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JUDUL: POPULATION AGEING IN CANADA : THE RELATIONSHIP BETWEEN LIFE EXPECTANCY, HEALTH CARE EXPENDITURE AND GDP

IJAZAH: BACHELOR OF SCIENCE (HONOURS)

SAYA: HONG SZE YEN (HURUF BESAR) SESI PENGAJIAN: 2015

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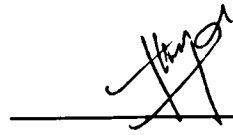

HONG SZE YEN
(BS 12110204)
25 MAY 2015

CERTIFIED BY

SUPERVISOR Signature

ASSOC. PROF. DR. HO CHONG MUN

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ABSTRACT

This dissertation examine the relationship between health care expenditure, GDP and life expectancy in Canada. This dissertation uses time-series tools for analysis. The time series based on the data of health care expenditure per capita, GDP and life expectancy from year 1975 to 2012. This dissertation does empirical analysis on the short run and long run relationship between health care expenditure, GDP and life expectancy using cointegration and granger causality based on an error correction model and vector auto-regression model. The result shows that there is no cointegration and granger causal relationship between health care expenditure and GDP in Canada. The results also show that there is no short run relationship between health care expenditure and life expectancy however long run relation does exists. However, there is unidirectional granger causal of life expectancy on GDP but not cointegrated.

PENUAAN PENDUDUK DI KANADA: HUBUNGAN ANTARA JANGKA HAYAT, PERBELANJAAN PENJAGAAN KESIHATAN DAN KDNK

ABSTRAK

Disertasi ini mengkaji hubungan antara perbelanjaan untuk kesihatan, KDNK dan jangka hayat di Kanada. Disertasi ini menggunakan alat masa-siri untuk analisis data. Siri masa berdasarkan data daripada perbelanjaan untuk kesihatan per kapita, KDNK dan jangka hayat dari tahun 1975 hingga 2012. Disertasi ini menjalankan analisis empirikal hubungan dalam jangka pendek dan jangka panjang antara perbelanjaan untuk kesihatan, KDNK dan jangka hayat dengan menggunakan ujian kointegrasi dan kausalitas granger berdasarkan model vector pembetulan ralat dan model vektor automatik regresi. Hasil kajian menunjukkan bahawa tiada kointegrasi dan hubungan kausalitas granger antara perbelanjaan untuk kesihatan dan KDNK di Kanada. Hasil kajian juga menunjukan bahawa tiada hubungan jangka pendek antara perbelanjaan untuk kesihatan dan jangka hayat tetapi wujud hubungan jangka panjang antaranya. Walau bagaimanapun, jangka hayat terdapat kausalitas granger terhadap KDNK walaupun tidak berkointegrasi.

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LIST OF ABBREVIATIONS

GDP	Gross Domestic Product
OECD	Organization for Economic Co-operation and Development
AC	Acute care
LTC	Long-term care
CIHI	Canadian Institute for Health Information
OLS	Ordinary least square
DF	Dickey-Fuller
ECM	Error-Correction Model
ARDL	Autoregressive Distributive-Lag
VECM	Vector Error-Correction Model
VAR	Vector Autoregressive Model
RSS	Regression Sum of Square

LIST OF SYMBOLS

+	Addition or positive
-	Subtraction or negative
x	Multiplication
÷	Divider
=	Equal
≠	Not equal
>	More than
<	Less than
i	Item i
t	Period t
Σ	summation
H_0	Null hypothesis
H_1	Alternative hypothesis
se	Standard error
()	Parenthesis
Δ	First difference operator

CHAPTER 1

INTRODUCTION

1.1 Definition

Total health expenditure is the sum of public and private health expenditures as a ratio of a total population. It covers the provision of health services (preventive a curative), family planning activities, nutrition activities, and emergency aid designated for health but does not include provision of water and sanitation. The indicator used is health expenditure per capita in current U.S. dollars (World Bank, 2014).

National income is measured by Gross Domestic Product (GDP). GDP is defined as the market value of all final goods and services produced within a country in a given period of time (Mankiw, 2011).

