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The impact of health expenditure on the number of chronic diseases☆

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ABSTRACT

We investigate the impact of health expenditure on health outcomes on a large sample of Europeans aged above 50 using individual and regional level data. We find a negative and significant effect of lagged health expenditure on subsequent changes in the number of chronic diseases. This effect varies according to age, health behavior, gender, income, and education. Our empirical findings are confirmed also when health expenditure is instrumented with parliament political composition.

1. Introduction

We investigate the impact of total health expenditure (HE) on health outcomes as proxied for by the change in the number of chronic diseases. The issue is of paramount importance in a historical phase in which 87 percent of deaths in high-income countries (and a substantial reduction of healthy life years) are caused by major and chronic diseases [2]. In this scenario, it is of foremost importance to assess the productivity of domestic health expenditure and to go beyond mortality indicators as they do not take into account the quality of life that is fundamental for societal wellbeing.

Based on these considerations the goal of this paper is to measure the impact of HE to GDP (HEgdp) and HE per capita (HEpc) on the change in the number of chronic diseases after controlling for standard socio-demographic factors, healthy lifestyles, and health care quality on a large sample of Europeans aged above 50. Our empirical analysis also contributes to verify whether the well-known negative nexus between HE and mortality [3,4] is driven by a reduction of chronic diseases.

One element of originality of our analysis hinges on the use of the change in the number of chronic diseases as health indicator. The prevalence of chronic diseases is rapidly increased worldwide, and so will be in the next years [5,2]. Whether this change is driven by a change in HE should be investigated for both economic and policy implications. The empirical literature often uses country-level data to analyze the impact of HE on mortality health outcomes such as life expectancy at a given age, premature mortality rate, and infant mortality rate. This approach could be profitably complemented with an analysis on diseases' insurgence, in particular if we focus on the effects of health status on human capital and National Health Service expenditure, which are more relevant from an economic perspective. As clearly pointed out by Nixon and Ullmann [3], the standard macroeconomic variables used in the literature such as infant mortality and life expectancy have two relevant limitations. They do not vary much in high income countries and they are determined by factors unrelated to health care systems, such as pollution, car accidents, and murders. Moreover, a morbidity measure approach is conceptually more suitable than generic mortality measures because it accounts for health gains due to specific treatments

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[6]. The need of a multimorbidity indicator was also highlighted by Andreson and Horvath [7] – who show the heterogeneous prevalence of chronic diseases across US population – and Diederichs et al. [8] – who investigate how to weight different diseases in a multimorbidity indicator. However, to the best of our knowledge the change in the number of chronic diseases has not been used so far as a morbidity indicator. These considerations lead us to focus on the change in the number of chronic diseases as synthetic health outcome in our empirical analysis.

A second element of originality in our approach hinges on the use of individual data. Beyond the quality of health care systems, both mortality measures and many disease outcomes are affected by individual characteristics such as standard socio-demographic variables (e.g., gender, education, income, and family status), healthy lifestyles (e.g., diet, physical activity, alcohol consumption, and smoking), and the concurrent individual health status which need to be controlled for. The use of individual-level data is also important since it allows to consider properly the part of individual variability that is lost when looking at the country-level data only. Estimates based on the latter generally consider correlations across country mean values, thereby ignoring that other quantiles in the distribution may have more relevance when dealing with health matters. For instance, more extreme percentiles in lifestyles such as intense drinking and smoking as well as extreme obesity would definitely have a stronger impact on health outcomes than their mean values. Therefore, matching inputs and outputs for each individual and checking the effect of specific combinations of socio-demographic factors on health at individual level may provide more accurate results than considering average socio-demographic factors for each country.

A third further advantage of our approach combining individual and country level data is that it allows to test whether the HE effect on health outcomes changes across different population subgroups. The comparison of the HE effect by different subgroups allows us to identify the specific constituencies that are more sensitive to HE policies and specific healthy lifestyles (e.g. diet and physical activity), which – when improved – will reduce HE without any negative effect on health outcomes.

