Atatürk Üniversitesi Sosyal Bilimler Enstitüsü Dergisi Aralık 2018 22(4): 2265-2286

Financial Sustainability of Turkish Health Care System

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Abstract: *Sustainability in health care systems, , and financial power of the system and how to attain financial sustainability through reforms are among the main topics discussed by policy makers today. In this study, health expenditures are compared with fundamental macroeconomic variables, the problem of sustainability was examined and possible scenarios to be faced by Turkish health care system in the future are presented through future projections of public health expenditures and external factors that could affect sustainability in the health care system. The results reveal that health expenditures have increased further than economic growth since the 1980s; but financial sustainability has become possible because of the slowing down health expenditures in the consequence of reforms realised after 2003. Future projections of external factors show that financial burden on the health care system will increase in the future due to the progress in these factors, and policy makers in health should take into consideration.*

***Keywords*:** *Health Care System, Health Expenditures, Financial Sustainability.*

Türk Sağlık Sisteminin Finansal Sürdürülebilirliği

Öz: *Sağlık sistemlerinde sürdürülebilirlik ve sistemlerin finansal gücü ve reform çalışmalarıyla finansal sürdürülebilirliğin nasıl sağlanabileceği, günümüzde politika yapıcılar tarafından tartışılan başlıca konular arasında yer almaktadır. Bu çalışmada sağlık harcamalarının temel makroekonomik değişkenlerle karşılaştırması yapılmış, sürdürülebilirlik problemi araştırılmış ve sağlık sisteminde sürdürülebilirliği etkileyebilecek dışsal faktörlerin ve kamu sağlık harcamalarının gelecek projeksiyonları ile gelecekte Türk sağlık sisteminin karşılaşması muhtemel senaryolar ortaya konmuştur. Çalışmanın sonuçları 1980'lerden günümüze gelen dönemde sağlık harcamalarının ekonomik büyümeden daha fazla arttığını ortaya koymaktadır, fakat 2003 sonrasında yapılan reformlar sonucunda sağlık harcamalarındaki büyümenin hız kesmesi nedeniyle, finansal sürdürülebilirliğin mümkün hale geldiği tespit edilmiştir. Dışsal faktörlerin gelecek projeksiyonları, bu faktörlerdeki gelişmeler nedeniyle sağlık sistemindeki finansal yükün gelecekte artacağını, sağlık politika yapıcılarının bu durumu gözönünde bulundurmaları gerektiğini göstermiştir.*

Anahtar Kelimeler: *Türk Sağlık Sistemi, Sağlık Harcamaları, Finansal Sürdürülebilirlik*

Makale Geliş Tarihi: 28.01.2018
Makale Kabul Tarihi: 11.09.2018

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I. Introduction

A sustainable health care system is a proper balance designed between cultural, social and economic environments in order to meet health and health care needs from protecting individuals' and population's health, to preventing diseases tiil the end of life, and supporting health (Prada, 2012).

This definition expresses the necessity for a multi-stakeholder system with a long term capacity to allocate and mobilize resources in meeting health care needs of the population and contributes to the protection of a productive population. Also sustainability of health care services is affected by government policies because political decisions are made in the context of budgets, priorities and fiscal limitations determining allocation. Naturally, this involves thinking how much people (individually or together) are willing to pay for the sustainability of health care services. Also, political decisions and social choices are always inclined to change according to developments in cultural, social, environmental and economic conditions (Prada et al., 2014).

In today's world, while health expenditures are increasing, countries are implementing quick reform programs for their health care systems to be sustainable. These reform programs in health care systems are centred on sustainability and the financial power of the health care system in the face of the increased cost pressures. Some of the most important elements affecting the financial power of a system are the changing structure of the population and increased disease burden, macroeconomic structures of the countries and Gross Domestic Product (GDP) being unable to grow at the same level as health expenditures, difficulty experienced by pension funds in financing health expenditures, the increase in the number of health care personnel employed and the resulting burden on the health care system, increased health awareness of individuals and individuals' growing health care expectations and the pressures of advances in health care technology on public finance (Crisp 2017; Angelis et al. 2017, Harper, 2010; Thomson et al., 2010).

Unsustainable health systems are big policy problems for governments and countries, so the financial sustainability definition, measurement and possible solutions of unsustainability are significantly important. In a publicly funded health care system, health care spending is equal or less than economic growth and/or tax revenue growth financial sustainability may be attained (Di Matteo & Di Matteo, 2012).

This study aims at evaluating the financial sustainability of Turkish healthcare system. First of all, growth rate in resources (for instance GDP, government revenue) is compared with growth rate in government health expenditure. It is a matter of concern for Turkish government whether Turkey's recent general health care system funded in a public manner can sustain longer. When considered from this point of view, current and previous trends of important endogenous factors of health care system are examined and prospective estimates are anticipated so that an interpretation of the additional financial resources can be created, which may be required in the following years. After that, various expenditure scenarios are composed in this paper considering regression

determinants and historical compound annual growth rate (CAGR) in the period of 1980–2016. It is considered that this study will make contribution to the literature as it will reveal the developments in Turkish health care system regarding financial sustainability in the period of 1980-2016 and it will provide insight into what the health care system will need financially in the future through health expenditure scenarios and future estimates of endogenous factors.

II. Financial Sustainability of Health Care System

The concept of financial sustainability in health care systems which is frequently addressed in the media, political and academic circles is a controversial one that can be interpreted differently. However, discussions rarely deal with the meaning of financial sustainability in a health care system or how a system can attain financial sustainability or what the political outcomes of the problem of sustainability are. (Thomson et al., 2009).

Sustainability in health care terms can be defined as the ability to maintain public health care which is of high quality and adequately allocated, while public sector health care sustainability refers to "*the adequacy of resources to ensure timely access to quality services which respond to citizens' changing health needs in the long term*" (Di Matteo & Di Matteo, 2012: 2). A sustainable health care system; 1) provides a care service that results in minimum possible mortality and morbidity for patients, 2) delivers services to the entire population as much as possible, 3) the keeps total cost of care is in a balance with other costs required for the given population as a percentage of the GDP and 4) service provision is seen as a satisfactory and attractive occupation (Miller, 2013).

Prada (2012), on the other hand, defines a sustainable health care system as one that 1) is designed to meet health and health care needs of the population and individuals (covering all aspects from improving health and preventing diseases until recovery and end-of-life), 2) yields optimal health and health care outcomes, 3) reacts and adapts to cultural, social and economic conditions and demands, 4) does not risk the ability of future generations at the expense of meeting individuals' own health and health care needs.

Most broadly, sustainability concerns ensuring that the evolving needs of citizens are met by the health care system through high-quality, comprehensive and efficient care services both today and in the future. This comprehensive definition includes such objectives of sustainability as maintaining health benefits, providing health programs require; institutionalizing the programs in organizational systems; and ensuring the community's capacity (Moat, 2016).