The income elasticity of demand measure the quantity demanded changes as consumer income charges.

$$income\ elasticity\ of\ demand = \frac{percentage\ change\ in\ quantity\ demanded}{percentage\ in\ income}$$

The higher the income, the quantity demanded increased. Normal goods have positive income elasticity because quantity of demanded move in the same direction with income. When quantity of demanded and income move in opposite direction, there is inferior goods which having negative income elasticity. Among normal goods, there is divide into necessities and luxuries. Necessity goods tend to have smaller income elasticity compare to luxury goods. Luxury goods which are not necessary which tend to make life more pleasant to consumer. In contrast with necessity goods, luxury goods are more costly and often bought by consumers that have a higher income or greater accumulated wealth than the average. The income elasticity of necessity goods is between 0 and 1, income elasticity more than 1 when it is luxury goods (Mankiw, 2011).

1.2 Objective of study

To examine the relationship between population ageing, health care expenditures and GDP in Canada over the period 1975-2012 as Canada was in the top quartile of countries in terms of per person spending on health compare to several other Organization of Economic Co-operation and Development (OECD) countries (Canadian Institute for Health Information). Other than that, this study is also to test the causality between population ageing, health care expenditures and GDP in Canada over the period 1975-2012.

1.3 Scope of study

In this study, assumed that the number of life expectancy will give a significant impact on the national income and total health expenditure of the country. Therefore, my study focus on three variables which are life expectancy, health care expenditure and GDP in Canada from year 1975 to 2012. Data is collected from World Bank for 38 years which is over the period 1975-2012.

1.4 Population ageing

Ageing is extent and change rapidly, but it taking place almost everywhere. In most developed countries, the population has been ageing for many decades, while in developing countries, population ageing has taken place relatively recently. The world population has been occurring significant ageing which is the process that results increasing the amount of older people in the total population since the mid-twentieth century.

Ageing determined by the allied size of the younger and older cohort in the population at different moments in time which is a dynamic process. The initiative size of every cohort depends on the population in childbearing ages at a given point in time, and the prevalent fertility rates. The number of people of each cohort that survives to old-age determined by mortality.

Ageing has recondite consequences on a capacious range of economic, political and social processes. Firstly, the rise of priority to promote the well-being of the growing number and proportion of older people in most countries of the world. While population

ageing represent the fiscal and macro-economic has given much attention, which governments must certainly confront and prepare for.

Furthermore, Ageing also involved a change in the sex composition of the population, since women tend to outlive men and therefore constitute a substantial majority of the older population. As fertility has drops, the increase of labor force participation in female category has been globalised, although female worker still engage less than male worker in paid work. At the same time, give of family support and care for all generational groups, especially children and older persons play an important role for women as a mother and daughter.

Ageing is also partly the result of the trend toward longer and generally healthier lives of individuals, but because chronic and degenerative diseases are more common at older ages, they result in an increased prevalence of non-communicable diseases at the population level. (United Nations, 2013)

1.5 Type of health care service

Health care includes the following types which are inpatient care, outpatient care, nursing home care and family informal care. These four generally divided into two categories which are Acute care (AC) which mainly reflects medical care and Long-term care (LTC) which mainly reflects nursing care. Inpatient care and outpatient care reflects the AC expenditure, while nursing home care and some of the family informal care reflects the long-term care expenditures. Long-term health care system support some of the family informal care through providing families who need help with at-home care service and care services at facilities (Ando, 2009).

