel data
JEL classification: C58; D25; E21; G39

Citation: Heryan, T. (2022). Reinvestments in dentistry and differences between western or central and eastern European countries, *Review of Socio-Economic Perspectives*, 7(4), 55-61.

Abstract

This paper has focused on the willingness of owners to reinvest their profit back into a company. Research gaps in the investigation of financial issues in the healthcare industry are apparent in the literature. The aim of this paper is to estimate the differences in reinvestments between dentistry companies operating in western or central and eastern Europe (CEE). Annual Orbis data were obtained from financial reports from 3,711 western and 1,173 CEE companies. The generalized method of moments with panel data, currently modified by Kripfganz (2019), has been deployed as the main estimation technique. The estimated sample has been divided according to the return on assets into quartiles. The results clearly show that western owners rather reinvested their earnings back into their businesses, whereas CEE owners reinvest at a lower level. Furthermore, the willingness to reinvest, as well as the financial constraints related to that, can affect the quality of dentistry services.

1. Introduction

A conflict of interest between managers and companies' owners is generally considered the leading cause of information asymmetry within corporate finance. Despite the interest in this conflict, few studies have considered health economics. Furthermore, to our knowledge, no one has studied dentistry as a specific business industry. In general, health economics has its role in identifying research priorities (Torgerson, Donaldson & Reid, 1996). During the last decade, we have faced an expansion of private companies that provide dentistry services. The results of this study will greatly contribute to health economics by comparing the willingness of owners to reinvest their profits back into their business. This work offers one of the first investigations into the finance of dentistry.

This paper aims to estimate the differences in reinvestments between dentistry companies operating in western or central and eastern Europe (CEE). In particular, this work examines the impact of return of assets (ROA) on retained earnings. Profitability plays a crucial role for existence of all private companies, not excluding the private dentistry. To not assume that each dentistry is similar, companies will be divided according to each quartile of ROA into four categories. Annual data obtained from financial reports from 3,711 western and 1,173 CEE companies within the period from 2011 to 2018 will be used for estimation. Such data in panels are suitable for estimation using generalized method of moments (GMM). However, according to recent features in applied statistics, Kripfganz (2019) approach is applied.

The structure of this paper is as follows; even though there is small evidence, especially in dentistry, after the introduction a brief literature review is focusing on the agency theory in Section 2. Section 3 describes the data as well as the GMM approach, including its current innovative techniques. Discussion made in Section 4

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DOI: https://doi.org/10.19275/RSEP141
Article Type: Original Paper

compares the results of those western and CEE dentistry companies. Finally, conclusion includes limitations of this study and offers areas for future research in this field.

2. Theoretical concept of the earnings management

Asymmetric information appears in the company within the relationship between managers and shareholders, and further between companies and creditors. Firms that do not send signals or send the wrong signals will be harmful to investors. Or an administrator who directly manages will know business information but will fully withhold it, causing adverse choices for shareholders and moral hazard for the manager. To minimize this behaviour, shareholders should align managers with the common interests of shareholders and businesses through salaries, bonuses, or partial ownership of company shares. Therefore, it is necessary to have a mechanism to monitor managers' decisions, increase their value to shareholders, and disclose information in financial statements accurately and transparently (Tran and Dang, 2021). The management causing moral hazard to the owner is described in Figure 1. The starting point for the creation of the model is the theoretical principal-agent model, constructed by Laffont and Martimort (2002) at Princeton University, who themselves state that it can also be applied to the representative conflict of shareholders vs. company management. However, in the case described below, it is not a relationship between the quantity of goods and their price, but a relationship between the profit achieved and the percentage of the profit paid out to the owners.

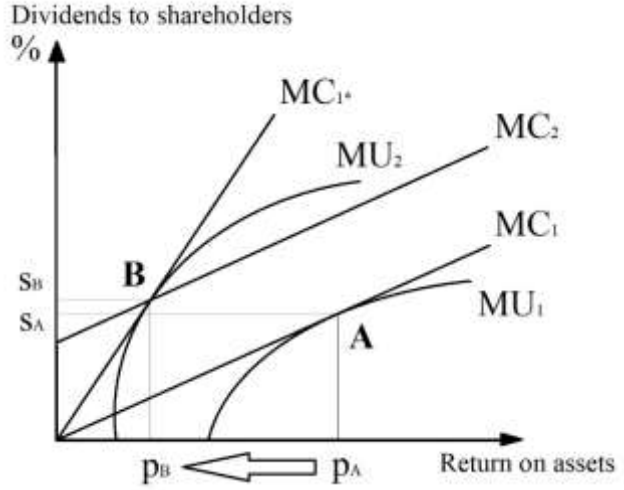

Figure 1. Theoretical scheme of the earnings management

Source: Author's illustration.

Apparently, even in the given case, it is true that the profit (utility) function of management that represents the MC indifference curves in the form of increasing half-lines is equal to the marginal costs in Figure 1. Simply put, the lower the share of earnings, the higher the percentage share of the profit required by the shareholders, and *vice versa*, the higher the share of earnings, the greater the willingness of the shareholders to reinvest part of the profit back into the business. The marginal utility of the owners is represented by increasing concave MU curves, where higher utility is represented by lower indifference curves, where a lower percentage increases in absolute value. Therefore, the given model is only valid under the condition that $S_B \geq S_A$, even in absolute monetary terms. The conflict between management and owners is evident just from the fact that there is no tangent to the maximum point of shareholder utility, the top of the concave curve. The only thing is that it would be a perfectly elastic function, in which case management would not be able to perform a management function. Management of earnings represents a situation in the scheme where, due to the reluctance of the owners to reinvest the profit back into the business, the management will use the previously described techniques for accounting adjustments so that the profit is actually slightly lower, even at the cost of higher shares of dividends (shift from point A to point B). Thus, a part of the potential profit is used for other financial operations without informing the owner. However, from what has been said, it can be argued analogously that the risk of moral hazard on the part of management decreases for companies with larger accounting-recorded reinvestments of profit back into the business.

Management of earnings is an area that has already been studied by many scholars. Nevertheless, at least for now, there is still no consensus on the definition of earnings management (Beneish, 2001). According to Schipper (1989), earnings management is understood as the adjustment of earnings to achieve predetermined management goals, which is a deliberate intervention in the process of providing financial information to achieve personal goals. Levitt (1998) defines the management of the economic result as a dark area where accounting

grievances often occur because the administrator, the agent, has already adjusted the profit according to the wishes of the management. Nonetheless, the profit and loss statement reflects those wishes of the management rather than the actual financial situation of the business. In addition, Healy and Wahlen (1999) argued that earnings adjustments occur when managers use accounting estimates or internal transactions to influence financial statements to mislead some related parties about the company's business condition or to affect contracts that have obligations based on accounting targets' revenues. Akers et al. (2007) define earnings management as management's effort to influence or manipulate the profit and loss statement by means of special accounting methods (or by changing the methods themselves), such as recognizing an item at the nonrecurring level, delaying or speeding up the recording of cost or revenue transactions, slowing down or speeding up the recording of costs or revenue transactions, or other methods designed to influence short-term income. Beneish (2001) argues that profit is an intentional aspect of business to provide investors and stakeholders with useful and truthful financial information about the business situation of businesses to help them make business-related financial decisions.

The originality of this paper lies in the use of dental companies from a financial point of view. However, the principal-agent model related to dentists was described by Maryniuk (1990) already. Although a physician will seek to defend the patient's economic well-being. Nevertheless, economic well-being depends on the acceptance of recommendations and the payment of such services by a patient. Hence, the medic's own interests might be in conflict with the desire to serve the client. Do et al. (2010) investigated income-related inequality in oral health, in other words, distinguishing between quartiles of equivalized income of patients. Even though this information asymmetry means that the situation in dentistry is not so simple. Except for the quality of innovative materials that affect not just patient comfort but the price of the services due to the higher costs Rekow et al. (2013) discuss the role of health care system may having a profound influence on whether, how, and how quickly alternative restorative materials can be introduced. Where a third party is sharing the costs, it is not always an advantage. However, downward pressure to slow down or even prevent the adoption of new materials affects dentistry. The time-consuming process of incorporating new technologies into dentistry related to failure stress is another complication that often affects dentist judgment (Rees, 2013).

3. Data & Methodology

3.1. Annual data from Orbis

The annual data for dental companies was obtained from Orbis, Bureau van Dijk. In particular, data from financial reports of 3,711 western and 1,173 central and eastern European (CEE) firms have been used. On the one hand, the return earnings ratio (RER) as a difference of shareholders' funds versus capital, on the other hand, the return on assets (ROA) using earnings before interest and taxes (EBIT), both have been measured on total assets. However, negative values for EBIT, capital, or even shareholders' funds have been omitted to employ just those healthy companies. First, to estimate the effect of liquidity, the acid test (LIQ) has been examined as a difference between current assets and inventories, measured on current liabilities. Second, to compare microeconomic development with macroeconomic development, the nominal GDP per capita in local currencies obtained from the World Bank statistical database has been used among selected countries. Furthermore, to prepare robust panel data, the outliers from the first and the last percentile have been omitted amongst panels.

When we compare the descriptive statistics in Table 1, the profitability of dental companies appears to be higher among CEE within all quartiles. However, it could be due to a different structure or even the quality of the equipment. The lower level of total assets then leads to higher profitability ROA. In the first two quartiles, the RER also seems to be higher in the CEE. On the other hand, the levels of reinvestments are closer to each other, comparing the variability of the data through a standard deviation. The LIQ liquidity acid test appears to be slightly higher among the first two quartiles in western Europe. The question is whether a higher level of retained earnings RER would be caused by a lower level of liquidity LIQ simultaneously increasing profitability ROA.

Table 1. Descriptive statistics of selected variables

	WESTERN EUROPE			*CENTRAL & EASTERN EUROPE*		
	ROA	***RER***	***LIQ***	***ROA***	***RER***	***LIQ***
Q1 (25%)	6.6135	15.5896	0.7024	8.8636	21.2125	0.5321
Q2 (median)	13.2945	37.9476	1.2733	19.0303	43.6648	1.2134
Q3 (75%)	24.8873	65.1922	2.7304	36.5522	65.8772	2.8922
Std. dev.	16.4720	28.9468	4.8741	22.3181	27.0880	3.6760
Obs.	10,681	13,544	14,342	3,553	3,564	3,719

Source: Author's calculation in STATA 17

The final issue related to data description is obvious from Figure 2 where we can see selected western as well as central and eastern European countries in particular. Positive changes of logarithmic GDP equal the economic growth, whereas negative changes decreasing of GDP in estimated years. The sovereign debt crisis in the Eurozone apparently affected the economic downturn in 2012 in western Europe (especially in ES, IT, and PT). The delayed impact of the global financial crisis frequently discussed in the literature is evident in the economic downturn among CEE countries in 2011, 2012 and even 2013 (e.g. BG, CZ, HR, and SI). Economic development could affect especially these more profitable dentistry companies. Either a patient would postpone already planned procedures, or cheaper services would be prioritized. On the other hand, patients would rather focus on expensive procedures that do not belong to the emergency if economic wealth increases.