According to Wang (2015), there are three ways to attain financial sustainability. In the first one, health care system revenues must exceed the expenditures in order for the system to function; in the second one, in need of more fiscal expenditure, the government would help the health care system; and in the third one health care demand can be met through basic health care system for all citizens.

Likewise, Ruggeri (2002) states that financial sustainability has three aspects. In the first one, economy is able to sustain current and future expenditures of health care. In the second aspect, the full fiscal system must be able to resist the pressures caused by increasing health expenditures. The third one is about to what extent governments can stay committed to the constitution for health care provision.

The indicators for financial sustainability of a health care system can be mainly divided into two groups. These are measurements based on health expenditures and revenues/resources and measurements based on the opinions of stakeholders (Özer, et al. 2015). Indicators of health expenditures and resources are mainly employed when evaluating and measuring financial sustainability of a health care system. More specifically, the most common indicator concerning sustainability is the ratio of total health expenditures (THE) to GDP, the ratio of public health expenditures to GDP, the ratio of public health expenditures to public revenues, the ratio of public health expenditures to the average growth, growth rate of GDP against the average growth rate of public health expenditures, the percentage of health expenditures within noninterest public health expenditures, tax revenue ratio, and growth rate of public health expenditures (Knowles et al., 1997; Ruggeri, 2006; Rovere & Skinner 2011; Di Matteo & Di Matteo 2012).

III. Methodology

A. Data Sources and Definitions

The study employed public data sources. In order to evaluate the financial sustainability of Turkish health care system, GDP, THE, government health expenditures (GHE), government total spending excluding interest payments (GTS-I), and government tax revenues (GTR) are used for the years 1980-2016. Since the longest period that could be accessed for data concerning THE and GHE is the 1980-2016 period, evaluations including health expenditures are limited to this period.

For the future projections concerning financial sustainability of Turkish health care system, life expectancy at age 65, the percentage of the population aged 65 and over in the total population, old-age dependency ratio between 1960 and 2016 are used as the endogenous variable whereas GHE and government revenue (GR) data pertaining to the 1980-2016 period are used as the funding gap indicators.

Turkish health care system can be divided into 5 periods in terms of the health care reform processes in Turkey it has gone through; i) pre-reform period 1920-1960, ii) health care reform period 1960-1980[*], ii) health care reform period 1981-2002, iv) health care reform period 2003-2013 and v) new vision health care in Turkey 2014-2023 (Özer et al. 2015). By considering the classification in the literature and data limitations in the first section of the study, financial sustainability is examined on the basis of four periods as 1980-2002; 2003-2013; 2014-2016 and 1980-2016. In the second section, the future

[*] It is possible to say that the first health reform was enforced when Law No.224, "Code on the Socialization of Health Services" in Turkey was adopted and came into effect in 1961.

projections concerning financial sustainability is examined on the basis of three periods as 1980-2002; 2003-2016 and 1980-2016.

GDP data are obtained from the World Bank Development Indicators database (2017). GHE, government total spending (GTS), GR, GTR, GTS-I are obtained from the General Directorate of Budget and Fiscal Control (BÜMKO, 2017). Data on life expectancy at age 65, the percentage of the elderly population 65 and over, and THE are taken from the Organization for Economic Co-operation and Development Statistic database (OECD, 2017b). In addition, future projections of the data concerning life expectancy at age 65 and the percentage of the population aged 65 and over are obtained from "Health at a Glance 2017" (OECD, 2017a). Old age dependency ratio data are obtained from "Pension at a Glance 2017" (OECD, 2017c).

GDP, THE, GHE, GTS-I, GR, GTR in national currency units (NCUs) are deflated using the World Bank yearly GDP deflator[†] as based on the year 2009 (World Bank, 2017).

Life expectancy refers to the length of time a person at a certain age can live on average, assuming the current death rates remain the same. Life expectancy at age 65 is the unweighted average of the life expectancy at age 65 of women and men. Elderly population over 65 can be obtained by dividing the population aged 65 and over by the total population (OECD, 2017a). The demographic old-age dependency ratio refers to as the number of individuals aged 65 and over per 100 people at working age (between 20 and 64) (OECD, 2017c).

B. Objectives, Assumptions and Projections

Financial sustainability of health care systems is an issue that has frequently come up in the world in recent years. Similarly, it has been a common topic of discussion in Turkey and reforms implemented in health care system since 2003 have made this issue even more popular. The health sector reforms in Turkey are considered to have been among the most successful of middle-income countries undergoing reform. Numerous articles have been published that review these reforms in terms of, variously, financial sustainability, efficiency, equity and quality. Evidence suggests that Turkey has indeed made significant progress, yet these achievements are uneven among its regions, and their long-term financial sustainability is unresolved due to structural problems in employment. As yet, there is no comprehensive evidence-based analysis of financial sustainability of Turkish health care system. The primary aim of this study is to evaluate the financial sustainability of Turkish health care system. Meanwhile, the specific comparison expenditure-resource base indicators of financial sustainability seek to whether government health spending is rising faster than the resource base. This evaluation is expected to reveal Turkish health care system current and past financial sustainability status. Also it is expected to show economic change in the Turkish health care system as a result of the health reforms implemented by policy makers.

[†] GDP deflator can be seen Appendix 1.

The secondary aim of the study is to provide insight to the additional financial resources that may be needed over the next few years in order to meet the demand and for health systems not to face with a sustainability gap. A possible future sustainability gap is tried to be calculated based on the assumption that governments will have difficulty in meeting health expenditures in the future because of negative macroeconomic (e.g. slowdown in GDP growth), and demographic (for instance, increasing old age dependency and pension incomes not being able to meet its expenses) conditions. In order to calculate the sustainability gap, 2030 projection is made with the polynomial regression equation of the GR in the 1980-2016 period. Three different forecast models are cases of real GHE; according to first model real GHE 2030 projection is generated based on the data from the 1980-2016 period using linear regression equation (Scenario 1), whereas in second model the future likely increase in GHE would be significantly higher and would be contained to the compund annual growth rate (CAGR) the 1980-2002 period (scenario 2), where in the third model, the increase would be moderate and similar to the CAGR of the 2013-2016 period. Both models assume that additional constraints will be put in the place over the period 2017-2030 relative to the what situation was until 2016. Consequently, the difference between future avaliable resources (the projected real GR annaul growth rate) and future health expenditures (the projected real GHE annual growth rates) are used to quantify the possible sustainability gap.