1.6 Total health expenditure in Canada

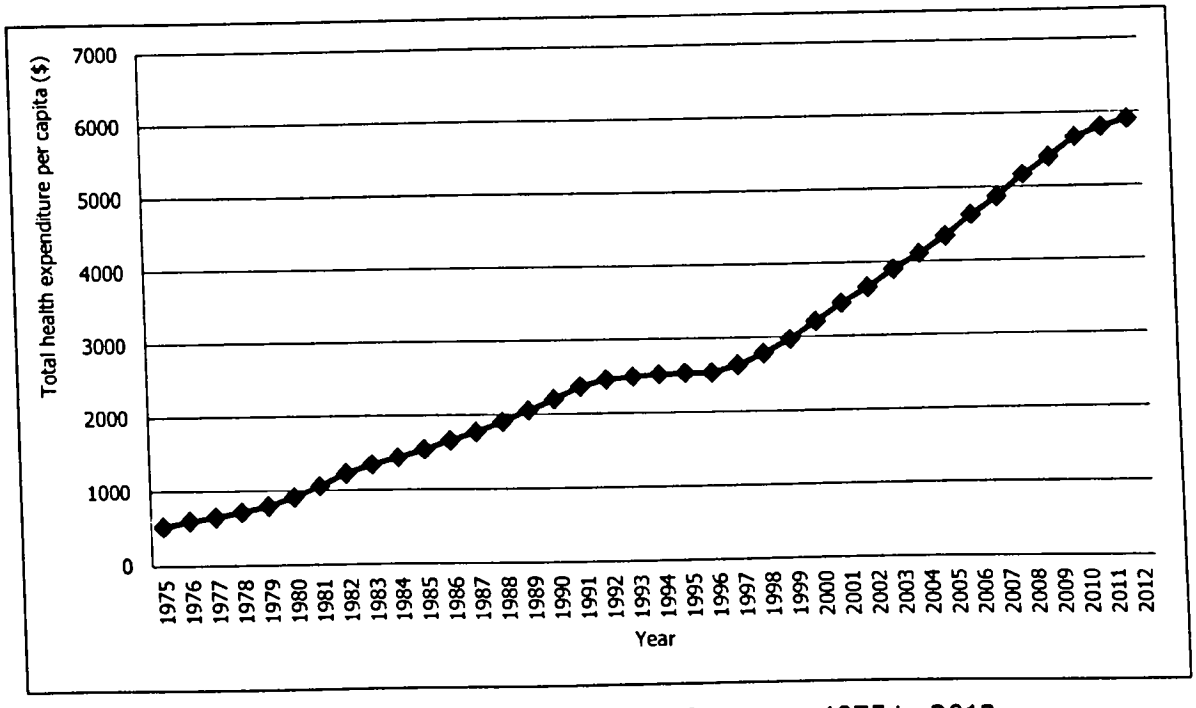

Figure 1.1 Total health expenditure per capita from year 1975 to 2012 (Source: World Bank 2014)

As the figure shown above, total health expenditure per capita increase steadily from year 1975 to year 2012. As the following figure illustrates, there have been three distinct phases in the growth of total health expenditure since 1975 which are growth phase from 1975 to 1991, then there is a short period of retrenchment and disinvestment from 1991 to 1996 when governments dealt with fiscal deficits and a growth phase that averaged 4.0% per year from 1996 until 2012, during which time health care became a top priority for Canadians. During this latter period, major investments were made in health care, including spending on physicians, drugs, hospitals and advanced diagnostics. However, growth in total health expenditure has moderated since 2005.

Canadian Institute for Health Information (CIHI) published a special report, titled Health Care Cost Drivers: The Facts., which shed light on the underlying factors influencing health care costs in November 2011. The report study the growth in public-sector health expenditure from 1998 to 2008 in relation to macroeconomic factors such as fiscal capacity and growth in gross domestic product (GDP). As well, the major

spending categories of hospitals, drugs and physicians were analyzed. The analysis used a common analytical framework that concentrate on price effects, demographics (population growth and aging) and other effects, such as volume and mix of services, technology and innovation. Price effects have been a significant driver of overall health expenditure. Since no ideal measure of inflation for the entire health care sector exists, economy-wide inflation was used for the purpose of the cost drivers study.

According the CIHI report, the main reasons of health care expenditure increases were compensation of health care providers, increased used of health care services and an evolution in the types of services provided and used. Due to the higher demand as well as to growth in number of hospital workers, the compensation has increases in the past decade. Besides that, physician spending has been among the fastest-growing categories in recent years. This is partly attributable to increases in physician fee schedules. Besides that, Canadians used more health care in some areas such as increased medical procedures, volume of drugs sold and use of physician services.

Population aging has been a relatively modest contributor to health care expenditure. However, the impacts of aging on health care spending varied considerably by province. It was more significant in the Atlantic provinces and Quebec. As the percentage of the population age 80 and older increases, decision-makers will be faced with the challenge of determining the levels of hospital care, long-term institutional care and community care for older Canadians that balance access, quality and appropriateness of care on the one hand and cost on the other. (Canadian Institute for Health Information, 2013)