These three advantages of our approach do not preclude a regional level analysis with aggregated observations, and this allows us to check whether significant findings persist also at this level.

Our results show that there is a negative and significant impact of both HEgdp and HEpc on the change in the number of chronic diseases. The impact differs across different subgroups. The effect is higher for the elders, the women, the overweight or obese, the below-median income group, and the less educated vis-á-vis their complementary subgroups. The results remain stable when adopting different approaches, such as instrumental variable (IV) estimates and the use of regional-level aggregated data.

The paper is divided into six sections. The second presents the main literature on the effect of HE on health outcomes as well as on the importance of individual characteristics on health outcomes. The third illustrates data and descriptive statistics. The fourth presents our econometric findings, testing their robustness with different specifications. The fifth discusses the results and their policy implications. The sixth section concludes.

2. Literature review

Public HE represents one of the largest government expenditure items (6 percent of GDP in the OECD area, [9]) and one of the most important drivers of health policies determined at country-level. On the link between HE and health outcomes, Nixon and Ullmann [3] find a significant and positive effect of HE on health outcomes in EU countries and show that, between 1980 and 1995, health care expenditure has added 2.6 years to male life expectancy and reduced by 0.63 percent the infant mortality rate. Along this line Or [4] documents that a high share of public HE is associated with lower premature mortality and infant and perinatal mortality, even though not affecting life expectancy at 65. Other authors [10] find that, even if mortality is negatively related to HEpc, the elasticity is very small, and therefore its economic significance is limited. Moreover, Elola et al. [11] find that per capita health care expenditure may explain more the variance in infant mortality than would do per capita GDP and that it is inversely correlated to female premature mortality, while positively correlated to female life expectancy. Conversely, a lower number of physicians and cuts in health care expenditure are associated with increased infant mortality, reduced life expectancy at age 65, and lower heart diseases. In particular, a 10 percent cut in health care expenditure is associated with a 6 months reduction in life expectancy for men and 3 months reduction for women [12,4].

These mixed findings clearly imply that the driving factor is not just the magnitude of HE but also its quality and efficiency. Concerning the latter, Joumard et al. [9] estimate that life expectancy at birth could be raised by more than two years on average, holding health care spending constant, if all countries were to become as efficient as the best performers. On the other hand, a 10 percent increase in health care spending would increase life expectancy by only 3–4 months if the distance from the efficient frontier remains unchanged. The same literature generally finds that institutional variables for funding arrangements are often not significant, with some exceptions (e.g., Or [4] shows that countries with fee-for-service at the hospital level tend to have lower premature mortality but no longer life expectancy at 65).

The existing literature also emphasizes the importance of individual factors. According to Thornton [13] the role of socioeconomic factors and lifestyles in preventing diseases and improving life expectancy is much more significant than medical care, even though we argue that national health care policies may also include prevention campaigns that are likely to affect individuals' lifestyles. In particular, smoking, sport activities, and obesity explain why some countries achieve better health status than others while using comparable levels of health care resources [14]. Another factor that has been acknowledged as having a crucial role on health is education. More educated individuals are modeled as people with "higher productivity" in combining market and non market inputs to produce health outcomes – in the productivity theory – and choose better combinations of inputs, especially healthy lifestyles and doctor advice, to obtain such results – in the allocative theory [15,16]. Joumard et al. [9] calculate that education contributed to a gain of 0.5 years in life expectancy at birth for females out of a total improvement of 2.49 between 1991 and 2003, while health care expenditure contributes for 1.14. Similar results are found for males. Among other factors, occupation is also important for health status, not only in terms of exposure to specific workplace risks, but mainly due to its role in positioning people along a society's hierarchy [17]. In particular, it has been shown how work opportunities and work conditions for females affect socioeconomic status and, as a consequence, have an impact on behavioral and environmental risk factors for breast cancer in women [18].

3. Data

We merge three sources of data. The first source is the cross-national panel data from the Survey of Health, Ageing and Retirement in Europe (SHARE). We use the first, second and fourth wave of SHARE implemented in 2004, 2006, and 2010 respectively and with observations covering the period 2004–2012 with the