IV. Financial Sustainability of Turkish Health Care System

Sustainability is directly associated with the growth levels of the resources and health expenditures of a country (Atılgan et al., 2017; Kamacı & Yazıcı, 2017). Growth in health expenditures can be sustained economically as long as the value gained through health care services exceeds the opportunity cost of health care services (Thomson et al., 2009). In other words, value exceeding cost is accepted as a measure of financial sustainability (Odame et al, 2013). Health expenditures become financially unsustainable when the opportunity of health spending is very high. In this case, the growth in the ratio of health expenditures in GDP will threaten the areas considered as other economic activities. It will also cause problems to come out regarding economic sustainability. A second, but not very frequent case is that health expenditures within economic growth cycle may increase at a more rapid pace than economic growth without causing downsizing in other areas of economic activities. As mentioned beforehand, if average growth of health expenditures exceeds the GDP growth and this gradually increases, it implies the risk/problem of sustainability. If health expenditures grow faster than the expenditures in the other components of economy, a larger share of GDP is consumed because of health expenditures, which causes concerns about not being able to make other imputed expenditures that help increase welfare (Thomson et al., 2008; Thomson et al. 2010). In this section of the study, GDP, THE, GHE, GTS-I, GTR data of the 1980-2016 period are deflated real data in accordance with the prices in 2009. After that, growth rates of GDP, GTR data are compared to the growth rates of THE, GHE, GTS-I data. Thus, it is aimed to find the answer to the question if the growth rates in the resources meet the growth in expenses.

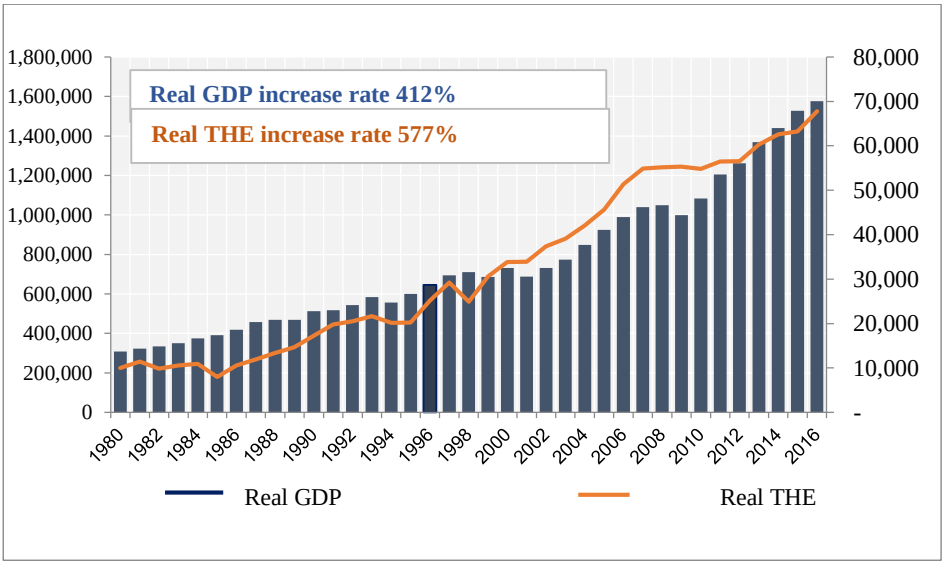

Figure 1: Real GDP and Real THE (Constant 2009 prices) Million NCU

Note: Calculations made by authors of article based on World Bank and OECD data.

In the 1980-2016 period, real GDP increased by 412% while real THE raised by 577% (Figure 1). The change in health expenditures in the given period is over GDP growth. Average annual growth rates compared to sub-periods are given in Table 1.

Table 1: Real GDP and Real THE Average Annual Growth Rates and Increase Rate (%), 1980-2016

Time Period	Real GDP		Real THE	
	Average Annual Growth Rate (%)	Increase Rate (%)	Average Annual Growth Rate (%)	Increase Rate (%)
1980-2002	3.82	137.76	6.66	273.16
2003-2013	5.95	77.09	4.53	54.17
2014-2016	4.81	9.46	4.00	8.27
1980-2016	4.53	411.87	5.81	577.21

Note: Calculations made by authors of article based on World Bank and OECD data.

Average annual growth rate of THE is 5.81% in the 1980-2016 period and it exceeds the average annual GDP increase of 4.53%, GDP growth is higher in the 2003-2013 and 2014-2016 periods than the increase in health expenditures.. It can be said that health

expenditures are at a sustainable level since they have remained under the GDP growth rate in Turkey since.

Expenditure-resource based indicators of financial sustainability seek an answer to the question whether public health expenditures increase faster than the resource base or not (Di Matteo & Di Matteo, 2012). Real GDP and Real GHE values for the years between 1980 and 2016 are presented in Figure 2.

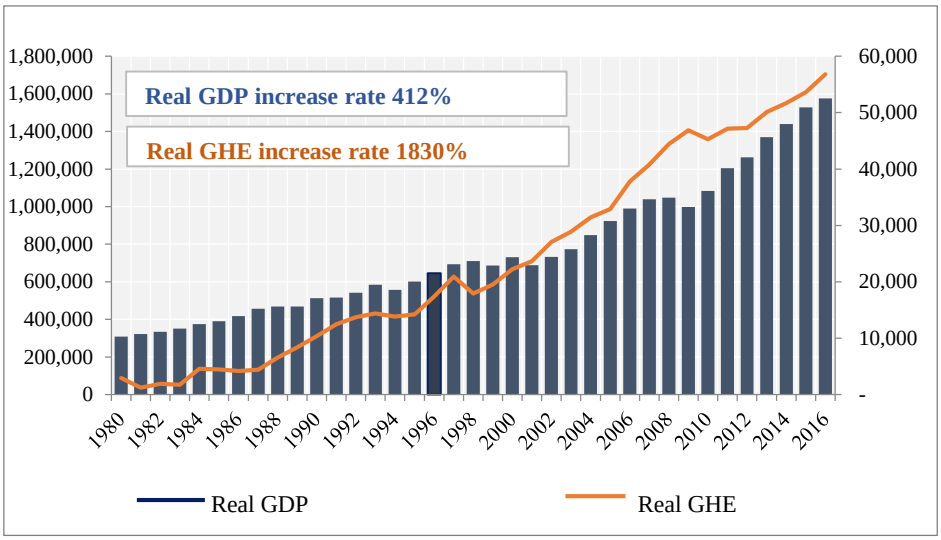

Figure 2: Real GDP and Real GHE (Constant 2009 prices) Million NCUs

Note: Calculations made by authors of article based on World Bank and BÜMKO data.

Real GHE increased significantly between the years 1980 and 2016. The real GHE raised mainly between 1980 and 2002.

Table 2: Real GDP and GHE Average Annual Growth Rates and Increase Rates (%), 1980-2016.

