UNIVERSITA' DEGLI STUDI DI PADOVA

DIPARTIMENTO DI SCIENZE ECONOMICHE ED AZIENDALI

"M. FANNO"

CORSO DI LAUREA IN ECONOMIA

PROVA FINALE

"HEALTHCARE: LUXURY OR NECESSITY? A SYSTEMATIC REVIEW OF THE LITERATURE"

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ANNO ACCADEMICO 2023 – 2024

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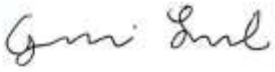
Firma (signature) ... 

ABSTRACT

In questa tesi, analizzo la letteratura scientifica riguardante il dibattito esistente sulla natura dell'assistenza sanitaria, in particolare se questa sia un bene di lusso o una necessità. la prima parte della tesi è dedicata alla spiegazione dei motivi per i quali la spesa destinata alla assistenza sanitaria è aumentata negli anni ed è destinata ad aumentare ancora. Nella seconda parte si trova la revisione della letteratura scientifica, nella quale analizzo gli studi più importanti in materia, specificando il metodo econometrico utilizzato e il risultato ottenuto, concentrandomi in particolare sulla elasticità delle spese riguardanti l'assistenza sanitaria sulle entrate totali di un paese. Infine, le evidenze ricavate da questa revisione confermano la natura necessitaria dell'assistenza sanitaria, dunque l'assistenza sanitaria è un bene necessitario.

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1- Introduction

In the last decades, several studies (Kleiman, 1974) (Newhouse, 1977) (Hall & Jones, 2007) have documented rising share of income spent on healthcare, thus leading to an increase in aggregate healthcare expenditure. For example, in the United States, health care expenditure as a share of GDP has greatly increased over the last 50 years. In 1970, health care spending was only 6.2% of GDP and by 2023 it has risen to the 18% of the GDP.
Other countries have followed similar trends, for instance: In France, the share of GDP devoted to health care rose from 5.2% in 1970 to 12,1% in 2023. Japanese healthcare spending was 4.4% of GDP in 1970, and 11.5% in 2013. Italy expenditures were 5.2% of GDP on 1970 and in 2023 it has risen toward the 9% of GDP. Overall, the OECD countries average expenditures has grown form 5.8% of GDP in 1970 to 9, 12% in 2023.
The rapid growth of healthcare expenditures has become one of the major challenges for the sustainability of public finances. Health care expenditure has clearly outpaced economic growth in recent decades in the OECD countries and, nowadays, forms a considerable share of government spending. If this growth continues at this pace, the other economic sectors of a country may be compromised, thus impacting negatively economic growth sustainability in the long run. The rapid growth of spending in healthcare and concerns about its long-term fiscal sustainability highlight the necessity to formulate effective cost containment strategies and has put more pressure on understanding the reason for this growth and to assess whether it has a positive effect on health and life expectancy (Murphy & Topel, 2006) (Cutler, 2006).
It is important to identify the determinants of the healthcare expenditure growth, because knowing the factors behind the growth in HCE[1] can help policymakers in priority setting and supplying sustainable resources as well as monitoring and evaluating the use of funds in the health sector. Therefore, identify the factor that determine the rise of HCE, and the size of their impact is the first step to control HCE growth.

This thesis is a systematic review of the empirical literature about the topic of the health care and is structured as follows: the 2nd chapter will review the studies that investigate the determinants of healthcare expenditures. The 3rd chapter will review the existing literature, and in particular the studies that estimate income elasticity of health expenditure, to find what is the most common finding and most reasonable conclusion about the problem of determining whether health care is a luxury or a necessity. In this chapter, I will describe the studies that focused on determining the size of income elasticity and, in particular, I will illustrate what they have tested, with which data and what conclusion they drew.
In the last chapter I will summarize what I've found by reviewing all the studies presented in this thesis, and I will try to give my interpretation of the problem and what result I have come up with.

2-The determinants of healthcare expenditures

Earlier studies found out that real GDP is the main and most important driver of healthcare, because when countries become wealthier, individuals spend more on health care (Newhouse, 1977).