1.6.1 Hospital spending

One of the major factor of total healthcare expenditure increases is due to hospital spending increases. Generally, the health care sector is labor intensive, and there is no exception in hospital. The largest component of labor force in hospital is nurses. Compensation of the hospital labor force has grown faster than non-health sectors. Hospital employees' wages have exceed increase in the Industrial Composite wage rates and the social and health sector component. The hourly paid to hospital employees increased by an average of 3.4% per year. The main reason is most probably the demand of health professionals such ask doctor and nurse in hospital. Other than that,

the effect of technology and innovation in hospital also one of the main reason to drove up de spending in hospital. Increasing the medical equipment to have a better facilities in hospital. Expansion hospital services such as hip and knee replacements and diagnostic imaging. Price inflation also is a major factor in the growth of hospital costs. (Canadian Institute for Health Information, 2013)

1.6.2 Drugs

Pharmaceuticals have been one of the fastest-growing components of health system spending in Canada. The largest contributors is increased volume of use and changes in the mix of treatments. Roughly one-third of overall growth in drug spending, cancer drugs, cholesterol-lowering drugs and immunosuppressants accounted. Due to uptake of newer biologic drugs has lead to the growth of cancer drugs and immunosuppressants. There has been a trend recently for public drug programs to regulate generic prices in addition due to a high number if generic products recently coming to the market. (Canadian Institute for Health Information, 2013)

1.6.3 Physicians

Physician was one of the fastest-growing categories of health care expenditure, physician expenditure in Canada has increase steadily since 1975. Physician fees have grown faster than wage for other health and social service workers, increase in physician fees have been above rate of inflation. Furthermore, the change of the scope of practice of non-physician health professionals. Governments are examining whether other professionals such as pharmacists or nurse practitioners can complement physician services. (Canadian Institute for Health Information, 2013)

1.7 Gross Domestic Product (GDP) of Canada

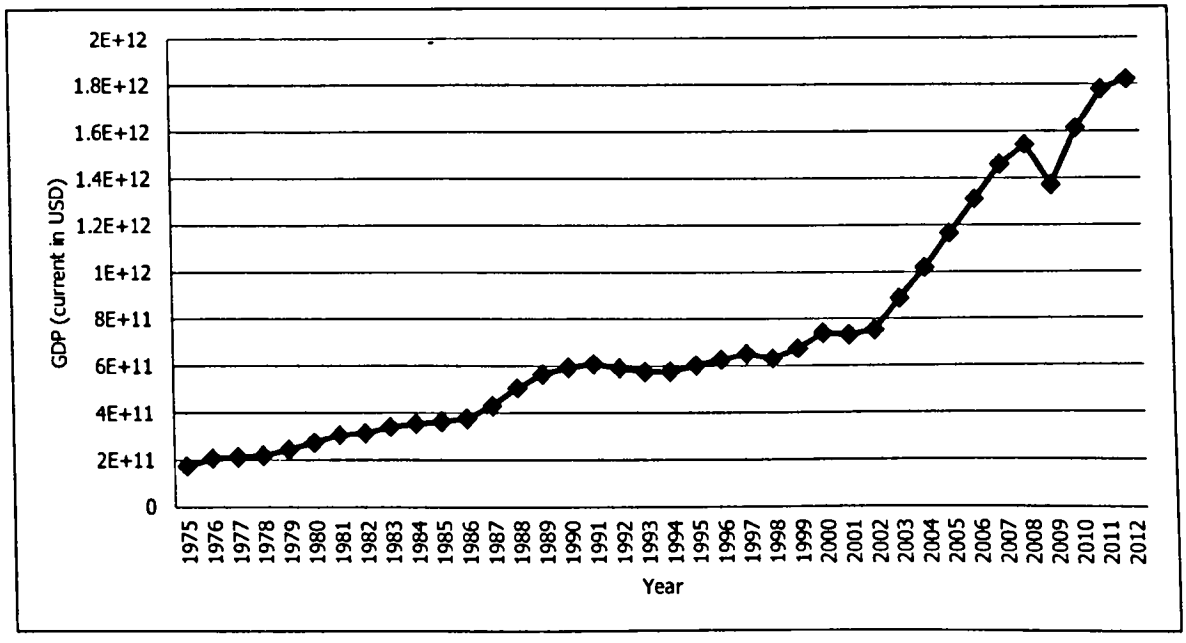

Figure 2.2 GDP of Canada from year 1975 to 2012
(Source: World Bank 2014)

From the figure above, we can seen that the GDP of Canada increase slowly from year 1975 to year 1992, then decrease slightly 2.6% to year 1993, then raise again from year 1994 to year 2000 and slightly decline 0.9% in year 2001 then roses steeply to year 2008. There is a sudden big dropped in year 2009 which is around 11.1%.