Figure 2: Logarithmic changes of the nominal GDP inside the panels

Source: Author's calculation in STATA 17

3.2. Generalized method of moments with dynamic panel data

To estimate differences in reinvestments between dentistry companies operating in western or central and eastern Europe (CEE), a generalized method of moments is used. In particular, the Arellano-Bover/Blundell-Bond system GMM, a two-step differenced estimator with dynamic panel data, has been constructed according to the following equation (1):

$$y_{it} = \sum_{j=1}^{p} \alpha_j y_{i,t-j} + x_{it}\beta_1 + w_{it}\beta_2 + v_i + \epsilon_{it} \qquad i = 1,\ldots,N \qquad t = 1,\ldots,T_i \tag{1}$$

where:

α_j indicates the total number of *p* parameters for the estimation of the endogenous variable RER,

x_{it} creates $1 \times k_1$ vector of the other endogenous variable ROA,

β_1 is $k_1 \times 1$ vector of parameters to be estimated,

w_{it} creates $1 \times k_2$ vector of predetermined variables, either LIQ or GDP,

β_2 is $k_2 \times 1$ vector of parameters to be estimated,

v_i represents panel effects that can be correlated with regressors,

and ϵ_{it} as residuals, through the panel of idiosyncratic errors having variance σ_ϵ^2.

, while for two-step GMM models for estimating period 2010-2018 is $T_i = 7$. An assumption for the functionality of the model is non-correlation between v_i and ϵ_{it}. Endogeneity tests developed by Kiviet (2020, 2022) are a significant contribution to the application of GMM with panel data, when it is already possible to decide which regressors to introduce into the model, as endogenous or predetermined variables, both in the event that the strict exogeneity of the given variable cannot be confirmed. However, the assumption of these tests is the condition of homoscedastic residuals.

4. Discussion on empirical results

Apparently, the lagged dependent variable of the retained earnings ratio (RER) is significant among all the cases in Table 2 and Table 3. Therefore, due to dynamic panel data, the need for the generalized method of moments (GMM) is evident for both western and CEE companies in dentistry. To distinguish between the types of companies depending on the asset structure, four groups of models have been estimated according to the quantiles of the return on assets (ROA). The important thing is that only companies with positive capital and further positive earnings before interest and taxes (EBIT) are included in the sample. Technically, ROA has been treated as endogenous, whereas liquidity acid test (LIQ) and the natural logarithm of nominal GDP per capita have been treated as predetermined within the GMM system. Furthermore, according to Sargan-Hansen techniques, the Q3 CEE model with LIQ and the Q4 CEE model with GDP, both suffer from overidentification. Hence, the estimates could have given just false significant estimates. However, based on techniques suggested by Kripfganz (2019), neither over- or underidentification has been evident among the rest of GMM models. Arellano-Bond serial correlations have also not been significant at the second or third order in all cases.

Table 2. GMM modelling with the liquidity acid-test (retained earnings ratio as explained variable)

	WESTERN EUROPE				*CENTRAL & EASTERN EUROPE*			
Variable	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
RER(1)	2.4200[a]	1.7139[a]	2.0703[a]	2.4880[a]	1.6892[a]	1.5964[a]	1.3620[a]	1.6472[a]
ROA	2.5436[c]	16.1043[a]	3.0688[a]	1.3354[a]	12.3129[a]	7.1350[a]	2.6747[c]	1.7776[a]
LIQ	1.0682	1.0221	1.0068	1.0000[a]	1.0658[b]	2.2226[c]	37.5368[b]	1.1360
Obs.	2,158	2,181	2,189	2,064	521	628	617	587
Groups	873	973	998	763	260	292	281	243

Note: Arellano-Bover/Blundell-Bond system GMM two-step estimator with linear moments; diagnostic tests for over- and underidentification, and cross correlations deployed from Kripfganz (2019).
Souce: Author's calculation in STATA 17

If the estimated means of the lagged RER are compared in both groups, western and CEE dentistry companies, a higher level of willingness to reinvest the earnings back into their business is evident among those western firms. There is a lower level of estimates within the CEE. Nevertheless, an interesting finding is that pressure on profitability is apparent not only amongst Q1 and Q2 CEE cases with liquidity. According to reinvestments, some pressure is evident even in western Europe Q2 within the modelling with liquidity in Table 2. Although employing the logarithms of GDP makes ROA insignificant in almost all cases, less profitable dentistry companies in the CEE have apparently been focusing on their profitability in Table 3. Not surprisingly, the impact of LIQ as well as of GDP is not significant in all cases. LIQ is obviously significant only for those more profitable dentistry companies in western Europe, whereas among CEE companies, in contrast, LIQ is significant for those less profitable. Simultaneously, only these more profitable western companies are sensitive to GDP, whereas these less profitable CEE companies tend to be less sensitive.

Table 3. GMM modelling with the GDP (retained earnings ratio as explained variable)

	WESTERN EUROPE				*CENTRAL & EASTERN EUROPE*			
Variable	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
RER(1)	2.2424[a]	2.3029[a]	2.3464[a]	2.1430[a]	1.5184[a]	1.7609[a]	1.5821[a]	1.5324[a]
ROA	1.6202	2.1278	1.0693	0.7689	3.9174[a]	1.4686	1.3752	1.0215
lnGDP	1.5671	1.2319	2.6919	10.7361[a]	2.8715[b]	3.0263	6.7372[c]	31.7894[a]
Obs.	2,170	2,190	2,196	2,072	659	673	700	668
Groups	875	975	1,000	763	271	310	312	266

Note: Arellano-Bover/Blundell-Bond system GMM two-step estimator with linear moments; diagnostic tests for over- and underidentification, and cross correlations deployed from Kripfganz (2019).
Souce: Author's calculation in STATA 17

5. Conclusion

The aim of this paper was to estimate the differences in reinvestments between dentistry companies operating in western or central and eastern Europe (CEE). To avoid overidentification of the GMM models with retained earnings as the dependent variable, two groups of models were constructed. The first employed only microeconomic variables, including the profitability and liquidity of western and CEE companies. The second group of models employed only profitability as a microeconomic variable and then GDP as a macroeconomic variable. Among both groups of models, they were distinguished according to the quartiles of the dependent variable, retained earnings. The positive impact of profit reinvestments was significant among all models. Although two groups of models were constructed, a higher level of willingness to reinvest profits back into the business was evident in both cases for those western dentistry companies.

Although already discussed in the literature addressed to dentistry (Doherty & Crakes, 1985; Maryniuk, 1990; Tilley et al., 2005), future research should focus more on the comparison of those fixed and variable costs. As the statistical tools has significantly increased in last decade, especially within the cross-section and panel data, there is still a huge research gap in the literature, though.

Acknowledgement

The paper was financially supported by the Development of R&D capacities of the Silesian University in Opava CZ.02.2.69/0.0/0.0/18_054/0014696.

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Vol.7 Issue.4 December 2022

RSEP Review of Socio - Economic Perspectives
ISSN: 2149 - 9276
E-ISSN: 2547-9385

A comparative analysis of healthcare expenditures in OECD and Türkiye[1]

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Article History

Received: 30 August 2022 Revised: 20 November 2022 Accepted: 29 November 2022 Available Online: 5 December 2022

Keywords: health expenditure, OECD countries, Türkiye
JEL classification: H51; I15

Citation: Erdal, A. & Isik, H.B. (2022). A comparative analysis of healthcare expenditures in OECD and Türkiye, *Review of Socio-Economic Perspectives*, 7(4), 63-73.

Abstract

This study discusses how the health expenditures in OECD countries and Türkiye are financed, and the similarities and differences in health expenditures. With the COVID-19 pandemic, 2020 was a year in which the economy slowed down but health expenditures increased. Total health expenditures worldwide reached 8.7 trillion dollars in 2020. In Türkiye, the total health expenditure increased by 24.3% in 2020 compared to the previous year and reached 249 billion 932 million TL. The ratio of current health expenditure to GDP was 4.6% in Türkiye in 2020, while the average of OECD countries was 8.8%. States appear as the party that covers the vast majority of health expenditures. While the ratio of general government health expenditure to total health expenditure in Türkiye is 79.2% in 2020, average of OECD countries is 73%. When inter-country per capita health expenditures are compared, we can see that the inter-country differences are very large and some countries spend only 1% of GDP and some more than 10% of their GDPs for health services. This study covers the data set from year 2000 to 2020, when all health expenditures data are fully available, and analyzes comparatively the health expenditures of the OECD and the Turkish health expenditures during this time period. The results show that Türkiye is in the last place between 2000-2020 in total health expenditures among OECD countries but improving in almost all indicators related to healthcare.

1. Introduction

The spread of Covid-19, which emerged at the beginning of 2020 and gradually increased its impact, has once again shown us how important the developments in the field of healthcare are. Just like all other countries, Türkiye has been negatively affected by this virus, and the economic and social problems in the country have seriously increased. The Covid-19 pandemic, which has still not ended and caused the reorganization of social life, has had important psychological consequences as well as physical, social, economic and political effects all over the world.

A healthy society is of great importance for the development of a country as well as being a qualified human resource. The health of the individuals in the society are closely related to the provision of the needed health services. All expenditures made for the protection, development and maintenance of human health and the treatment of existing diseases are included in the scope of healthcare expenditures. Although it differs from country to country, health expenditures, which are known to be effective on economic growth and development, constitute one of the most important expenditure items in all countries. Especially in developed countries, the shares of health expenditures allocated from their budgets are relatively higher than in other countries. While health expenditures are one of the most discussed issues in recent years, it also constitutes one of the main areas of health economics (Boz and Sur, 2015: 24). The main goal of all countries and health systems is to create a

[1] This study is related to the PhD thesis of Abdurrahman ERDAL.