[1] Health Care Expenditures

A contribution on this subject was made by Smith et al. (2009). Smith et al. (2009) uses a panel data set for 23 OECD countries from 1960 to 2006 to regress per capita spending on per capita GDP, an insurance coverage's indicator, and demographic variables, with country and year fixed effects, and they use those fixed effect of the year as measurement of the effect of technological development across all the countries. This view allows Smith et al. (2009) to estimate the relationship between technological change and income growth, however, due to the difficulty in determining measures of insurance across countries, they are unable to estimate an insurance-technology interaction with any precision. Overall, according to Smith et al. (2009) growth in income is responsible for a measure between 29 and 43 percent of the increase in health and the interaction between technical change and income affects for another 27 percent. They attribute between 0 and 26 percent to a pure technology residual, depending on assumptions about income elasticities and medical productivity but, mostly, they attribute a critical role for the increasing cost to income growth.

Hall and Jones (2007) analysing a model of an economy with two type of consumptions, health consumption and non-health consumption, state that increasing income will always result in increased health expenditures. The reason is that there are no diminishing returns to health. They say that non-health consumption has decreasing marginal returns in each period and to increase lifetime utility one individual must increase the number of periods in which they can consume their life expectancy. Health consumption will increase life expectancy and thereby lifetime utility. Non-health consumption, on the other hand, has diminishing returns to period utility and therefore will not increase lifetime utility. Moreover, as income increases, non-health consumption will grow at a slower rate than income, while health consumption will grow at a faster rate. So, they conclude that growth in health expenditure is the rational response to the growth in individual income. Moreover, they eventually predict that based on the undiminishing marginal utility of extending one's person life, the optimal level of health care expenditure in the United States will exceed thirty percent of GDP by the middle of the twenty-first century.

Chernew and Newhouse (2010) analyse the causes that make health care spending keep growing. In fact, they start from the assumption that given an equilibrium at time t, spending growth requires some variable that causes the equilibrium spending level to change, and an isolated change will generate a new equilibrium. After the new equilibrium is established, spending growth would cease. However, we observe spending growth continuously. This means that there must be a continually changing variable. Therefore, after analysing the empirical literature, they find that this ever-changing variable and the driver of the growth of health care expenditures is the technology development, while other secondary factors are the spread of insurance, the growth of the average age of the population, factor productivity and defensive medicine. In addition, they affirm, that, health care expenditures growth cannot be more than income growth forever, indeed for the long run we will need to develop a financing system that is sustainable.

White (2007) put in comparison the growth of healthcare expenditures of the United States and that of other OECD countries. He then separates the growth in per capita health expenditure into three components, the real growth in per capita income, the national annual population aging, and "excess growth," which is the real growth in health expenditure not attributable to the first two categories and find that USA had more excess growth. Since technology move freely between countries, White states that this trend was not due to the technology but instead, he suggests that is likely due to institutional and policy differences such as those in the organization of health care financing and delivery. For examples, the OECD countries give to a central body, that could be either the national government or social insurance administrators, more authority to limit health spending than the United States.

Other determinant of HCE is physical capital, which is described in the traditional economic growth theories as capable of affecting HCE through human capital. Healthier workers are physically and mentally more energic and more productive, while ill workers put less effort on work and are more likely to be absentees. Impairing learning and discouraging parents from investing in their children's education is a consequence of sickness that reduce human capital (Khan & Ul Husnain, 2018). However, this rising in expenditures one day will have to stop, because, as Kotlikoff and Hagist (2007) state, "No country can spend an ever-rising share of its output on health care, indefinitely. There is a limit to how much a government can extract from the young to accommodate the old. When that limit is reached, governments go broke."

An answer to the question on whether the rising in health expenditure has a positive effect on health and life expectancy can be found in the work of Murphy and Topel (2006) that estimate the economic gains from improvement in health and from declining mortality in the United States over the twentieth century, and find that "gains in life expectancy were worth over $1.2 million per person to the current population. From 1970 to 2000, gains in life expectancy added about $3.2 trillion per year to national wealth, with half of these gains due to progress against heart disease alone." The authors distinguish two types of health improvements, those that extend life, because utility from goods and leisure is enjoyed for longer, and those that raise the quality of life, because utility from given amounts of goods is raised. So, they analyse the returns from medical research and health expenditure and find out that there is a positive effect.