One of the richest states of the world is Canada, the state is GDP rank 14 worldwide due to the gross domestic product (GDP) of Canada is about 1432,140 billion in US dollars. Canada is up to 1265.838 billion dollars in 13th place in purchasing power parity.

Canada is considered a social market economy, but the economic margin for maneuver is huge, Canada will be rated higher than most western European countries and slightly lower than the USA in the "Index of Economic Freedom," of the Heritage Foundation. The service sector dominate the Canadian economy as in other developed countries. The primary sector anyway is above average , which is due to the abundance of natural resources and their exploitation.

Canada is the world's largest producer of zinc, uranium, potassium, cadmium, sulfur and nickel. Regarding commodities mining is the most important to the Canadian state because of its abundance of natural resources. In the cases of the degradation of aluminum, titanium, cobalt, molybdenum, gold and lead the country ranks third. About 80% of the exploited resources are exported, mainly to the United States of America.

Canada is one of the world's largest exporters of agricultural products, even though there is only 8% of the Canadian area is used for agriculture. The Canadian agriculture can be divided into five main groups: Primarily intended for export are cereals and oil seeds (34% of agricultural income) and meat products and live cattle (27%). Destined for the domestic market are dairy products (12%), fruit and vegetables from the garden (9%) and poultry and eggs (8%). The undertakings are highly modernized and mechanized (The Mining Association of Canada,2012).

1.8 Life expectancy in Canada

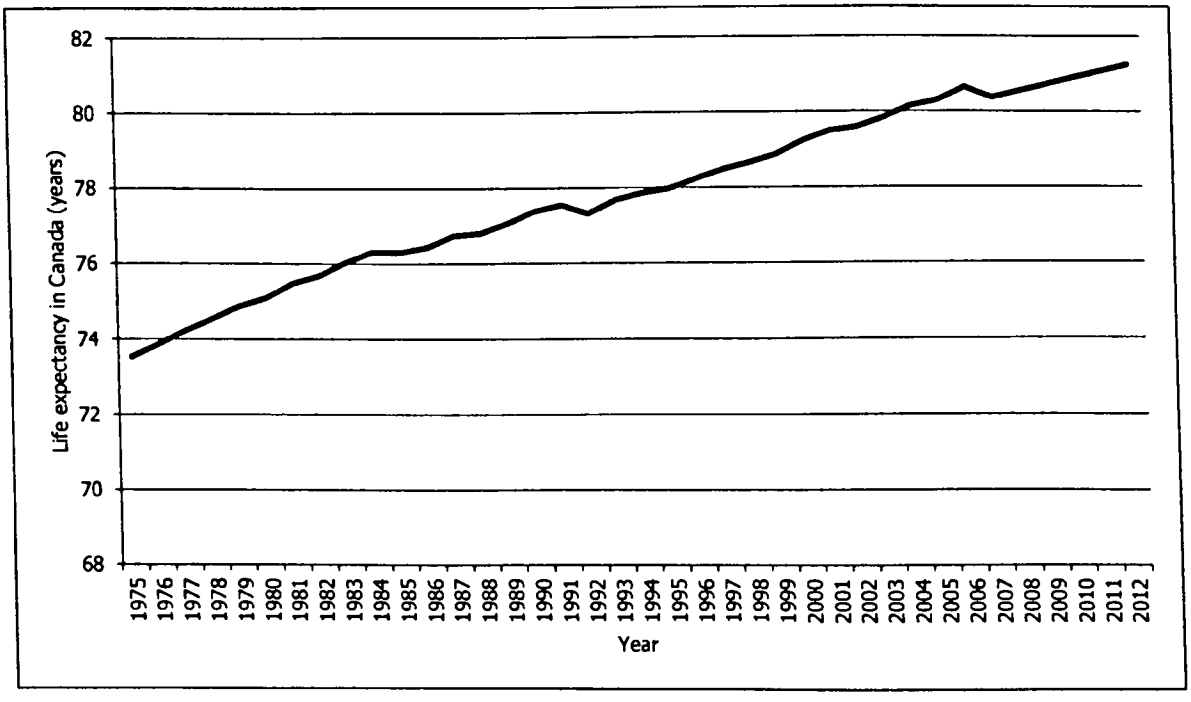

Figure 3.1 Life expectancy of Canada from year 1975 to 2012
(Source: World Bank 2014)

The graph above shown that the life expectancy of Canada over the period 1975-2012. Life expectancy of Canada increase steadily from year 1975 to 1991 but slightly drop a

bit in the year 1992, which drop around 0.47% then raise again from year 1993 to 2006. From year 2006 slightly drop 0.34% to year 2007 but then increase again to year 2012. Overall, the life expectancy raise from year 1975 to 2012.