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DOI: https://doi.org/10.19275/RSEP142
Article Type: Original Paper

healthy individual and a healthy society. Therefore, the health expenditures of the countries are increasing day by day and gaining more importance. In addition, since comparisons can be made between countries, characteristics and effects of these expenditures are important, as well. This study aims to reveal the position and ranking of Türkiye within OECD countries in terms of health expenditures during the period of 2000-2020.

2. Literature Review

According to Akdur (2020), countries have to spend at least a certain amount per person, even for the basic health services that individuals need. If the health expenditure is less than this amount, it means that the people of the country cannot benefit from the most basic health services. Although health expenditures are generally shaped within the framework of the socio-cultural values of the countries and the health system implemented by the country, the reasons for the increase in health expenditures are generally similar regardless of the socio-cultural values of the countries, the applied health policies and their level of development.

Basically, it has been revealed in the literature that economic, social-cultural and technological factors are effective in the increase in health expenditures (Hansen and King, 1996: 127). Many factors such as increase in personal income, technological developments in medicine, change in demographic structure, increase in global health risks, increase in chronic diseases, change in insurance coverage, urbanization, increase in education level and health awareness, easier access to health services, changes in social value judgments, prolongation of life expectancy, changes in social order and personal lifestyle affect health expenditures (Khanolkarvd., 2016: 34-35). The most important factor affecting health expenditures is the increase in per capita income. Individuals tend to buy goods and services that will enable them to continue their lives more comfortably with the increase in their income. People increase their demand for other goods and services, especially when basic services are provided by the state or other institutions. In this case, it is seen as an expected development that individuals who want to improve their living conditions will increase the demand for health services (Mutlu & Işık, 2012:216).

The scarcity of resources allocated to health in developing countries is among the main problems in the delivery of health services. While the relevant countries are insufficient in providing the necessary health services to their population, they cannot prevent this inadequacy with a rapid population growth. Of course, this situation makes it difficult to access health services offered in underdeveloped and developing countries (Mutlu & Işık, 2012).

Compared to developed countries, infectious disease cases and resulting deaths are more common in developing countries. At this point, the health expenditures that countries will make in order to protect them from epidemic diseases will both protect the current population from infections and protect future generations. At the same time, it is stated that it will prevent international health expenditures that may occur due to the epidemic and contribute to the health economy (Mushkin, 1962; Akın, 2007).

One of the reasons for the increase in health expenditures is today's vital differences. The diseases caused by the period and the past experiences of individuals affect the demand for health expenditures (Yıldırım et al., 2018: 551). Health has many economic, social, cultural and environmental components. Imbalances in income distribution are closely related to health protection, basic needs, compulsory foods, medical aid and other issues (Kalyoncu, 2011: 25).

Most of the developed countries want to increase the efficiency of health services in order to develop human capital. Therefore, they aimed to protect human health by allocating a larger share of the Gross Domestic Product (GDP) to health expenditures. (Tokgöz, 1981: 498).

Therefore, strengthening primary health services is seen as an effective policy tool. Primary care is expected to play an important role in producing effective policy tools in the health sector by limiting unnecessary hospitalizations and reducing associated hospital costs (OECD, 2020). In OECD countries, there is a mismatch between skills and duties in primary care teams, and population and patient needs (Frenk et al, 2010).

In their study, Çetintürk and Gençtürk analyzed 14 different expenditure variables used by 36 OECD countries in health services between 2003 and 2017 using the Ward method, and as a result of the analysis, the countries were clustered according to their health expenditure types and the countries that Türkiye showed the most similarity in various health expenditure types are Estonia, Latvia, Mexico, Czech Republic, Luxembourg, Belgium and Australia. This result indicated that Türkiye lags behind developed countries in health expenditures and is in the same cluster with countries with relatively low health expenditures (2020).

There has been a lot of progress in the field of health in Türkiye in recent years. For example, social security institutions were combined in 2006, everyone living in Türkiye was taken under health insurance with the Social Security and General Health Insurance Law that came into force in 2008, the Strategic Plan of the Ministry of Health was accepted in 2009, and the family medicine institution was established in 2010 (Sülkü , 2011). Contrary to the narrow-framed and weak implementations of reforms carried out in previous years, the reforms

after 2003 were carried out within the framework of a comprehensive program and fundamental reforms were made with the aim of creating a new system (Yilmaz, 2018).

3. Data & Methodology

In this study, a comparison was made on the health data of OECD and Türkiye. The data from 2000 to 2020 were obtained from the World Bank, OECD and TSI (Turkish Statistical Institute).

Some factors affecting health expenditures of OECD countries and Türkiye were considered as, life expectancy at birth, number of doctors (per 1000 people), mortality at birth, number of hospital beds (per 1000 people), urbanization, ratio of total health expenditure to gross domestic product.

One of the most important factors affecting health expenditures is life expectancy at birth, that is, average life-span. In developed countries, the increase in the quality of life with increasing income, technological advances and the development of more effective drugs against diseases have provided significant increases in the life span of people. Living longer means that people demand more health care services and spend more on health care. While good living conditions prolong the average lifespan, the prolongation of the average life expectancy causes the population to age and health expenditures to increase (OECD, 2005: 90).

Table 1. Data on Selected Indicators in OECD Countries and Türkiye

Countries/Years/Indicators	**GDP Per Capita Current US$**		**Life Expectancy at Birth (Years)**		**Population Age 65 and Over (% of Total Population)**		**Length of Hospitalization (days)**	
	2000	**2020**	**2000**	**2020**	**2000**	**2020**	**2000**	**2020**
Türkiye	4337	8536	70	77	6.2	8.98	5.6	4.5
OECD	23007	38116	77	80	13	17	7.2	9.4

Source: Word Bank, 2022.

According to Table-1, life expectancy at birth has increased significantly in the last 20 years, increasing from 70 to 78 years in Türkiye compared to 77 to 80 in OECD countries.

The health level of the society; factors such as climate, environment, access to clean water, literacy rate also affects it. Variables such as the number of beds in the hospital, doctors per thousand people, and length of stay in the hospital are also determinants in health expenditures (Yalçın & Çakmak, 2016: 709). Health services are also one of the important indicators of the economic and social development levels of countries (Tutar & Kılınç, 2007: 32).

As it can be seen from the Table-1, GDP per capita is another important determinant of health expenditure and from 2000 to 2020 Türkiye's GDP increased from 4337 to 8536, while the OECD average rose from 23007 to 38116 Dolars.

Table 2. Data on Selected Indicators in OECD Countries and Türkiye

Countries/Years/Indicators	**Mortality at Birth**		**Number of Doctors (per 1000 people)**		**Number of Hospital Beds (per 1000 people)**	
	2000	**2020**	**2000**	**2020**	**2000**	**2018**
Türkiye	30.9	8.1	1.3	2.05	2.1	2.85
OECD	11.0	6	3.0	3.8	5.5	5

Source: Word Bank, 2022.

There has been a significant decrease in the mortality at birth in Türkiye in the last two decades compared to OECD average (Table-2). We can attribute this to health reforms and developing technology in Türkiye. Moreover, the increase in the number of hospital beds and doctors per capita is higher than the OECD averages.

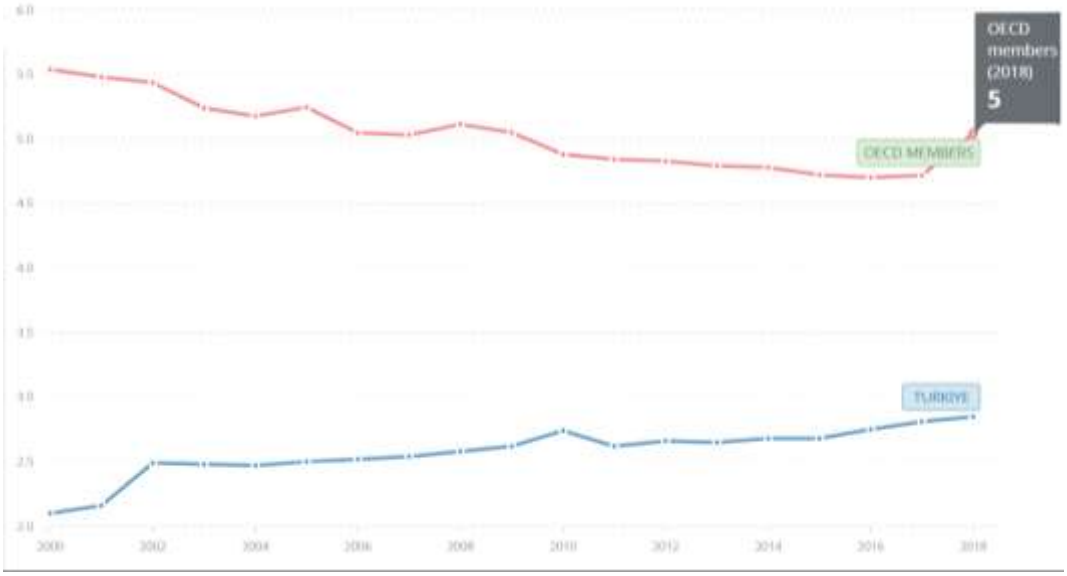

Figure 1. Hospital Beds (Per 1000 People)- Türkiye, OECD Members

Source: Word Bank, 2022.

In Figure-1, while the rate of the number of hospital beds per 1000 people decreased in the last twenty years in OECD countries, it had a steady upward trend in Türkiye except for a year 2011. This could be to do with the increase in the number of hospitals built in Türkiye in recent years.

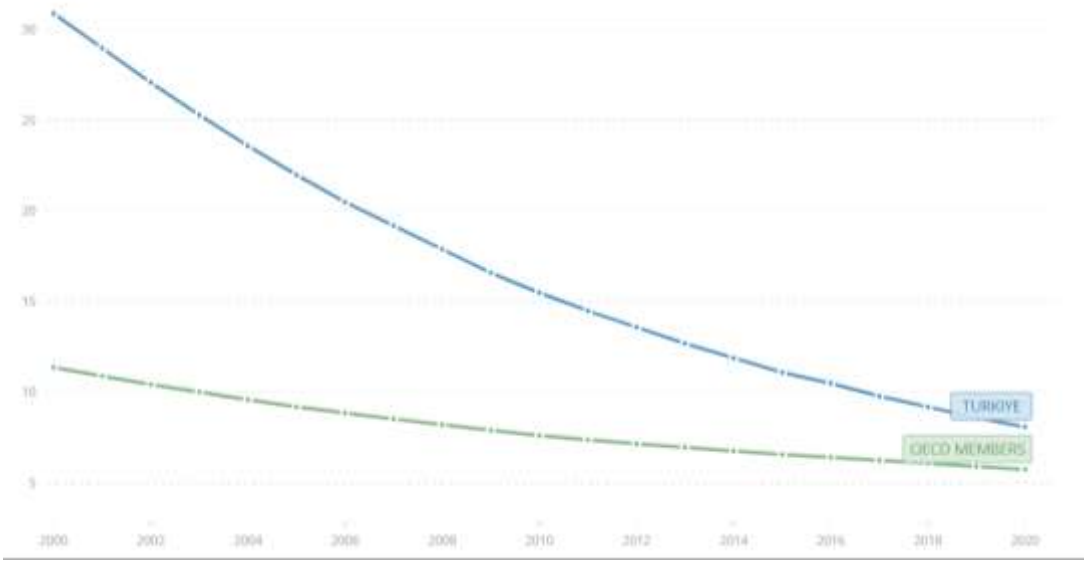

Figure 2. Mortality rate, infant (per 1000 live births)-Türkiye, OECD members

Source: Word Bank, 2022.