Cutler et al. (2006) use life expectancy data from 1960 to 2000 to determine costs per year of life gained, starting from the assumption that 50percent of gains are due to medical care. They find that the average cost per year of life gained during this period is $19,900 at birth, $31,600 at 15 years, $53,700 at 45 years, and $84,700 at 65, with costs growing faster than life expectancy for the latter group. Except for spending on the elderly, they conclude that the spending growth between 1960 and 2000 has provide reasonable value. However, as a summary of the existing literature that focus on determining the factor behind the HCE growth, we can consider the work of Amiri, Kazemian, Motaghed and Abdi of 2021, who in their work, review thirty-six studies published until 2017 with the aim of finding the drivers of HCE and to describe how they impact. They find that there is a broad range of factor that contribute to influence the rising on HCE and those can be divided in five main categories:

1- Socio-demographic factors that include the size of population, population growth, population age structure, which is included by 32 studies out of 36 due to the fact that the younger and older population are more likely to use health care resources; time remaining to death for the same reason, race, urbanization, which contribute to HCE by affecting individuals' health; and education level of which impact change in relation of the type of the analysis that is conducted, being one of the major determinants when studying the micro level as more literate people tend to spend more on medical care services; while being different using aggregate data, as more education leads to healthier lifestyles.

2- Economic factors including a country's financial resources, which is assessed by almost all the literature as the main determinant of HCE; the income distribution, unemployment, since an unemployed person may not have the resources to provide himself with medical assistance which would the decrease HCE but only in the short term, indeed in the long term there will be more person that needs critical assistance or emergency room, thus increasing overall HCE; price growth, foreign aid resources and government fiscal space.

3- Technological factors, which are important because doesn't include only the physical capital but also the medical procedures. This category consists of health technology growth, impact of technological progress, and investment on health technology.
4- Lifestyles and environmental factors and include the effect of lifestyle and environmental quality.
5- Factors related to the administration and design of the health sector, which include health system financing, a measure of the public spending in health; health system efficiency, health insurance development, which can guarantee greater access to health care services; and the overall organization of healthcare system.

These factors can contribute by affecting both the demand and the supply of healthcare services. As a supply-side factor, national income has been found as the main determinant that explain the differences in spending in HCE between countries. Socio-demographic factors are seen as demand-side factors, while the technology development is seen as both a supply-side and a demand-side factor. Indeed, it affects the process of development, production, delivery and financing of health care in a complex way. This complexity, together with the problem of capturing the effects that technology development has on HCE, means that few studies consider it a variable contributing on spending growth. However, those studies that consider it, asses technology progress as a main driver, implying that policy maker should consider the issues about how and what technology is introduced. There are then the factor concerning the fifth group which are located outside the demand and supply concept; indeed, they regard the administration of health services, and these must be further examined. In fact, the World Health Organization (WHO) estimates that 20% −40% of healthcare spending is wasted globally. A possible strategy to control HCE could be limiting the expenditure on health administration, even if it could be difficult.
Overall, the researcher divides all the factors in two major group: the first is composed by the non-modifiable factors, like the increase of the elderly population, which increase HCE by natural or macroeconomic causes. The second group is formed by the modifiable factors, which highlights supply-side inefficiencies that increase demand for unnecessary health services. This distinction could help in choosing the right policy to address the rise in health spending.

3- Healthcare: luxury or necessity?

Most of the existing literature focuses on determining the size of the income elasticity. The income elasticity of healthcare expenditures is defined as the percentage change in healthcare expenditures in response to the percentage change in income per capita.

The formula to derive income elasticity is:

$$Income\ elasticity = \frac{\%\ change\ in\ expenditures}{\%\ change\ in\ income}$$

The aim is to assess if income elasticity is above or below unity: in the first case, healthcare would be a luxury, as it would be more expensive as income would grow, and its demand should be left to market forces. In the second case, healthcare would be a necessity, thus making a major involvement of the state in the health care system justified (Cuyler, 1988). It's easily understandable that determining the size of income elasticity has important policy implication, indeed determine if healthcare is a necessity or a luxury helps the government to allocate the resources more effectively. It is helpful also to the private sector, in fact for private healthcare providers and insurers, understanding this distinction helps in pricing