Time Period	Real GDP		Real GHE	
	Average Annual Growth Rate (%)	Increase Rate (%)	Average Annual Growth Rate (%)	Increase Rate (%)
1980-2002	3.82	137.76	16.62	818.45
2003-2013	5.95	77.09	5.87	73.69
2014-2016	4.81	9.46	4.28	9.91
1980-2016	4.53	411.87	12.42	1829.89

Note: Calculations made by authors of article based on World Bank and BÜMKO data.

Average annual growth rates of real GDP and real GHE are close to each other in the following years (2003-2013 and 2014-2016 periods). In the 2003-2013 period, when Health Transformation Program was implemented, average GDP growth rate and additionally the growth rate of GHE were very close to each other and additionally were higher compared to the 2014-2016 period. In the early years of health reforms, a rapid increase in health expenditures is an expected necessity brought about by the process (Ministry of Health, 2012). In 2014-2016 period, a decrease both in the real GDP average growth rate and in the real GHE growth rate in happened. However, the decline in the real GHE growth rate was greater than that in the real GDP average growth rate. This can be accepted as an indicator that expenditure growth rates started to show a falling tendency upon completing the first phase of health reforms in Turkey. Whether GHE has a very high share in the GTS and if they have an increasing or decreasing tendency is an extremely significant indicator of the sustainability of a health care system (Di Matteo & Di Matteo, 2012). Based on this approach, real GTS-I growth rate should be compared with the real GHE rate (Di Matteo & Di Matteo, 2012; Özer et al. 2015; Atasever et al. 2017).

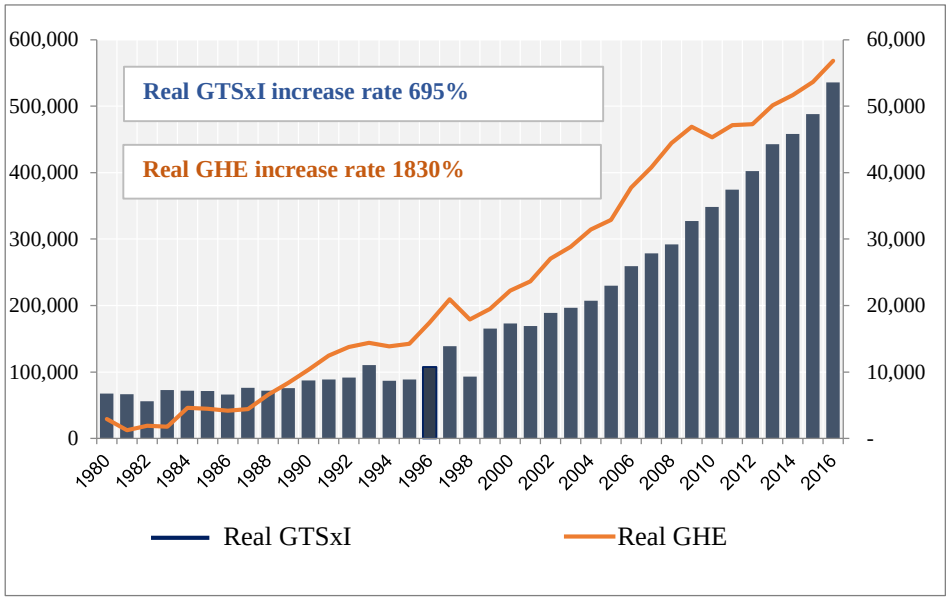

Figure 3: Real GTS-I and Real GHE (Constant 2009 prices) Million NCUs

Note: Calculations made by authors of article based on BÜMKO data.

In Turkey, real GTS-I has increased by 695% and real GHE rose by 19,830% in the last 37 years (Figure 3). It is seen that the increase in health expenditures is greater than the increase in the resource base.

Table 3: Real GTS-I and Real GHE Average Annual Growth Rates and Increase Rates (%), 1980-2016

Time Period	Real GTS-I		Real GHE	
	Average Annual Growth Rate (%)	Increase Rate (%)	Average Annual Growth Rate (%)	Increase Rate (%)
1980-2002	5.64	180.48	16.62	818.45
2003-2013	8.23	125.34	5.87	73.69
2014-2016	6.66	17.01	4.28	9.91
1980-2016	6.49	695.19	12.42	1829.89

Note: Calculations made by authors of article based on BÜMKO data.

However, when considered on period basis, real GHE average growth rate remained behind the real GTS-I average growth after 2003 and after. The falling tendency in the real GHE average growth rate after 2003 can be accepted as an indicator showing that positive steps have been taken towards sustainability in the Turkish health care system (Table 3).

Finally, real GTR and real GHE are compared in order to assess financial sustainability of Turkish health care system. As of 2016, 75% of the total health expenditures in Turkish health care system has been made by the public (TUIK, 2017). Therefore, growth rates of GTR, the greatest resource of the public, and growth rates of GHE are important in terms of sustainability.

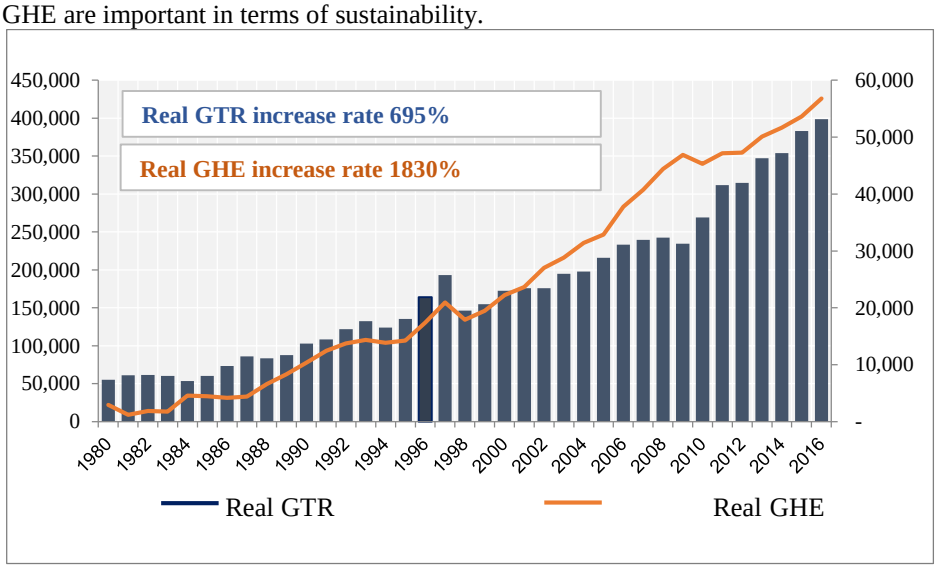

Figure 4: Real GTR and Real GHE (2009 Constant Prices), Million NCUs

Note: Calculations made by authors of article based on BÜMKO data.