According to Figure 2, the mortality rate at birth in Türkiye decreased from 30.9 to 8.1, approaching the OECD average of 6. On the other hand, urbanization causes an increase in the demand of individuals for health services. The demand for health services is increasing due to epidemics and similar diseases that people may encounter as a result of living together. This means an increase in physical areas, health employment and health expenditure. The increase in the rate of urbanization day by day may cause inadequate health services and an increase in epidemics (Akın, 2007).

Table 3. Urbanization

Countries/Years/Indicators	Urbanization (%)	
	2000	**2020**
Türkiye	64,7	76,1
OECD	75,6	81,0

Source: Word Bank, 2022.

In Table-3, it is seen that the urbanization percentage of OECD countries is higher than Türkiye. However, the increase in the rate of urbanization in Türkiye in the last 20 years has increased at a higher rate than the average of OECD countries.

3.1. Health Expenditures in Türkiye

Health services are mostly provided by the public. When the income elasticity of public goods and services is assumed to be higher than one, a one-unit increase in individuals' income causes an increase in the demand for health services by more than one unit (Görgün, 1993). In other words, the increase in the income of individuals will lead to an increase in the demand for health services from the private sector (Mutlu & Işık, 2012).

In the field of health services, Türkiye has made great strides compared to its past periods. At this point, many activities have been carried out in the field of health, such as the transformation in the social security system and the acceleration of modern hospital formation in the last 15 years. In terms of the provision of health services, one of the brightest periods of the Republican period is being experienced.

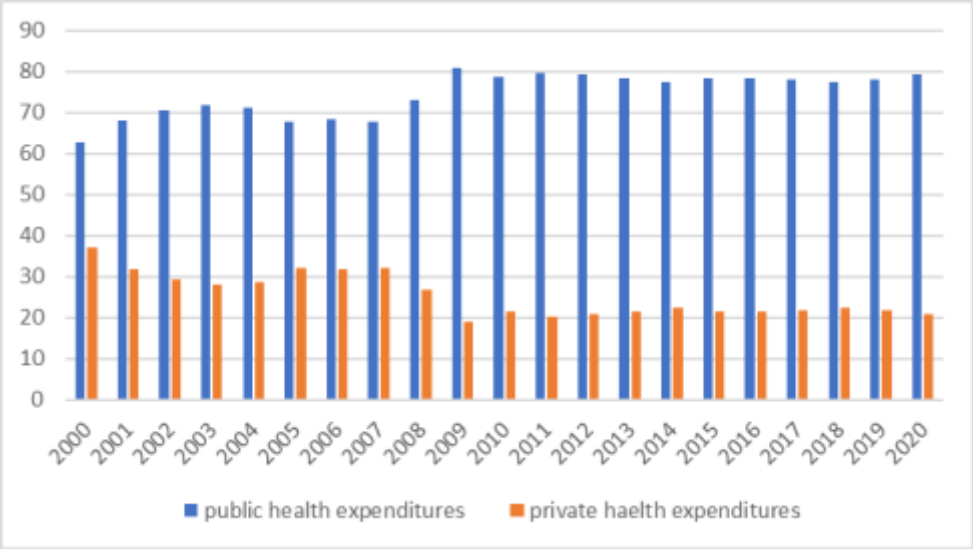

Figure 3. Ratio of Public and Private Health Expenditures to Total Health Expenditures in Türkiye

Source: TSI, 2022.

Health expenditures have increased over the years in both private and public sectors. However, the share of public sector health expenditures in total health expenditures in every period is higher than the share of private sector health expenditures. While public sector health expenditures increased significantly, especially during crisis periods, private sector health expenditures either remained the same or turned into a declining form. Figure-3 shows how much of the total health expenditures are financed by the private sector and how much by the public sector.

Although an increase is observed in health expenditures in Türkiye over the years, investment expenditures have not increased at the same pace. However, health investment expenditures have also recently shown a significant increase (especially after 2017).

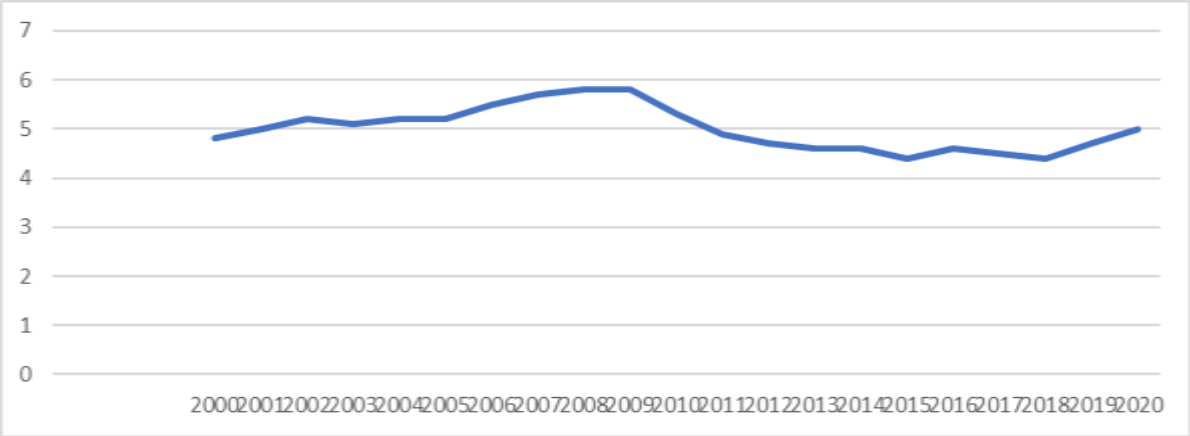

Figure 4. Ratio of Total Health Expenditure to Gross Domestic Product in Türkiye (%)

Source: TSI, 2022.

The years with the highest health expenditures in GDP were 2007, 2008 and 2009 (Figure-4). The share of the public sector's health expenditure in GDP was the highest in 2009 with 5.8, while the share of private sector health expenditures in GDP was the lowest. This could be to do with the 2008 global economic crisis. All these data indicate that the public sector is the leading financier in the field of health expenditures for Türkiye.

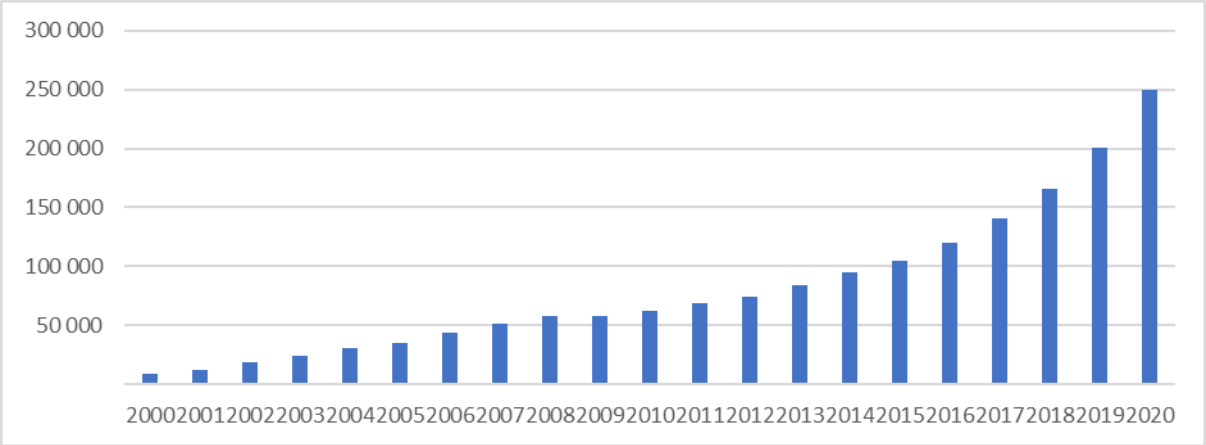

Figure 5. Total Health Expenditures in Türkiye

Source: TSI, 2022.

Total health expenditure increased by 24.3% in 2020 compared to the previous year and reached 249 billion 932 million TL. General government health expenditure increased by 26.3% and reached 198 billion 62 million TL. Private sector health expenditure was estimated as 51 billion 869 million TL with an increase of 17.3% (TSI, 2021).

The ratio of general government health expenditure to total health expenditure was 79.2% in 2020, while private sector health expenditure was 20.8%. Looking at the sub-components of the general government and private sector in 2020, the Social Security Institution (SGK), the central government, the households, the insurance companies, the non-profit organizations and local administrations had a share of 51.0 %, 27.6%, 16.0%, 2.6%, 2.1%, and 0.7%, respectively (TSI, 2021).