strategies and the development of services that supply to different segments of the population. Under the economic perspective, the recognition of healthcare as necessity encourages more investment from the state, allowing cheap access to the service to poor consumers, thus making the society healthier and more productive. On the other hand, healthcare as a luxury would mean that individuals are priced out of the market and they would have to pay for themselves, potentially burdening families with high expenses.
The results of the empirical literature are various and often conflicting. This might be due to the use of different data sets, in fact the first studies had limited availability of data for a limited number of countries. Other factors that may contribute to such diversity are the different level of data aggregation (Getzen, 2000) and the adoption of different econometric methods. Indeed, (Gerdtham & Lothgren, 2000) report several approaches for the analysis of GDP and HCE in the Organization of Economic Cooperation and Development (OECD) countries: for example (Newhouse, 1977) uses cross-sectional bivariate regression, Leu (Leu, 1986) and Gerdtham et al (Gerdtham, Søgaard, Andersson, & Jönsson, 1992) adopt a cross-sectional multivariate regression, Gerdtham et al (Gerdtham, Sögaard, MacFarlan, & Oxley, 1998), Barros (Barros, 1998), Roberts (Roberts, 1999) and Hitiris and Posnett (Hitiris & Posnett, 1992) use panel data model, Gerdtham and Lothgren (Gerdtham & Lothgren, 2000), Atella e Marini (Atella & Marini, 2007), Yavuz et al (Yavuz, Yilanci, & Ozturk, 2013) Murthy and Okunade (Murthy & Okunade, 2016) and Khan et al (Khan, et al., 2016) use unit root and cointegration analysis. For a deeper analysis, we can affirm that the earlier studies use small and cross-sectional data sets under the assumption of homogeneity across countries, then, trying to include cross-country heterogeneity, explorer used longitudinal data. By the 90s, thanks to the larger data accessibility, researchers could address the problem of spurious relationships between health care expenditures and income and analyse their non-stationarity and cointegration properties, while in the last years, new econometric methods, such as methods for non-stationary panels with structural breaks, panels for spatial correlation or unobserved common correlated factors and estimation techniques for heterogeneous panels, were developed.

3.1 Review of the literature

The empirical literature that analyses the relationship between healthcare expenditure and GDP can be classified into five main group: The first group of studies (Gerdtham, Søgaard, Andersson, & Jönsson, 1992); (Getzen, 2000); (Murthy & Okunade, 2009) demonstrate that healthcare is luxury by finding that income elasticity is above unity and range from 1.08 to 1.50. The second group ((Hansen & King, 1996), (Hitiris & Posnett, 1992), (Blomqvist & Carter, 1997), (Gerdtham & Lothgren, 2000)) find income elasticity close to unity. Then, there is a third group in which researcher apply panel unit root and panel cointegration tests and conclude that HCE and per capita GDP are non-stationary. This result doesn't change even after structural breaks are taken into account. Non-stationary means that those data are unpredictable and unforecastable, and the use of non-stationary data can lead to spurious results. The fourth group report healthcare as a necessity, for example Tamakoshi and Hamori (Tamakoshi & Hamori, 2016) Baltagi et al (Baltagi, Lagravinese, Moscone, & Tosetti, 2016) and khan and Ul Husnain (Khan & Ul Husnain, 2018). The fifth group find bidirectional causality between GDP and HCE.

The first group of studies that I want to talk about, are those that adopt a cross-sectional regression approach. Cross-sectional regression is a statistical technique used to analyse the relationship between variables across multiple observations at a specific point in time, therefore without regard in difference of time. It is usually preferred as methods because of the efficiency and he low cost of usage, indeed it uses existing database, and because it allows comparison of different segments within a large sample.

As I've already said, the first work is that by Newhouse (1977), which is broadly described as the pioneer of this subject. In his study, using a sample of thirteen developed countries, Newhouse analyses the relationship between HCE and income. He uses only those countries in order to have similar medical knowledge and amount of disease. Firstly, he regresses per capita medical care expenditures on GDP per capita and find income elasticity in a range between 1.15 and 1.31 thus finding healthcare as a luxury. Then he regresses the share of the medical sector of GDP on GDP and the result is the same: healthcare as a luxury. However, his study shows that the cross-section data for the USA indicate that within the USA income elasticity is very low and so he investigates why there are differences between the within country cross section ant the international cross section. The answer to this problem is that probably the price is not an important factor within a country at one point in time, while it becomes important between countries over time, suggesting the use of a panel regression analysis.

Murthy and Okunade (2009) also use a cross-sectional analysis for 44 African countries for the year 2001, while controlling demographic, epidemiological, socio economic and public health factors, to test if real per capita GDP elasticity on real per capita HCE indicate that health care is a luxury or a necessity. More precisely in their study they use per-capita real GDP (*PRGDP*), per-capita foreign aid (*FAID*), physicians per thousand population (*DOC*), percent of population aged 65 years of age (*AGE*65), and maternal mortality rate (*MMR*) as variables. This paper contributes to the literature mainly because for the first time, in the study of this subject, they have used a set of econometric estimators to test for robustness across methods, such as the OLS, TSLS (two-stage least squares), and the robust LAE (least absolute error). Furthermore, this paper is the first to discuss the policy implication for the African continent and implemented an econometric method to derive the income elasticity of HCE for the individual country. This is the specification of the model:

$$lnHEXP = ln\beta_1 + \beta_2 lnPRGDP + \beta_3 lnDOC + \beta_4 lnAGE65 + \beta_5 lnFAID + \beta_6 lnMMR + \varepsilon$$