When real tax revenues are compared with public health expenditures, it can be seen that the increase in tax revenues fell behind the increase in health expenditures in the 1980-2016 period (Figure 4). Similar to the previous results, real GHE increase rate is lower than the increase rate of real GHE in the period between 2003 and 2016 (Table 4).

Table 4 : Real GTR and Real GHE Average Annual Growth Rates and Increase Rates (%), 1980-2016

Time Period	Real GTR		Real GHE	
	Average Annual Growth Rate (%)	Increase Rate (%)	Average Annual Growth Rate (%)	Increase Rate (%)
1980-2002	6.59	217.97	16.62	818.45
2003-2013	5.62	78.11	5.87	73.69
2014-2016	6.83	12.61	4.28	9.91
1980-2016	6.32	621.09	12.42	1829.89

Note: Calculations made by authors of article based on BÜMKO data.

V. Current Trends And Future Projections In Endogenous Variables Potentially Influencing Financial Sustainability

Financial sustainability of health care systems is associated with countries' economic growth rates as well as demographic, macroeconomic, labor market conditions, health system structure and expectations and values of citizens (Thomson et al. 2010). Thus, in this section of the study, future projections of endogenous factors is conducted possibility of sustainability gap is examined. Endogenous factors can be defined that may have important effect on the system's performance and sustainability, but they are not directly associated with health system's financial performance (Angelis et al., 2017). After selection of related endogenous factors, trends existing in the 1960-2016 period are studied and the potential direction of health care system is forecasted.

A. Endogenous Factors: Trends and Projections

Demographic factors may somehow increase the demand for health care services and affect financial sustainability. Life expectancy at age 65 has had an increasing tendency since the 1960s both in OECD countries and Turkey. Although Turkey is generally under the OECD average, life expectancy at age 65 has increased rapidly since 2010 both for females and males. Figure 5 presents the OECD and Turkey values for life expectancy at 65 for females and males between 1960 and 2015, and the projected values for the years 2020 and 2065. According to the OECD average, life expectancy at age 65 for females increased by 42.8% from 14.8 years in 1960 to 21.1 years in 2015. In Turkey, on the other hand, life expectancy at age 65 for females had a 60.3% increase and reached from 12.1 years in 1960 to 19.4 years in 2015. Similarly, OECD is average life expectancy for males increased from 12.7 years in 1960 to 17.9 years in 2015 with

change 40.9%. As for Turkey, life expectancy at 65 for males increased by 43.8% from 11.2 years in 1960 to 16.1 years in 2015.

According to OECD projections, compared to the year 2015, OECD average of women's life expectancy at age 65 is projected to reach 21.3 years in 2020 with an increase by 0.81% and 25.5 years in 2065 rising by 27.5%. In Turkey, on the other hand, it is expected to decline by 1.8% and reach 19.1 years in 2020 while increasing by 23.5% to 24 years in 2065. OECD average of men's life expectancy at age 65 is estimated to increase by 1.8% compared to 2015 and reach 18.2 years in 2020 and by 27.5% reaching 22.8 years in 2065. In Turkey, life expectancy for men at age 65 is projected to fall by 4.6% and reach 15.4 years in 2020 and to reach 20.4 years with an increase by 28.8% in 2065 compared to the year 2015. While life expectancy at 65 is estimated to decline in the short term, it is expected to have a growth close to the OECD growth rate and life spans will approximate to the OECD average in the long term (Figure 5). While increased health care expenditures have influenced life expectancy in a positive way, other social determinants also play an important role (OECD, 2017a).

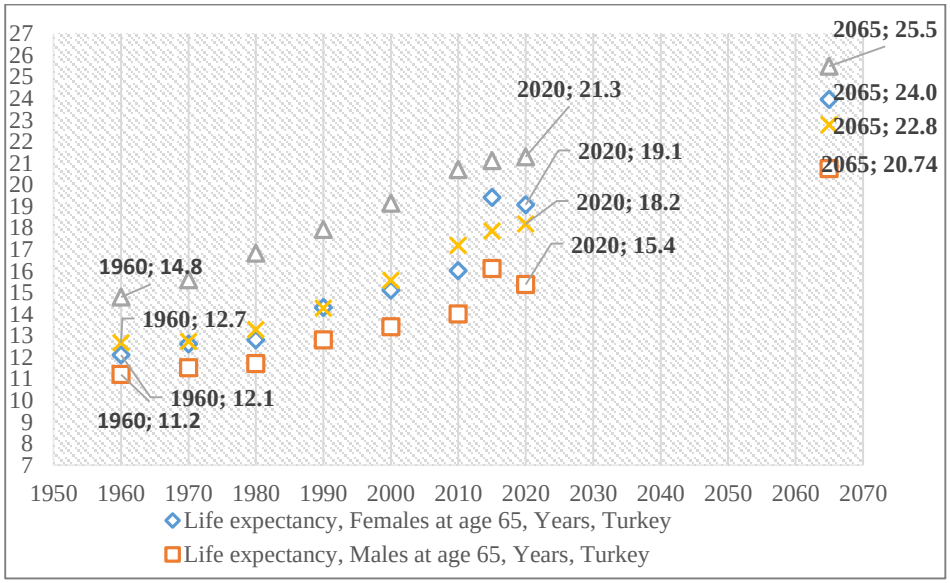

Figure 5: Life Expectancy at 65, 1960-2015 and 2020-2065 Projections, Years

Note : Life expectancy at 65 in the years 2020 and 2065 are based on OECD projections.
Source: OECD, 2017a; 2017b.

Extended life expectancy at age 65 and over causes a higher elderly population ratio. According to OECD average, the ratio of the population aged 65 and over to the total population was 8.55 in 1960 and occurred as 17% in 2016 with an increase by 98.5%. In Turkey, the ratio of the population aged 65 and over to the total population rose by 134.28% from 3.5% in 1960 to 8.2% in 2016 (Figure 6).

According to OECD estimates, OECD average for the ratio of the population aged 65 and over to the total population will increase by 61.1% compared to 2016 and reach 28% in 2050. As for Turkey, it is estimated to reach 20.6% with an increase by 151.2% compared to 2016 (Figure 6). Although the mean age of elderly population over 65 years in Turkey is behind the OECD average, it is remarkable that the elderly population increase rate in Turkey is higher than two times of the OECD increase rate. This could possibly result from the improvement in of the population's health status as a result of the recent developments in health care services in Turkey.