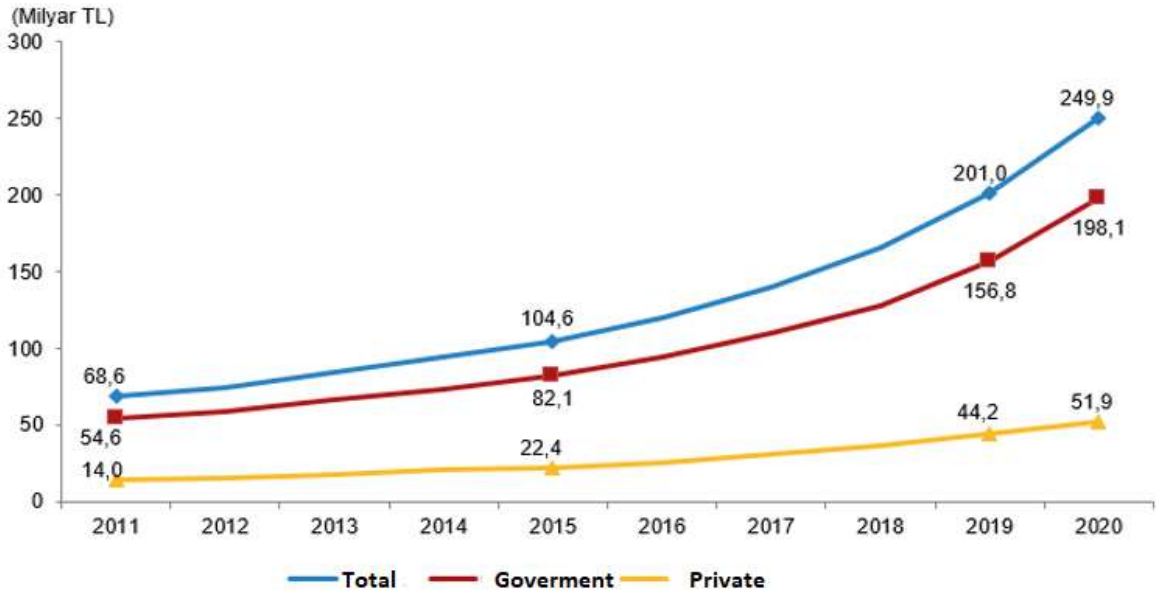

Figure 6. Comparison of Total-Public-Private Health Expenditures in Türkiye (2011-2020)

Source: TSI, 2022.

Health expenditures reached the peak point in 2020 with 250 billion TL in Türkiye. In the same period, total health expenditure has reached its highest level since 2000. In this increase, the rise in the demand for health services with the rapid increase in the population can be expressed as an important factor. In addition, the reason for the peak of spending in 2019 and 2020 is the Covid-19 epidemic which broke out in 2019. During this period, total health expenditures in Türkiye increased almost 1.5 times.

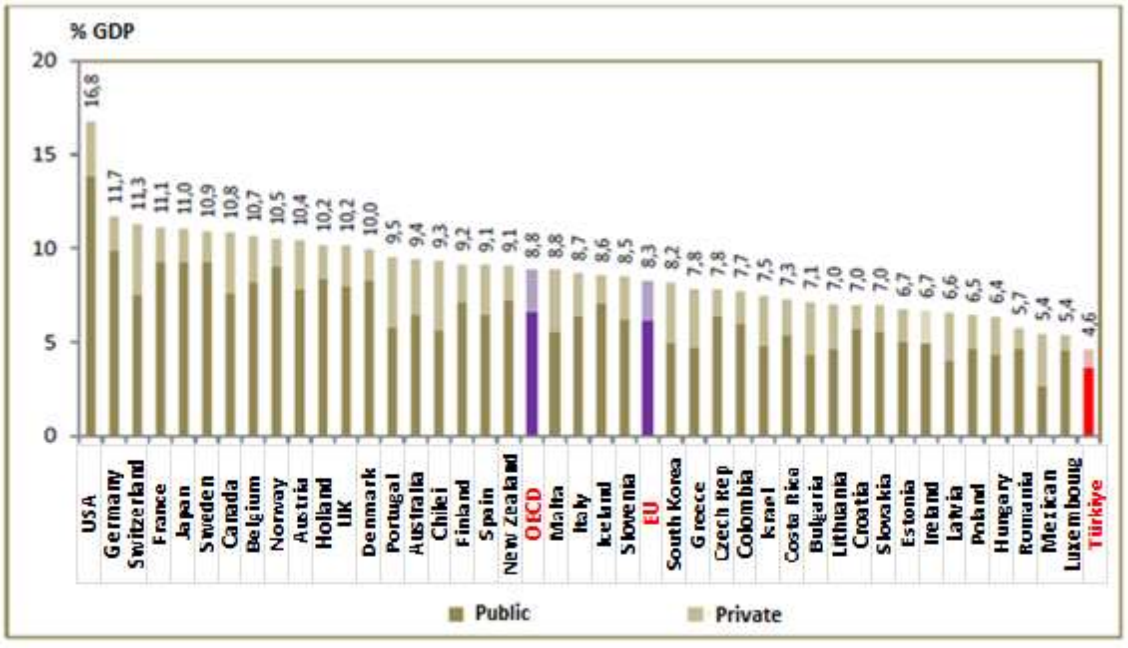

Figure 7. Comparison of Health Expenditures in Türkiye and OECD Countries

Source: TSI, OECD Health Data 2021

Note: Country data refer to 2019 or the nearest year. Data of Türkiye is for 2020.

Figure-7 shows private health expenditures and public health expenditures by country. At this point, the OECD average can be considered as a benchmark. The health expenditures of the countries were mostly financed by the public sector.

Among the countries in Figure-7, Türkiye is the country with the lowest share of health expenditures in GDP with a rate of 4.6%. The closest country to Türkiye is Luxembourg.

While the country with the highest public sector health expenditure in total health expenditures is Luxembourg, the country with the least public financing is Mexico. Of course, this situation can also be caused by the differences in the health expenditures of the individuals living in the country and the health systems.

Table 4. Total, Public and Private Health Expenditures per Capita

Countries/Years/Indicators	Total Health Spending per Capita US $		Public Health Spending per Capita US $		Private Health Spending per Capita US $	
	2000	2020	2000	2020	2000	2020
Türkiye	432	1.304,7	266	1.029	124,9	214,4
OECD-Average	1.765	3.484	1.298	3.346	336	681,3

Source: OECD, Health Data 2022

Türkiye's total, public and private health expenditures remained below the average of OECD countries between 2000 and 2020. When we look at the total health expenditures, we can see that the expenditures in Türkiye have increased proportionally more than the OECD average. A similar perspective applies to public health expenditures. However, the same cannot be said for private health expenditures.

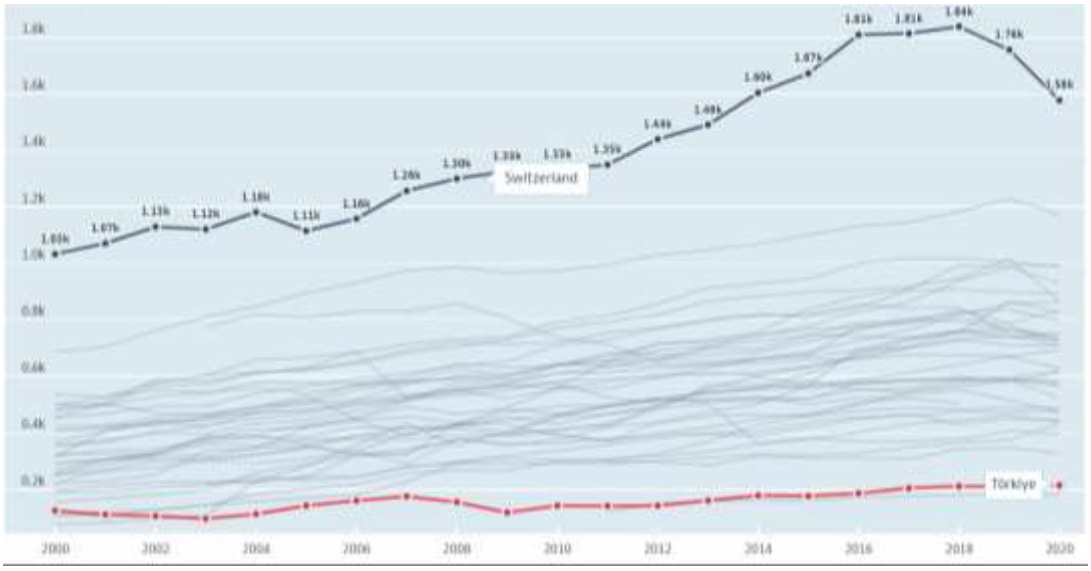

Figure 8. OECD-Türkiye Comparison of Out-of-Pocket Expenditures, 2000-2020

Source: OECD Health Data, 2022.

While Türkiye ranks among the last in out-of-pocket health expenditures among OECD countries between 2000 and 2020, Switzerland has been the country with the highest out-of-pocket spending by a clear margin.

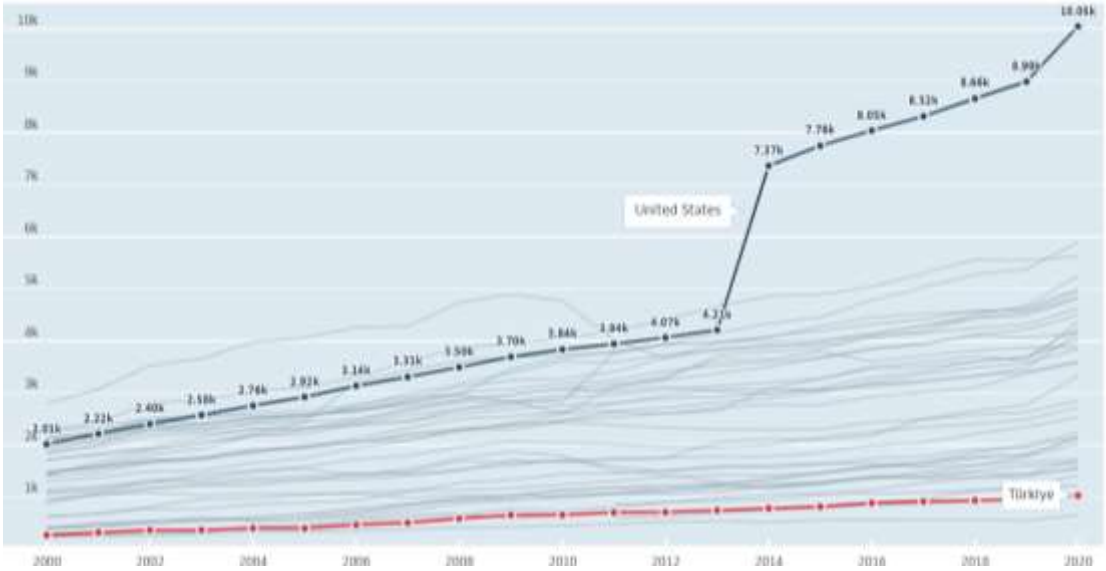

Figure 9. OECD-Türkiye Comparison of Public Health Expenditures, 2000-2020

Source: OECD Health Data, 2022.