With this study, they have found that for the African countries the most important determinants are the real per-capita GDP and the real per-capita foreign aid, as they are statistically significant and have positive effect on healthcare expenditures. Moreover, healthcare is found as a necessity rather than a luxury. For the researcher the result that health care is a necessity and a normal good, is a proof of the belief that healthcare's behaviour changes along with the degree of economic development. Indeed, most previous studies of the developed countries empirically have found health care to be a luxury good, while this paper confirms that for the African countries, health care is a basic need sought more for 'physiological cure' than 'care'.
On the other hand, country-specific estimates of the income elasticity of health spending confirm that health care tends to behave as a luxury commodity in most African countries. This is probably due to the presence of aggregation bias and the methodology used to derive the elasticity estimates. However, they think that the usefulness of individual country results for health policy making could hardly be exaggerated, as it is insightful.
Cross-sectional regression has its limitations: the first and more important is the limited causality inference, as it's unable to establish causality or determine the direction of relationships between variables. This is due to the collection of the data in only one point of time, which makes difficult to determine if changes in one variable cause changes in another. This fact makes the use of longitudinal data necessary.

To assess this problem, it was necessary to use a panel regression. A panel regression is a method that combines time series and cross-sectional data and allows to have more observation and more degree of freedom. Other advantages of this method are the capacity of

capturing the complexity of the human behaviour than the cross-sectional regression or the time series analysis. Indeed, it allows to build and test more complicated hypothesis, it helps in controlling for omitted variables and can generate more accurate prediction. Moreover, it can simplify the computation and statistical inference in some case, e.g. the analysis of nonstationary time series, in which the sample approximation of the distributions of the least-squares are no longer normally distributed, while with panel data it is possible to invoke the central limit theorem across cross-sectional units to show that the limiting distributions of many estimators remain asymptotically normal (Hsiao, 2007). This is possible thanks to the greater data availability and to the technological advancement.
Hitiris and Posnett (Hitiris & Posnett, 1992), use a pooled sample of 20 OECD countries for the years 1960 to 1987, that form a total of 560 observations. So, they use a pooled regression. This method to estimate the regression could support that the disturbance terms are cross-sectionally heteroskedastic and time-wise autoregressive, with the degree of auto regression that varies between the unit. They also introduce a set of country-specific shift dummies to test whether the countries in the sample represent a single homogeneous group or a number of heterogeneous groups and find these shift dummies to be significant. In order to address some issue present in the previous works, the authors have examinated three relationships: (1) The relationship between per capita health spending and per capita GDP. (2) The potential influence of non-income variables on differences in health spending. (3) The relationship between crude mortality rates, GDP per capita, and per capita spending on health. The estimated equation for the relationship between HCE and GDP is this:

$$\text{In } TE(ER) = -2.846 + 1.026 \ln GDP$$

In *GDP* indicating the income elasticity around unity and, once again, the positive relationship between health spending and GDP. Other finding of the paper is that non-income variable are important too: the relative price of health care must be included to avoid downward bias in the estimated income elasticity.

Di Matteo & Di Matteo (1998) (Di Matteo & Di Matteo, 1998) use a pooled time-series and cross- section regression to estimate the determinants of Canadian provincial government health spending over the period 1965–1991. A time series analysis of total per capita health expenditures on per capita GDP in Canada would be the right way, it would omit the difference between the region, as I've already highlighted while explaining the reason for using a panel regression. For this paper, the authors don't have to worry about some problem that previous study had, like the exchange rate differential, because they focus only on one nation, Canada. Indeed, the restriction of the analysis to one nation is the real improvement brought by this panel. The results show that real per capita provincial government health spending had a significant and positive effect on real per capita income, on the proportion of population aged 65 and over and real provincial per capita federal transfer revenue. Moreover, income elasticity is found to be 0,77 and therefore HCE is a necessity.
The study shows also the importance of an aging population and federal transfer payments to health expenditure, indeed half of every dollar allocated by the federal government to the provinces goes to fund health care and, at the same time, the increase in the proportion of the population over age 65 will add on average about 1.3 per year to real per capita provincial government health expenditures. Eventually, they find that the aging of Canadians plus the decline in federal transfer payments will make the public funding of health care a policy problem in the future.