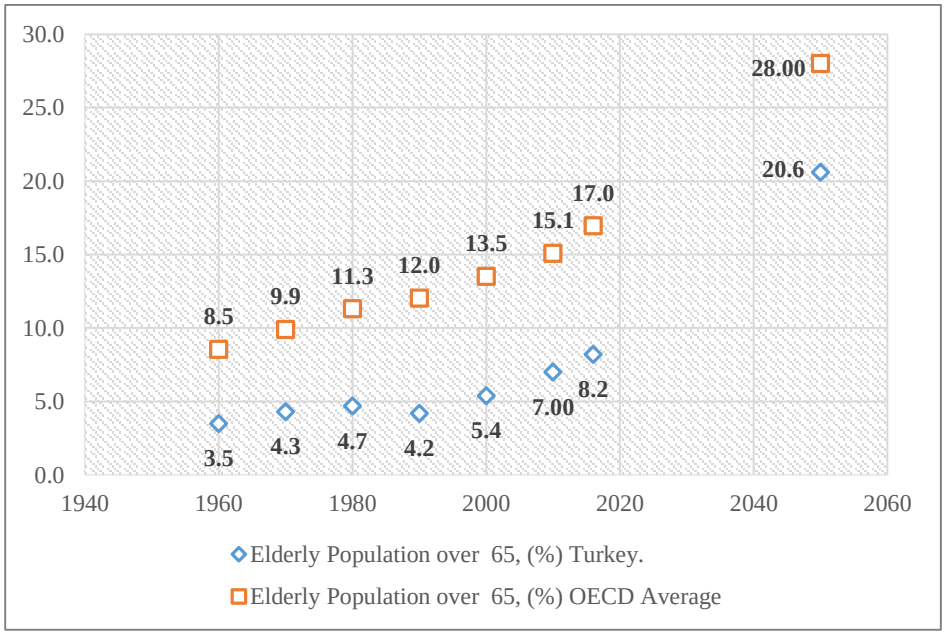

Figure 6: Elderly Population over 65, 1960-2016 and Projection 2050, (%)

Note : Elderly Population over 65 in the year 2050 are based on OECD projections

Source: OECD, 2017a; 2017b.

The increase in life expectancy at age 65 and over and in the ratio of the population aged 65 and over to the total population would have an impact on old age dependency.

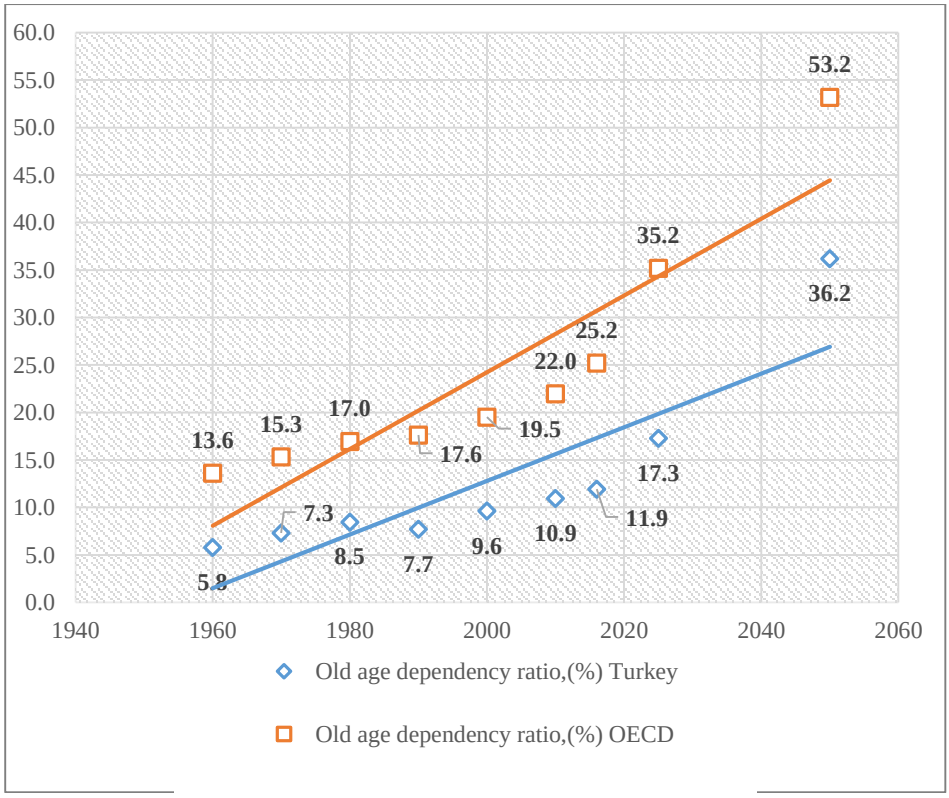

Figure 7: OECD average and Turkey Old Age Dependency Ratio, 1960-2016 and Projections 2025-2050, (%)

Note : Life expectancy at 65 in the years 2025 and 2050 are based on OECD projections.

Source: OECD, 2017a; 2017c.

Figure 7 shows OECD old age dependency ratios and projections for the 2025-2050 period. The OECD average for old age dependency ratio was 13.65% in 1960 and with an increase by 85.3% it occurred as 25.2% in 2016. As for Turkey, old age dependency ratio rose by 105.4 % and increased from 5.8% in 1960 to 11.9% in 2016. Based on the OECD projections, old age dependency ratio OECD average is estimated to increase by 39.6% to 35.2% in 2025 and by 111.1% to 53.2% in 2050 compared to 2016. In Turkey, on the other hand, it is envisaged to rise by 45% reaching 17.3% compared to 2016 and to occur as 36.2% in 2050 with an increase by 203.3%. Despite being behind the OECD average, it is apparent that Turkish population has entered into an aging process and the possibility that this may significantly increase health expenditures must be taken into consideration by policy makers.

B. Government Health Expenditure Trends and Projections

In this section of the study, real GHE and real GR are examined based on three periods as 1980-2002; 2003-2016; 1980-2016 considering the reform processes Turkey has gone through. According the specified periods, real GHE growth rates and real GR growth rates with 2009 prices are presented in Figure 8.