In public health expenditures between 2000 and 2020, Türkiye was again in the last place in OECD countries. While the country with the highest spending was Luxembourg before 2011, the USA has been the country with the highest out-of-pocket spending compared to other countries after 2013.

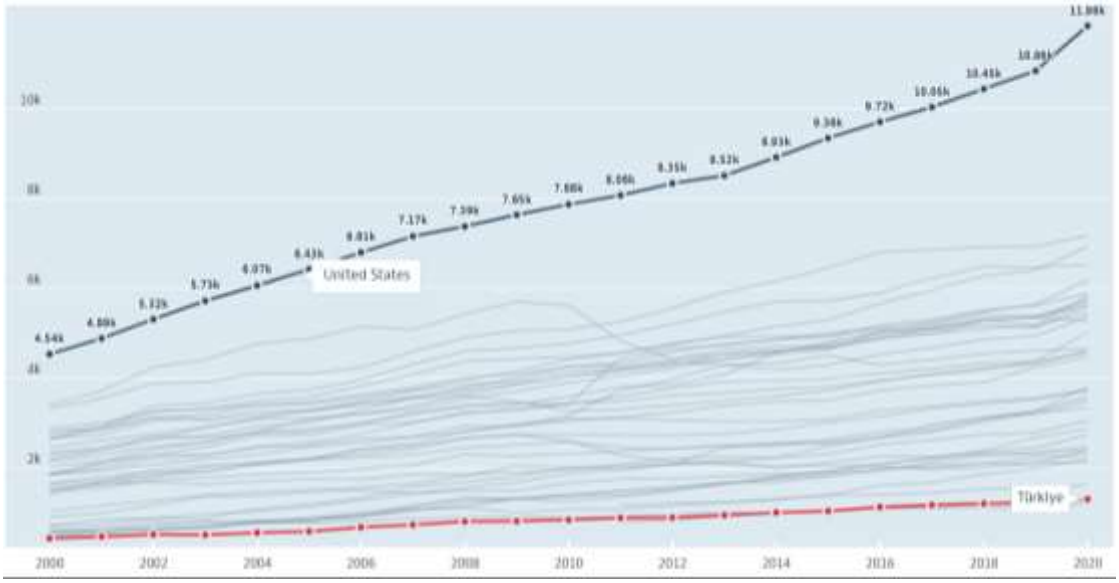

Figure 10. Total Health Expenditure Comparison of OECD-Türkiye

Source: OECD Health Data, 2022.

Türkiye was in the last place in total health expenditures between 2000-2020. The USA has been the one with the highest health expenditure by a clear difference compared to other countries. While Luxembourg was in the second place in the ranking of the countries with the highest health expenditures until 2010, Switzerland became the second after 2010.

4. Conclusion

The health expenditures varies with population and the intensity and spread of diseases. In recent years, with the Covid-19 pandemic, world countries have made various changes in order to use health expenditures more effectively. The differences in the healthcare systems also reveal differences in the presentation and financing of health expenditures. At the same time, economic development and education level appear as important variables in the field of health services. The development level of countries can also affect the budgets they allocate to health expenditures and health investments. This affects life expectancy, birth and death rates, as well.

In terms of financing health expenditures, all countries have both public and private financing at different rates. This is to do with health system or social security system of the relevant country. In Türkiye, almost %80 percent of health expenditures is financed by public sector. As for delivery of health services, there are health institutions belonging to the private sector as well as public health institutions.

With the increasing population in Türkiye, mainly due to refugees from Syria and Afghanistan, health expenditures increased over time. Therefore, the rate of participation in the Social Security System has increased rapidly with the reforms, and the public health expenditure burden has increased.

With the Health Reform Packages made after 2002 in Türkiye, there has been an increase in health expenditures but still not enough compared to OECD countries. While the total health expenditure per capita in Türkiye in 2000 was 432 dollars, it became 1.304 dollars in 2020. The average of OECD countries has reached 3,484 dollars from 1,765 dollars. The average of OECD countries in total health expenditures per capita has reached almost 3 times that of Türkiye. Mortality at birth and number of hospital beds approaching OECD average.

Economic crises and pandemics have a great impact on health expenditures. While the private sector health expenditures started to decrease with the crisis, the public sector health expenditures increased. Although there are improvements in many indicators, Türkiye performs very poor at almost all categories/indicators and needs stronger economy and policy changes to reach to OECD averages.

Countries should identify the best practices to promote better policies for better lives in order to improve their health systems and decrease burden on the public sector. It will be an important step to utilize public resources in a more productive and efficient way and promote the private sector to participate more in health expenditures.

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Vol.7 Issue.4 December 2022

RSEP Review of Socio - Economic Perspectives
ISSN: 2149 - 9276
E-ISSN: 2547-9385

Income smoothing and performances of enterprises: A study of manufacturing firms in Nigeria

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Article History

Received: 15 July 2022 Revised: 10 November 2022 Accepted: 1 December 2022 Available Online: 5 December 2022

Keywords: income, smoothed, performance, businesses, financial statement.
JEL classification: L21; L25; M41

Citation: Ilemona, S.A. (2022). Income smoothing and performances of enterprises: A study of manufacturing firms in Nigeria, *Review of Socio-Economic Perspectives*, 7(4), 75-85.

Abstract

The study examined income smoothing and performance of enterprises: A study of manufacturing firms in Nigeria. The objective is to determine whether income smoothing has relationship with performance of businesses taking a study of manufacturing firms in Nigeria. Using purposively sampling, technique data for five years (2017-2021) on Market Value Per Share (MVPS), Earnings Per Share (EPS), Net Assets Value Per Share (MVPS), Earnings Per Share (EPS), Net and Income (NI) were obtained from the annual reports of selected 20 manufacturing firms quoted on Nigerian Stock Exchange (NSE) as at 31st December, 2021. The analysis of the data was done using correlation and regression methods. Further, F-test statistics was done to compare variance obtained from the grouped sample. It was found that relationship exist between income smoothing and performance of manufacturing business, it was also found that firms in the high sales bracket presents less variable income numbers in their financial statements implying smoothed income than those manufacturing enterprises in the low sales bracket. The study recommends engagement of qualified and skilled auditors to investors for proper analysis of financial statements of enterprises for identification of smoothed income in the financial statements which in some cases are done fraudulently.

1. Introduction

One of the key benefits of accrual based accounting system of International Financial Reporting Standards (IFRS) is its application of accounting principles that allow estimates and personal judgments in financial reporting. The application of the accounting system helps users of financial information in assessing the economic performance of an entity during a period. With the use of estimates and personal judgment, management can apply control over records of transactions and prepare reports based on their taste and choice (Mooren and Harnby, 2016). The taste and choice of management in financial report preparation are usually made in order to reduce fluctuations in earning from one period to another as a way of managing expectations. The management of expectations involves moving revenues and expenses from one accounting period to another with management intention to level fluctuations in net income from different reporting periods purposely to attract investors (Leonard & Allen, 2017). Income leveling or smoothing is a means to woo investors and they (investors) are usually willing to pay a premium for stocks with steady and predictable earnings streams as opposed to stocks of companies with unstable and volatile earnings pattern. A company that shows consistent returns from year to year is likely to attract more investments as the investors will be comfortable seeing steady returns on their investments (Lawrel & Patrick, 2018). Investment is key in micro and macro economic growth and volatility in earnings of enterprises is a deterient to this growth variable as such, companies, engage in income smoothing especially under the IFRS reporting regime to attract investors (Richard & Ocleam, 2016).

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DOI: https://doi.org/10.19275/RSEP143
Article Type: Original Paper

However, as advantageous as income smoothing is to a business strategy for investment attraction and growth, it is often used fraudulently and in a reverse manner detrimental to stockholders (Howski & Pencer, 2015). The reversal usage of income smoothing resulted in pursuit of interest has led to erosion of confidence of investors and collapse of many corporate organizations like Enron, Global crossing, Worldcom, Krispy Krene and others in some of these developed nations (Forllen & Garthmer, 2016 and Brainner & Fitzer,2017). In Nigeria, fraudulent reporting of earnings in the disguise of income smoothing brought transparency reporting and performance of banking industry into question in the 1990s and early 2000s when many of them went into liquidation. Though sometime, income smoothing can be used as a managerial tool to display unrealistic performance of an enterprise, but then, if accounts are smoothly prevented with focus on transparency reporting using accounting principles such as compliance and identify permitted by Generally Accepted Accounting Principles (GAAP) and (IFRS) information rolled out in such accounts and reports can impact positively on market valuation of the enterprise useful for investment purpose.

The manufacturing industry is a critical component of the real sector of the Nigerian economy. The sector is significant in growth of the economy in terms of production and employment generation for which the participation of investor is key. Unfortunately, the sector is freighted with a myriad of operational difficulties that usually culminate into volatility of earnings. In the midst of these difficulties, it would not be out of place for managers these enterprises in an opportunistic behaviour engage in earning management/income smoothing mechanisms to influence the market value of their businesses in a bid to attract investors (Welldon & Jacklin, 2018). However, while Gilbert and Njoku (2020) and Dosunmu and Nabbo (2020) are of the view that the moderation of year to year fluctuations' in the income/earnings of many enterprises in Nigeria has helped in boosting their performance, authors such as Kuta and Dulora (2020) and Yunusa and Gana (2021) argued on the contrary that income smoothing is of no help to businesses in Nigeria particularly manufacturing enterprises as many investors see income smoothing as a means to dampen the volatility of underlying performance noting that reporting company's smoothed earnings is a deceptive practice as the act decreases predictability of future earnings. Colloborating the views of Kuta & Dulora, 2020; Yunsa & Gana, 2021) Ulenuga and Okheimen (2021) opined that doubts of investors on growth prospects of manufacturing enterprises in Nigeria are on the increase of which no managerial skills of accounting nature including income smoothing can erase.

It is against the backdrop of the contradicting views about the impact of income smoothing that paper has its objective to determine whether income smoothing has any relationship with the performance of especially manufacturing enterprises in Nigeria essentially in terms of meeting the yearnings of investors/fund providers.

2. Literature Review and Hypotheses Development

2.1.Conceptual Review

Firm performance (FP): A performing enterprise from funds suppliers or investors point of view is that enterprise with consistent increase in earnings from year to year (Pedro & Zedder, 2016). For them (investors), it is the level satisfaction of their wealth maximization goal and stability of increased earnings that matter most in the performance index of an enterprise. Thus, Parazelin and Lockney (2016) viewed a performing firm as the enterprise that consistently create value addition and meeting the expectation of the shareholders in terms of wealth maximization. In wealth maximization, shareholders or stockholders are keen on the yield of their investment and variables such as Market Value Per Share (MVPS), Earning Per Share (EP), Dividend Per Share (DPS) Net Asset Value Per Share (NAVPS) Net income scaled by total Assets as indices of performance (Dorthey 2015:; Morren & Hardler, 2016; and Schoola & Tucklern, 2018).