Population ageing is the combine effects of an incline in life expectancy and a decline in fertility. Canada's population is ageing. Estimation by 2015, Canada will have more people aged 65 and older than people aged 15 and younger. Given that Statistics Canada projects seniors aged 65 and over to grow from 14 per cent of Canada's population today to approximately 25 per cent by 2036. Municipalities will need essential resources to make their communities more age-friendly. Part of the Canadian senior citizens live in small town and rural communities will face environmental changes and particular social that can have an impact on quality of life different from those facing larger urban populations. Seniors citizen of Canada who wish to age in place in rural area or small town face larger difficulty in their homes. Therefore, government have already take action to response to seniors' citizen needs (Federation of Canadian Municipalities, 2013).

1.9 Anticipated effects of population ageing on economic growth

Population ageing effect on Canada's economic growth will essentially be felt through its impact on overall labor force participation.

One of the effect is the participation rate of labor force in Canada. Due to the growth of the population in the older age categories, the overall labor force participation rate in Canada is likely decline. There are four factors that cause the rate of economic growth which are the rate of growth in output per hour worked or productivity, average hours worked per employee, the overall employment rate and the overall labor force participation rate. Nevertheless, the rate of economic growth will decrease if the rate of growth in productivity, the average hours worked per employee and the employment rate increase sufficiently to equalize the decline in the labor force participation rate.

Canada's overall employment rate is likely to drop over the coming decades due to the increase of proportion of the population falls into the older age categories that historically had lower employment rates than younger age categories unless the employment rate of Canadian seniors increases relatively significantly in future. Therefore, public policies is planned to increase the younger age categories labor force

in the employment rate and other categories that have experienced corresponding to high levels of unemployment or underemployment. This might help to alleviate the adverse effects of population ageing on the overall employment rate.

Some of the economists believe that the rate of productivity growth will be corresponding to a higher level in future. The relative scarcity of labor homogeneous with population ageing will give higher pressure on wages, which will encourage young and future cohorts of Canadians to increase their resources in human capital such as individual knowledge, skills and experiences. Human capital resources are respected to be an substantial determinant of the rate of productivity growth. The resulting higher rate of productivity growth could alleviate or even offset the adverse effects of population ageing in economic growth if these investment are made (Library of Parliament, 2011).

CHAPTER 2

LITERATURE REVIEW

2.1 Income elasticity of health expenditure

From previous studies, some researchers had proved that there is a connection between health expenditure and income. If an income elasticity less than one classified health expenditure and income as inelastic which is also consider health as a necessary good. On the other hand, an income elasticity more than one classified health expenditure and income as elasticity which consider health as a luxury good. Income elasticity changes depend on the study.

Some of the studies has reached the conclusion that healthcare seems to behave as a necessary good rather than luxury good. Chakroun (2010), Baltagi & Moscone (2010), Sulku & Caner (2011), Lv & Zhu (2014) and Dreger, Reimers, & Arbeit (2005) has comes to the conclusion that healthcare is necessity as the income elasticity of health expenditure is less than one.

In Chakroun (2010) study, panel smooth transition regression model has used to estimate the relationship between income and healthcare expenditure for 17 OECD countries over the period 1975-2003. On average the income elasticity of health care spending is below unity for the 17 OECD countries of the sample. During the period 1975-2003, the income elasticity of healthcare expenditure is increasing constantly. Elasticity grows to be close to unity at the end of the period for 14 countries.

Baltagi & Moscone (2010) using a panel of 20 OECD countries for 34 years which is from 1971 to 2004 to measured the income elasticity of healthcare. In their paper, particularly finding the cointegration properties and non-stationarity between health expenditure and income. In their findings, the income elasticity is smaller than one which suggest that healthcare is necessity rather than luxury.

In the case study in Turkey, Sulku & Caner (2011) examine the long-run relationship between health care expenditure and national income in Turkey over the period 1984-2006. In this case study, they find that the income elasticity of total

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