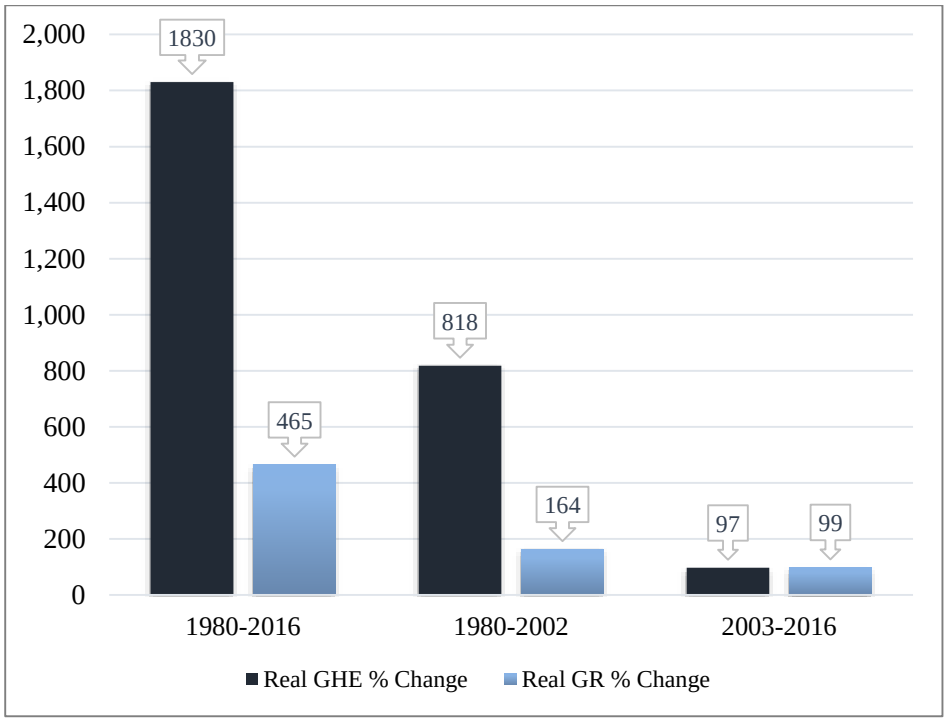

Figure 8: Real GHE and Real GR Growth Rate (%) 1980-2016

Source: Authors calculation based on BÜMKO data.

Considering the 37-year period, the growth rate of the real GHE with the 2009 prices are much higher than the growth rate of GR in Turkey. However, it is seen that in 2003 and after, the growth rate status is similar to the results in the previous section. The real GHE growth rate lower than GR growth, albeit 2%., in 2003 and after.

Since Turkey went into a reform period after 2003 and after and a significant improvement was realized in this process, 2030 projection has been envisaged in three separate scenarios. In the first scenario, real GHE 2030 projection is generated based on the data from the 1980-2016 period using linear regression equation[‡].

[‡] Linear regression equation can be seen Appendix 2

In the second scenario, real GHE 2030 projection is made based on the compund annual growth rate (CAGR) increase in the 1980-2002 period and is considered in the third scenario CAGR increase rate in the 2003-2016 period. As seen in Table 9, GHE is expected to increase by 32% according to the first scenario, by 286% in the second and by 135% in the third scenario.

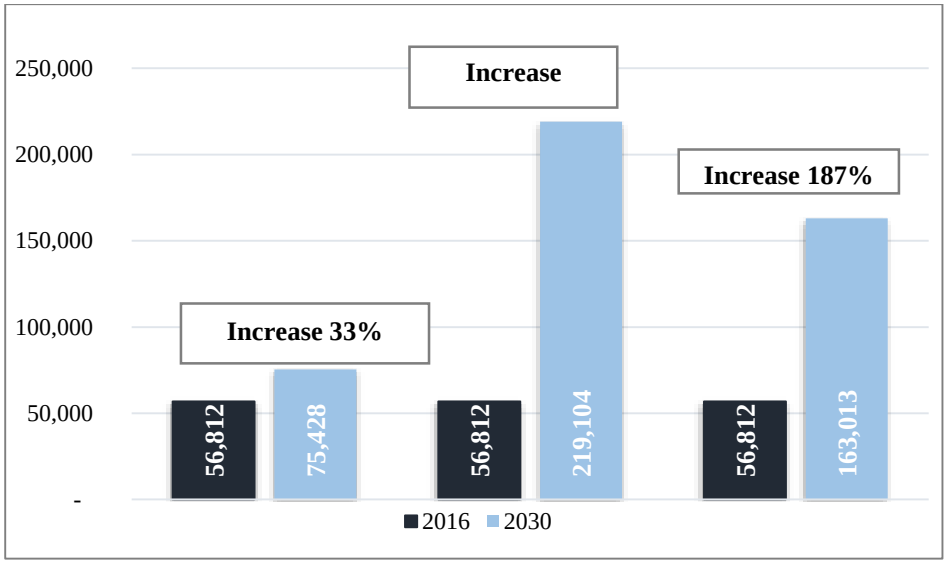

Figure 9: Real GHE Projections Million NCUs, 2030 (Constant at 2009 prices).

Source: Authors projections based on OECD data.

In order to calculate possible sustainability gap, 2030 projection is forecasted with the polynomial regression equation[§] of the GR in the 1980-2016 period. Three different forecast model were cases of real GHE; according to first model real GHE 2030 projection was generated based on the data from the 1980-2016 period using linear regression equation (Scenario 1), whereas in second model the future likely increase in GHE would be significantly higher and would be contained to the compund annual growth rate (CAGR) the 1980-2002 period (scenario 2), where in the third model, the increase would be moderate and similar to the CAGR of the 2013-2016 period.

Potential sustainability gap takes place as a result of the difference between the projected real GR average growth rate (horizontal red line) and projected real GHE in the scenario 2 and 3, average growth rates (vertical bars). Based on these assumptions, the possible sustainability gap that could occur in the 2017-2030 period in Turkey is given in Figure 10.

[§] Polynomial regression equation can be seen Appendix 3

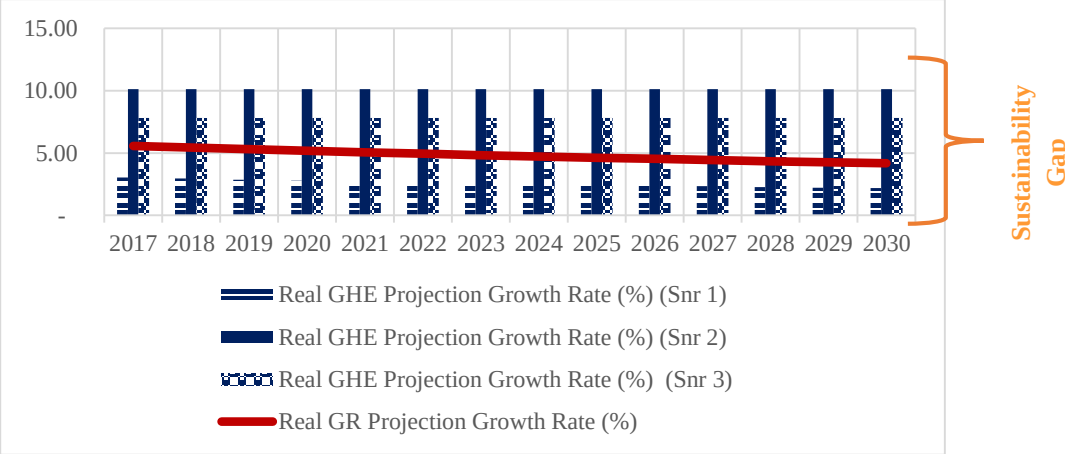

Figure 10: Projected Real GHE and Real GR Average Growth Rates and Potential Sustainability Gap, 2017-2030

Note: Author projections based on OECD and BÜMKO data

As seen in Figure 10, if the real GR and GHE increase relative to the regression equation of 1980-2016 period, no potential unsustainability situation is encountered. However, if real GHE rises by CAGR in scenario 2, or CAGR in scenario 3, a sustainability problem is likely to arise, because a health expenditure increase over the increase in resources.