Market Value Per Share (MVPS): The MVPS of a company is the price at which the share of a company can be acquired in the market place particularly at the stock exchange market (Harvey & Arthur 2017). The price varies throughout a trading day as determined by the forces of demand and supply. The MVPS of a company is a good indication of investors' perception about the prospects of the business (Nicmas & Damien, 2018). The share value is determined by multiple of values accorded by investors such as price-to-sales, price to earnings, value to earnings before interest and taxes and so on (Nicholas, 2017). The higher the valuation, the higher the market value of share.

Earnings Per Share (EPS): it is a company's profit divided by outstanding shares of its common stock (Polycarp, 2018). The resulting number serves as an indicator of company's profitability. EPS indicates how much money a company makes for each share of its stock and it is widely used as a metric for estimating corporate value (Khante & Canon, 2016). A higher EPS indicates greater value because investors will pay more for a company's share if they think a company has a higher profit.

Dividend per Share (DPS): This refers to the dividend declared by a company for every ordinary share outstanding (Brein, 2016). DPS is arrived at by dividing the total dividends paid out a business over a period of time usually a year including interim dividend by the number of outstanding ordinary shares issued (Kennol &

Gregory, 2017). DPS is an important metric to investors because the amount a firm pays out in dividends directly translates into income for shareholders.

Net Asset Value Per Share (NAVPS): it is the net assets (Total assets on statement of financial position less total liabilities) divided by the number of equity shares in issue (Syllen & Hogler, 2018). Assets include total market value of investment, cash and cash equivalent, receivables and accrued income. Liabilities on the other hand include total short-term and long term liabilities plus(+) accrued expenses such as staff salaries and other operational expenses. An increase in NAVPS by means such as buyback may lead to an increase in the market value of a company's shares (Desmond & Elliot, 2017).

Net Income (NI): NI represents the overall profitability of a business after all expenses and costs have been deducted from total revenue (Burnkyn & Singer, 2016). NI, also referred to as the net profit or the bottom line generally refers to all monies that flow into a business minus all monies that flow out (Doonor, 2017). For a manufacturing enterprise, the major source from where income is derived is sale of goods of which the number of Sale Outlets (SOTLTs) are the determinants of the quantum of income revenue that comes in or the inflows. A part from the product sale other sources of revenue for manufacturers include interest income from investment income realized from sale of assets and other revenue sources perculiar to a manufacturing outfit (Gimtha & Edvin, 2016). The revenues from all sources constitute the total revenue from all operating expenses are deducted to arrive at the NI. Therefore the simple formular for NI calculation is Total Revenue – Total Expenses (NI = TR – TE) expanded as NI = TR – (Taxes + operating costs + Depreciation + Other expenses) (Kleiffer & Leonard, 2015; Dyer & Arnold, 2017 Harman & Gurceno, 2019).

Income Smoothing (IS): It is the use of accounting techniques to level out fluctuations in the NI of a business from (Leonard & Peck , 2015). The technique can sometime be used illegally or fraudulently by management and can also be used or deployed legally within the guidelines permitted by Generally Accepted Accounting principles (GAAP) (Leonard & Peck, 2015). It is part of earnings management that involves moving revenues and expenses around by business manager in order to help investors better predict future performance (Kent & Armon, 2016). Example of IS technique is revenue deferring during a good year where it is anticipated that the following year it could be difficult or deferring recognition of expenses in a challenging year in anticipation of improved performance in the near future.

Broadly classified into two, IS can be either natural or designed. Natural IS an embedded opportunity in operations of a business that creates smooth flow of income without manipulation of profits (Flywood & Nee, 2017). This type of smoothing is not part of earnings management in actual sense as it does not involve income or profit manipulation. On the other hand, designed or intentional smoothing is earnings management which occurs when managers use their personal judgment in financial reporting to manipulate structure of equations in order to change the financial reporting (Wright & Malta, 2016). Further, the designed or intentional smoothing could be real or artificial. Real IS refers to techniques of business managers implemented to smooth income with the end result of reducing cash flow volatility (Ornell & Berth, 2016). The technique of real IS typical of manufacturing organization according to Robert and Sleck (2017) include manipulation of sale through accelerating the timing of sales, creation of over production and credit conditions with falling prices and engaging in excessive production in order to report lower cost of goods sold etcetera. These according to Robert and Sleck (2017) are risky IS to derive assurances among customers and suppliers in anticipation of higher growth prospects.

Artificial Smoothing (AS) refers to accounting technique undertaken to shift revenues and costs from one period to another with no direct cash flow consequences (Silkert & Sarthurt, 2016). Examples of AS according to Murrey and Porter (2018) include shifting costs between expenses and capital accounts, timing of discretional expenses such as payment of bonuses, timing of sales of investment, changing of accounting principles examples from Weighted Average method to First-In –First-Out (FIFO) method etcetera. Implementation of any of these techniques is capable of reducing the variability of reported earnings by exercising discretion over financial reporting. Generally, the aim of implementation of AS is that business managers can use their discretion to communicate private information hypotheses (Muller & Oliver, 2015). It is in view of this communication of private information which can sometime be a mere desire to inform or cover up the true performance of a business that IS performance index, Eckel's IS index formular and analytical procedures have been developed for IS detection.

Eckel's index formular is a mathematic representation involving percentage changes in profit and sales of firm that shows smoothing (Younis, 2018 cited in Emad, Wasan & Laith, 2020). The formular is depicted as CV∆%

Net profit $\leq$CV∆% sales= smoothing where: CD∆% Net Profit = Net Profit – Net Profit -1/Net Profit – 1or CV∆% sales = Revenue – Revenue – 1/Revenue -1. If the result from the formular above is less than 0.9, it is an indication that the company performs smoothing and if the index is greater than 1.1, it show no smoothing is performed (Emad, Wasan& Laith, 2020).

The analytical procedure for IS detection are the basic tests that auditors use in studying and evaluating the relationship between financial and non-financial data and comparing these relationship to find deviations. Analytical procedure was statistical and mathematical tools such as financial ratios analysis, trend analysis, regression analysis and indicators analysis (Valaskova, Kliestik & Kovacova, 2018). A careful analytical procedures of auditors using these rations will help in identifying any significant or material deviations in financial statements signifying that the information have been smoothed

3. Empirical Review

In literature, the value of a firm and performance are largely based on the amount of revenue earned and the financial information that its accounting numbers represent during a period (Teoax & Edward, 2018). There are studies conducted on IS. For instance, Krama and Mrthlau (2017) carried out a study on value relevance of IS in the banking sector of Ghana. The study employed pooled regression technique of ten (10) banks from 2012-2016. Findings revealed a significant correlation between IS and adjusted returns of the banks. Similarly, Bayel and Perlyman (2018) in their study on the effect of IS on share prices of Kenyan firms in the service industry and Tharile and Domlan (2019) in a study of IS and performance of Rwandan firms, found out in their studies that IS has significant influence on stock prices and EPS of the firms. Stock prices and EPS are strong indicators/metrics of firms' value and critical for investment decision.

In the UK, Donley and Cohen (2019) analysed the impact of earning management activities on stock prices and investment decision. The study was conducted among the service industry between 2018 and 2019. Firstly, they found evidence of positive relationship between earning management and investment profile in the industry and secondly they also found a positive influence of earning management on stock prices of the companies. The positive influence of IS/earning management was further confirmed in a study of Baron and Thompson (2020) that investigated the moderating effect of IS on performance and predictability of future earnings. Data for the study were obtained from 1200 companies in UK from 2015 – 2019. IS was measured by changes in firms' NI compared to changes in discretionary accruals (difference between operating cash flows and accounting profits). The results of panel analysis and Ordinary Least Square (OLS) model indicated that as shareholdings increase, the association between IS and predictability of future earnings increase. The findings implies that shareholding is the key motivating factor that make mangers to use IS to report earning according to their taste for the purpose of influencing investors.

The study of Rothman and Graham (2020) provide evidence that slightly differ from the findings of (Krama & Murthlau, 2017; Bayel & Perlyman, 2018; Donley & Cohen, 2019; Tharile & Domlan, 2019 and Baron & Thompson, 2020) that examined the impact of IS and performance of firms; A comparative analysis of discretionary and non-discretionary accruals methods. In analysis of impact of IS on the performance of 200 firms in USA for two years -2018-2019, it was found that while positive relationship exist between usage of discretionary accrual method of IS and performance of firms, non-discretionary accrual method of IS is limited due to industrial regulations and as such is incapable of influencing share prices and investment decisions of investors. However, the findings from the study of Bryan and Herfrey (2020) on the influence of discretionary accruals of IS on the performance of firms differ from that of Rothman and Graham (2020) where in a study of 250firms in China found out that the usage of IS practice by managers have impaired the ability of investors to correctly predict future performance and earnings of the firms. Similarly, Burnner and Synord (2021) in their study of the relevance of IS on stock prices of firms found that IS is weak and a means of fooling the market as there is no correlation between share prices and actual performance of firms .It is against these contradictory findings that the following hypotheses were formed to guide this study:

Ho_1: There is no relationship between income smoothing and market value of manufacturing firms in Nigeria

Ho_2: The incidence of income smoothing is not related to increase in sales of manufacturing firms in Nigeria

4. Theoretical Framework

The study is anchored on income and dividend smoothing theory propound by Miller and Modigliani in 1961. The theory postulates that firms adjust dividend payment in response to changes in earnings and the value of speed of adjustment coefficient that C_i is within the range of $O<C_i$ (zero less than adjustment coefficient) the theory closely related to that dividend signaling suggests that the amount a company pay as its dividend is always in response to earnings and management would engage in income smoothing using applicable accounting rules to satisfy the yearnings of investors. Investor's satisfaction is critical to managers as shareholders always consider a company paying high dividends to be more profitable than those paying smaller dividends. The general assumption of the theory is that the aim/goal of income and dividend smoothing is to satisfy the expectation of investors and other business stakeholders. Investors do often ascertain the extent to which their

expectations of are meant by monitoring a company's cash flow to see how much cash they generate from operation (Christen & Harris, 2016). If a company is profitable then it should generate positive cash flow and have enough funds set aside in retain earnings to pay out or increase dividends (Hallison & Dodhar, 2017).