Baltagi and Moscone (2010) use a panel of 20 OECD over the period between 1971 and 2004 to explore the long run relationship between healthcare expenditures and income. Moreover, they check for the non-stationarity and cointegration properties between these two

determinants. The method used is a heterogenous panel model with cross sectionally correlated errors, in which they include a factor structure with the intent to describe the effects of shocks that could hit health and that are not measurable, e.g. advances in medical care technology, new diseases and change in preference of healthcare users. This factor structure can capture any contemporaneous correlation that arises from the response of countries to these events. Furthermore, with the assumption that the regression error follows a spatial autoregressive process they have modelled the cross-section dependence. The data collected are about per-capita total health care expenditure and per-capita income. Other variables that have been analysed are public expenditure on health care over total health care expenditure; the dependency rates for old and young people, defined as the population aged 65 and over divided by the population aged 15–64, and the population aged 0–14 divided by the population aged 15–64, respectively. This analysis is more complex than the previous one: firstly, they check the non-stationarity of the variables and find that are non-stationary; then they estimate the income elasticity, controlling also for unobserved common factors, and find it to be lower than one, confirming that HCE is a necessity. Moreover, they find that omitting the time dummies the income elasticity become more than one, but those variables are significant and must be included. Public expenditures and dependency rates for old people are found to be not significant, result that is conform to that found by Hittiris and Posnett (Hitiris & Posnett, 1992); the variable dependency rates for young people is found to be significant and to have a positive impact on HCE.

Farag et al. (2013) expand the existing literature on income elasticity of health expenditures using a 12 years panel data sets of 174 countries that include low-, middle- and high-income countries, basing on the 2007 World Bank Country classification system. As we see, this is the first work that do not focus on a single cluster of nation, like the OECD countries or the African, instead it tries to analyse the entire world, or at least all the countries for which there are available data. However, to make this possible they have to employ robust economic methods, namely a two-way fixed effect and instrumental variable model. In the model the dependant variable is the log of per capita total healthcare expenditure and main explanatory variable of interest is the log of GDP per capita and since they include developing countries too, it is necessary to have governance variables and a variable that could capture the influence of the change in population age. These variables allow to overcome the major concern of the bias resulting from time-invariant country level factors, thus making this paper innovative. The first model estimated is a two-way fixed effects model, which shows an elasticity of 0.85 using the full dataset of 173 countries for 12 years, finding healthcare as a necessity. In the second model, using an instrumental variable approach, they estimate an income elasticity of health care spending of 0.90 with the instruments used for country income that are agriculture share of the economy and primary school net enrolment ratio. In Model 3, they estimate a two-way fixed effects model with vector decomposition, which allows to includes time-invariant variables in a fixed effects model and that shows an elasticity of 0.90 and that health care demand and supply levels using the different proxy variables have a significant influence on health care spending.
In Model 4, which includes governance variables in addition to the two-way fixed effects, they estimate a slightly lower elasticity of 0.88 and find that the ‘Voice and Accountability’ measure have a significant positive influence on mobilizing more resources for health.
As a summary of their estimates: healthcare is clearly a necessity, however the full increase in health spending can’t be attributed only to the income variation of a country. Indeed, other factor can influence it, like the combined effect of health insurance and technological change in addition to other factors such as aging populations in these countries. Another finding of their study is that low-income countries exhibit a relatively lower elasticity (0,52), which is important because it shows that convergence in health and health spending around the world

is likely to take a very long time to actually occur even if GDP growth rates stayed uniform around the world.

Halıcı-Tülüce et al. (Halıcı-Tülüce, Dogan, & Cüneyt, 2016) examine the relationship between HCE and economic growth of twenty-five high income and nineteen low-income economies for the period of 1995–2012 and 1997–2009. To carry out the analysis they use a dynamic panel data methodology, namely a Generalized Method of Moments (GMM). This research differs from the previous because the authors introduce a clear distinction between private and public health expenditures and their impact.
They test for Granger causality, which is a statistical hypothesis test to determine if one time series is useful to forecast another, for two variables: GDP and Health expenditures. The formulated equation is the following:

$$ln\,(GDP)_{it} = \rho ln\,(GDP)_{i,t-1} + \alpha_{1,i}\,ln\,(HEPRIVATE)_{i,t} + \alpha_{2,i}\,ln\,(HEPUBLIC)_{i,t} + \alpha_{3,i}\,ln\,(GFC)_{i,t} + \varepsilon_{i,t}$$