If health expenditures increase in accordance with CAGR in scenario 2 or 3, a sustainability problem will appear since growth rate of health expenditures will be higher than growth rate in resources.

VI. Discussion and Conclusion

Problems in health care system financing caused the acceleration of health care system reforms all around the world. A series of reform program was put into practice in 2003 in order to organize health care services in Turkey effectively and efficiently and also fairly, to supply and provide finance for healthcare services. This reform program has been named as the Health Transformation Program. It is aimed in New Vision Program in Healthcare Services, which is a follow-up of health transformation program, that Turkey should provide a health care service at or above European standards. These reform programs have caused critical increase in health expenditures. Rapid increase of health expenditures in 2003 and thereafter has brought up the issue of sustainability to the agenda. Health expenditures have been increasing due to the reasons such as population ageing, change of disease burden, healthcare inflation developed by new health care technologies, the increase of requests for the services depending on health conscience, which keeps financial sustainability on the agenda (Ministry of Development, 2013). Sustainability of Turkish health care system has been a significant

matter of debate for both citizens and healthcare policy-makers. It is aimed in this study to analyse financial sustainability of Turkish health care system through quantitative data and carry out evaluation for future.

In this study, financial sustainability is defined as "the growth in the resources of a health care system being equal to or larger than the increase in health expenditures", therefore, growth rates between resources and expenditures are examined for 1980-2016 period. Findings show that health expenditures grew on a rate greater than growth rate especially for the period between 1980 and 2003. However, this situation cannot be considered as direct evidence that Turkish health care system is unsustainable. Upon examining the health care system in terms of the reform periods, it has been found that the increase in health expenditures in 2003 and thereafter fell behind the increase in the resources. It is obvious that reform studies carried out in 2003 and after then has made a positive contribution to sustainability of Turkish health care system.

In the second part of the study, future projections are made for some endogenous factors that could possibly affect financial sustainability and health expenditures and it is found that both endogenous cost drivers such as demographics and medical technology, and exogenous financial pressures such as macroeconomic factors and public pension have an effect on the financial sustainability of Turkish health care system.

On the other hand, projections provided over endogenous variables reveal that life expectancy at age 65 and the ratio of people aged 65 and over to the total population are on a rapid increase. These increases, especially occurred as of 2003, are indicators that the reforms implemented in Turkey have resulted in a rapid improvement in citizens' health status and extended life expectancy has led to the old age dependency ratio to go up. This is considered to cause pressures on the financial sustainability of the Turkish health care system in the future.

It is obvious that lifetime of the citizen which lengthens thanks to recovery of their health status will increase health care expenses. A higher growth of health care expenditures than the resources will damage the sustainability of the health care system. As seen in the health expenditure projections for 2030, the possible sustainability gap can be threatened the sustainability of the system. For that reason, it is necessary that the growth rates in resources and expenses should be carefully monitored.

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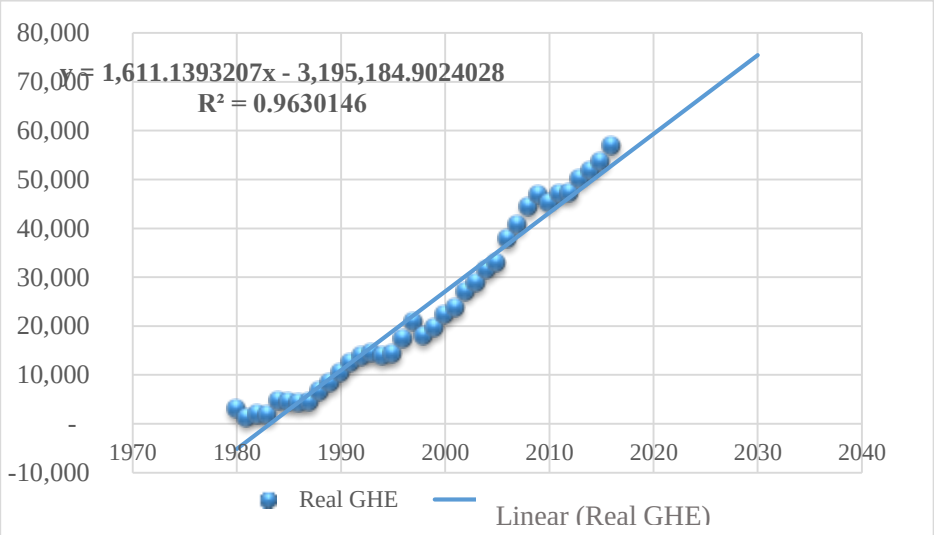
APPENDIX

Appendix 1: Inflation, GDP deflator (annual %)

Year	Inflation, GDP deflator (annual %)	Year	Inflation, GDP deflator (annual %)
1960		**1990**	58.24439811
1961	4.808894461	**1991**	59.16410689
1962	5.349371567	**1992**	65.19943828
1963	6.41669448	**1993**	68.37942836
1964	2.352436519	**1994**	104.7491372
1965	3.92450774	**1995**	86.00754244
1966	6.311991205	**1996**	77.22351222
1967	5.92343332	**1997**	81.45486258
1968	4.611560278	**1998**	143.6925417
1969	6.876317103	**1999**	54.29047331
1970	8.644504447	**2000**	49.34068172
1971	16.90208715	**2001**	52.92365688
1972	10.97567605	**2002**	37.57442908
1973	21.9302187	**2003**	23.32004368
1974	28.99234735	**2004**	12.44688837
1975	21.30924007	**2005**	7.104863112
1976	15.61265749	**2006**	9.371704044
1977	24.08902325	**2007**	6.216641784
1978	47.54114671	**2008**	12.03733641
1979	76.72086672	**2009**	5.40180338
1980	93.00322479	**2010**	7.012657721
1981	44.0570705	**2011**	8.188568494
1982	28.2268344	**2012**	7.418217912
1983	26.25824542	**2013**	6.268813913
1984	48.23683261	**2014**	7.421677746
1985	53.05447687	**2015**	7.826941985
1986	36.00688555	**2016**	8.098262201
1987	33.61222903		
1988	69.01813111		
1989	75.40483061		

Appendix 2: GHE Linear Regression Equation



Appendix 3: GR Polynomial Regression Equation