The relevance of the theory to the study stems from its assumption and emphasis on dividend payment in response to income generated from operation often smoothed to meet the yearnings of investors.

5. Methodology

This section describes the method used in carrying out the study and the procedure adopted in data collection. The study covered manufacturing companies quoted on Nigerian Stock Exchange (NSE) as at 31st December, 2021. Out of 43 of them, a sample of 20 were purposively selected. Using a five year (2017-2021) annual reports, data on the MVPS, EPS, DPS, NAVPS and NI of the selected companies were obtained. The analysis of the data was done empirically using correlation and regression method/technique. Further, F-test statistics, was done to compare the variances obtained from the samples.

5.1. Model Specification

The econometric equations depicting the relationship between the variables are as follows:

Model 1: $$NI_{it} = \alpha_0 + \mu_1 + CNI_{it} + \alpha_1 S_{it} + \alpha_2 NOS_{it} + \alpha_3 SOLTs_{it} + \varepsilon_{it}$$

Model 2: $$MVPs_{it} = \alpha_0 + \mu_1 CNI_{it} + \alpha_1 EPS_{it} + \alpha_2 DPS_{it} + \alpha_3 NAVPS_{it} + \varepsilon$$

Model 3: $$\frac{n\sum CNI_i^2 -}{N(N-1)}$$

Where: S = Sales, NI = Net Income, $MVPS_{it}$ = Market Value Per Share for Firm i in year t., EPS_{it} = Earnings Per Share from i in year t., DPS_{it} = Dividend Per Share for Firm i year t, .NAVPS =Net Asset Value Per Share for Firm I in year , CNI_{it} = Change in Net Income for Firm i in year t, NOS = Number of Shares, SOLTs= Sale Outlet of a Firm, E = Error Term, N = Number of branches of a Firm

6. Results and Discussion

Table 1: Correlation between change in Net Income and other Performance Variables

	MVPS	CNI	EPS	DPS	NAVPS
Pearson correlation	1.00	0.625	0.440	0.436	0.514
Sig (2 tailed)		0.052**	0.001*	0.005*	0.011**
N	20	20	20	20	20
Pearson correlation	0.612	1.00	0.528	0.493	0.578
Sig (2 tailed)	0.001*		0.052**	0.005*	0.0001*
N	20	20	20	20	20
Pearson correlation	0.545	0.326	1.00	0.511	0.472
Sig (2 tailed)	0.053*	0.125***	0.171***	0.039**	0.101***
N	20	20	20	20	20
Pearson correlation	0.416	0.645	0.502	1.00	0.417
Sig (2 tailed)	0.019*	0.0055**	0.168***	0.121***	0.0533**
N	20	20	20	20	20
Pearson correlation	0.673	0.512	0.659	0.511	1.00
Sig (2 tailed)	0.115***	0.057**	0.013*	0.051**	0.018*

N	20	20	20	20	20

Computation using SPPS version 2018.

***Correlation significant at 10 percent level, **Correlation significant at 5 percent level and *Correlation significant at 1 percent level

The correlation matrix in table 1 showed that all the variables are positively associated all the variables are positively associated and are significant at either 1 percent; 5 percent and 10 percent for a two-tailed test. The highest correlation occurred between MP and EPS (0.673 and 0.659). Further, the positive signs of the values indicate the importance of the variables in performance assessment of the firms by stakeholders particularly investors. Further, the coefficient values are less than 0.7 confirming the absence of multicolinearity among the variables.

Table 2: Regression of MVPS on Income Smoothing

Variable	Coefficient	Std. Error	Z	P>/z/	Prob
CNI	0.475985	0.198310	2.036410	0.01581	0.000
NOS	0.583958	0.175927	2.977736	0.01264	0.000
EPS	0.642354	0.193518	3.149196	0.38318	0.000
DPS	0.610237	0.254243	2.314101	0.01565	0.000
NAVPS	0.501036	0.150944	2.456373	0.015167	0.000
C	5.692425	0.702136	6.420922	0.43012	0.000
R-squared	Within 0.4458		Number of obs		20
	Between 0.2094		Number of groups		2
	Overall 0.5108		Obs per group (min)		1
Corr (u,i,x)	0		Avg		1.5
Sigma u	0.287332		Max		2
Sigma e	0.308786		Waldchi 2(3)		19.87
Rho	0.801594		Prob>chi 2		0.001

Source: STRATA version 12 Output

Table 2 presents the regression result of MVPS on change in NI on the performance variables. The calculated probability (p>/z/) value for the variables (CNI, MP, NOS, EPS, DPS and NAVPS) are greater than 1.96 (z.> 1.96) at 5 percent (α0.05) significant level or 95 percent confidence level for a two-tailed test. Therefore, the first null hypothesis of the study is rejected. This implies therefore that there is a relationship between IS and MVPS. This result is consistent with Golbert and Njoku (2020) and Dosunmu and Nabbo (2020). Further, the overall coefficient of determination (R^2) value of 0.51 is an indication that 51 percent variation or change in NI of the firms are associated with management acts to improve companies MVPS, NOS, EPS, DPS and NAVPS to satisfy investors.

Table 3: F-Statistical Test for Active and Non-Active Stocks

	Firms with Active Stocks	Firms with Non-Active Stocks
Mean	-0.41823	-0.79722
Variance	2.86750	4.19973
Observations	9	11
DF	8	12
F	0.64864	
P(F-Stat<f)	0.23273	

Source: SPSS version 18 output.

Table 3 presents variability of change in NI for manufacturing firms with active stocks and those with non-active stocks. The results indicated that the variance for firm with non-active stocks at approximately 4.2 is greater than the variance for firms with active stocks at 2.9 approximately. This implies that firms with active stocks are more likely to engage in income smoothing as means of providing continuous assurances to investors of performance and stability of earnings at all times including periods of low income. Investors are always interested in stability of their investments and earnings of companies they have committed their funds.

Table 4: Correlation between Sales and Change in Net Income

	Sales	CNI	SOUT
Pearson correlation	1.00	0.421	0.694
Sig (2-tailed)		0.182***	0.0576**
N	20	20	20
Pearson correlation	0.587	1.00	0.522
Sig (2-tailed)	0.014**	0.056**	0.001*
N	20	20	20
Pearson correlation	0.611	0.468	
Sig (2-tailed)	0.051**	0.030**	0.001*
N	20	20	20

Source: Computation using SPSS version 18

***Correlation significant at 10 percent level,**Correlation significant at 5 percent level and *Correlation significant at 1 percent level.

The matrix in tables showed the correlation between the variables in a 2-tailed test. The figures indicated that a positive association/relationship exist between all the variables (Sales (S), CNI and SOLTs). The positive signs of the values showed the importance of the variables especially S and SOLTs in terms of their quantum in assessing the performance of a firm.

Table 5: Regression of Gross Sales on Income Smoothing

Variable	Coefficient	Std. Error	Z	p>/z/	Prob
S	874.7505	110.1876	2.957	0.01613	0.000
SOLTs	219.8004	88.1470	2.3665	0.0129	0.000
C	1948.972	2476.070	2.780	0.391	0.000
R-Squared	Within 0.1835		Number of obs		20
	Between 0.2781		Number of groups		2
	Overall 0.4623		Obs per group (Min)		1
Corr (u,i,x)	0		Avg		1.5
Sigma u	0.3516.068		Max		2
Sigmae	0.2755.276		Waldchi 2(3)		19.87
Rho	0.721435		Prob>chi 2		0.001

Source: STRATA version 12

Table 5 presents the regression analysis of gross sale being a major source of income for manufacturing enterprise on income smoothing. The calculated probability values for the variables (S and SOLTs) are greater than 1.96 (<> 1.96) at 5 percent (α0.05) level of significance or 95 percent confidence level for a two-tailed test. Therefore the second hypothesis of the study is rejected. This implies that the implementation or incidence of IS is related to the sales value in financial reports of the companies. Further, the overall value of the coefficient of determination (R^2) at 0.46 approximately signifies that 46 percent variation in NI of the enterprises is accounted for associated with IS.

Table 6: Analysis of variability of change in Net Income for the selected Manufacturing Firms

	High Sales	Low Sales
Mean	-0.46516	-0.82199
Variance	1.85249	4.96912
Observation	07	13
Df	12	15
F	0.3691	
P(f<=f) 2 tailed	0.231	

Source: computation SPSS version 18

Table 6 presents the variability of change in NI for manufacturing companies with high sales and those with low sales. The categorization into high and low sales groups is based on sales volume. Those enterprises with sales volume in billions of naira and above in a year are in the high sales group while those in with sales volume in millions of naira but less than billions of naira in a year are in the low sales groups. From the table, the variability of change in NI of manufacturing enterprises recording high turnover is smaller than those enterprises recording low sales. This therefore implies that manufacturing firms recording high sales present less but variable but smoothed income numbers in their financial statements than those recording low sales.

7. Conclusion and Recommendations

Income smoothing has always been an intentional interference of management in external financial reporting with intent to woo investors. However, the relevance of IS in enhancing the performance of companies in a bid to attract investors has always been in doubt in Nigerian business environment. The study therefore investigated the relationship between IS and performance of manufacturing enterprises in Nigeria. Data for the study were obtained from annual financial statements of 20 Purposively selected manufacturing companies quoted on Nigerian Stock (NSE) as at 31st December, 2021. Result of variability analysis of changes in NI Shows that manufacturing firms in high sales bracket present less variable income numbers in their financial statements than those manufacturing enterprises in low sales bracket. Further, the F-statistical test for and non-active stocks provides evidence that firms with active stock profile presents less variance in their financial statements than those companies recording non-active stocks. This is consistent with the earlier results of variability analysis of changes in NI. Generally, IS though legal if the accounting techniques used are within the guidelines of GAAP, it can be performed fraudulently for desired result to the disadvantage of investors' ability to assess performance and correctly predict future earnings of business entities. It is in view of this that the following recommendations are put forward as a guide to investors:

(i) Engage the services of qualified, competent and skilled and auditors to use models especially that of Eckel's and to also perform various analytical procedures for evidence of income smoothing in financial statement of enterprises before investment.

(ii) In case of company's performance in terms of consistent rising income suspected to be smoothed, investors (actual and potential) should do well to carefully check Chief Executive Officers (CEOs) or Directors' relative holdings of options and stocks. If the options dominate, it is always advisable to proceed to invest in the company because of the numerous advantages of holding of options compared to that of holding investments in stocks.

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