In this equation, HEPRIVATE stands for the private healthcare expenditure, while HEPUBLIC stands for the public one. GFC represents gross fixed capital.
The results show that the effect of public expenditures is significant and positive. Indeed, the estimated elasticity is 0.131277 for high- income countries and 0.115874 for low-income countries. On the other hand, for private health expenditures the impact is negative (-0.22786), suggesting that the private investments of the health infrastructure in developed countries are not used in an active way and that private healthcare expenditure must be decreased. For the low-income countries the impact is still negative but lower than the high-countries' one (−0.04510), which may be due to the low share of private investment in the GDP of these countries. The negative effect of private health expenditure on economic growth may be due to the negative effects of these expenditures on fixed capital investments.
The major finding of this paper is the positive effect of public health expenditure on economic growth in both group of countries, which means that increasing the expenditures on healthcare will enhance the welfare of the population.

Baltagi et al. (2016) in 2016, investigate the relationship between health care expenditure and income using a sample of 167 countries over the period 1995-2012, from the World Bank Open data set. To overcome the problem of other studies, namely the assumptions of homogeneity and cross-sectional independence, they carry the analysis both at global level and by macro-areas using the United Nations geo-political classification and the income classification of the World Bank. Moreover, to address the significant heterogeneity that occurs among the countries, they use a panel model with heterogeneous slope coefficients, they allow for country-specific effects and cross-section dependence represented by unobserved common factors which may be linked with income. The aim of this last point is to capture the presence of unobservable risk factors, like smoking or obesity, that may affect health of the population. They also test the non-stationarity and cointegration properties of the variables. By the time they've made this research, this was the first paper that studied income elasticity worldwide while allowing for heterogeneity between health care expenditures and income. The countries are divided following the United Nations classification into five geo-political regional groups:

1. WEOG, Western European and Other Group (Australia, Italy, United Kingdom, USA, Germany, etc.)
2. Asia-Pacific (Bahrain, Indonesia, India, Iran, Japan, Korea, Malaysia, Qatar, Philippine, etc)
3. Eastern European (Albania, Armenia, Czech Republic, Georgia, Hungary, Russia, Slovenia, Ukraine, etc.)

4. GRULAC, Latin American and Caribbean Group (Bolivia, Brazil, Chile, Colombia, Dominican Republic, Mexico, etc.)
5. African (Algeria, Congo Rep, Kenya, Cote d'Ivoire, Sierra Leone, Tunisia, Uganda, etc.)

Moreover, the selected countries are divided in four group basing on their income: High, Upper-middle, Lower-middle, Low. The preliminary analysis shows that countries with higher per-capita GDP has also higher per-capita health expenditures and provides the cross-sectionally estimates of the income elasticities, which indicate income elasticity above 1 for the richer countries. Those results are in line with the first studies that focus mainly on the OECD countries and that often used the cross-section regression.
The formulated equation is the following:

$$h_{it} = \alpha_i + d_i t + \beta'_i x_{it} + \gamma'_i f_t + e_{it},$$

where x_{it} is a vector of regressor that include per-capita GDP (y_{it}), α_i is a country-specific effect, d_it is a country-specific time trend and f_t is a vector of unobserved common effects. The results show that, using the Mean Group (MG) estimator, the income elasticity estimated for the world is 0,84, which rise toward 0,87 when adding the public health expenditure rate. Using another estimator, the Common Correlated Effect MG (CCE MG) which is proposed by Pesaran (Pesaran M. , 2006), the estimation is smaller: 0,78 when including only GDP and 0,73 when including public HCE too. This confirms the necessity nature of health care. Other results of the analysis are that for the WEOG and Asia-pacific group and for the high and upper-high income group the income elasticity estimated is below one, thus confirming that for these countries healthcare is a necessity. For the African and GRULAC countries the income elasticity was still less than one, but larger than the WEOG and Asia group countries. So, we can say that the level of income elasticity rise toward unity moving from wealthier to poorer countries. Once again, these results demonstrate that the level of income of a country is a key factor in explaining the income elasticity and show the positive effect that wealth has on it.

The last paper I want to talk about is the work by Khan and Ul Usnain (Khan & Ul Husnain, 2018), who study the relationship between healthcare expenditure and income using a sample of 15 Asian countries over the period 1995-2014. They use a panel cointegration method and, as in the previous study, they control for cross-sectional dependence through unobserved common factors (UFCs). The reason is that the presence of UFCs can lead to spurious results. The aim is that of finding if healthcare is a necessity or a luxury, through analysing the share of government spending in HCE, old-age dependency rate and maternal mortality rate, as well as real GDP.
The estimated model is the following:

$$h_{it} = \gamma_i + n_i t + \varphi'_i x_{it} + u_{it} \quad \text{i=1,2,3..N, t= 1,2,3…T}$$

Where h_{it} is per capita HCE, $x_{it}$is a vector of regression that include real GDP, share of public expenditure on HCE, labour force participation, maternal mortality rate and elderly population of greater than 65, γ_i and n_i are unobserved country-specific fixed effects and the heterogeneous country-specific time trend and, finally, φ'_i are vector of heterogenous parameters in country i. The first test is the cross-section dependence test, through the test proposed by Pesaran (Pesaran M. , 2004), which reject the null hypothesis of independence. So, they use an aggregate panel and, to account for UCFs, use the already cited Pesaran CCEMG estimator (Pesaran M. , 2006). The result of CCEMG estimator indicates that the income elasticity is 0,66, thus confirming once again that healthcare is a necessity. Moreover, they have found that a rise in the share of government expenditure in HCE result in a

increasing of aggregate HCE, with a coefficient of 0,36. This suggest that Asian countries' government has to invest more on development of healthcare infrastructure and services. Finally, the other variable, such as labour force participation or maternal mortality rate, are found to be insignificant.

4 - Conclusions

The main goal of this paper was to explore the empirical literature concerning the subject of health care expenditure. Before drawing my final conclusions, I'll make a summary of what I've found in the previous part: In the following table (Table 1) I will report the finding of the studies I've analysed.

Table 1. Summary of discussed studies

Study	**Subject**	**Findings**
(Chernew & Newhouse, 2010)	13 OECD countries	Income elasticity range 1,15/1,31- Luxury
(Murthy & Okunade, 2009)	44 African countries	Income elasticity range 1,07/1,14- Luxury
(Hitiris & Posnett, 1992)	20 OECD countries	Income elasticity range 1,02/1,16- Luxury
(Di Matteo & Di Matteo, 1998)	Canadian provinces	Income elasticity 0,77- Necessity
(Baltagi & Moscone, 2010)	20 OECD countries	Income elasticity range 0,44/0,89- Necessity
(Farag, et al., 2012)	174 Countries from all the world	Income elasticity range 0,52/0,90- Necessity
(Halıcı-Tülüce, Dogan, & Cüneyt, 2016)	25 High income countries, 19 Low-income countries	Income elasticity range 0,11/0,13- Necessity
(Baltagi, Lagravinese, Moscone, & Tosetti, 2016)	167 countries from all the world	Income elasticity range 0,73/0,84- Necessity
(Khan & Ul Husnain, 2018)	15 Asian countries	Income elasticity 0,66- Necessity

As we have seen, income elasticity decreases progressively below one as we move to more recent studies. This review seems to suggest that the more advanced is the research and the econometric method used more the results stabilize toward these range of income elasticity. Indeed, just the change between a cross-section regression to a panel regression lead to a variation in the depth of the analysis and to its precision. This is due to the difference of health care system and the demand for services across different countries, that is addressable only using advanced econometric technique. There are still some facts confirmed by most of the studies, like the positive effect that public health care expenditure has on the GDP per capita, which implies that government has a role in the healthcare sector.
However, the main goal of this thesis was to understand if health care is a necessity or a luxury, and basing on the results and consideration reported above I'd say that it is generally a necessity. Another evidence that can be observed in this paper, is that income elasticity tends to be higher for poorer countries. This highlight is easily observable in those paper that

analyse all the world ((Baltagi, Lagravinese, Moscone, & Tosetti, 2016), (Farag, et al., 2012)). This means that in poorer countries health care is less of a necessity than in richer one, which may be due to the difference in perspective and, in particular, in what is seen as a necessity in the poorer countries.
As my consideration, i think that is undeniable the benefits that spending in health care can give to a nation and to an individual. I think that the finding that healthcare, not only should be a necessity for everyone, but it is also found empirically that is a necessity good, is the proof that there should be more fund on healthcare in every nation and that is necessary a redistribution of resources in all the countries in which healthcare isn't considered a luxury yet. [i]

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[i] Totale parole senza contare frontespizio, indice, abstract e bibliografia: 6834