

LONG-TERM FINANCIAL SUSTAINABILITY AND INEQUALITY OF PHARMACEUTICAL EXPENDITURE IN THE EUROPEAN UNION, 2011-2060: A COMPARATIVE ANALYSIS

Stefano Olgiati, PhD

Alessandro Danovi, Associate Prof. of Management

Università degli Studi di Bergamo, Italy

Abstract

The European Union has achieved near-universal health coverage (Mean=99.15%; Standard Deviation=1.46%; Variation Coefficient=1%) and equity of access to healthcare services but, in the period 2000-10, such goal has been achieved at a Not Sustainable rate with total health expenditure growth (4.2%, STDDEV=2.4%) exceeding the growth rate of the GDP (1.7%,STDDEV=1.4%) by +2.5 percentage points on average and pharmaceutical expenditure (3.5%, STDDEV=3.0%) exceeding the growth rate of the GDP by +1.8 points. In the period 2011-2060 the GDP is expected to reduce and stabilize its growth rate from an average of 1.7% (STDDEV=1.4%) to an average of 1.6% with lower variation among the countries of the EU (STDDEV=0.5%). There follows that if the growth rate of health and pharmaceutical expenditure of the period 2000-10 is not reduced in the period 2011-60 only 4 nations will achieve economic and financial sustainability: Netherlands, Sweden, Denmark and Italy. Health policymakers in the European Union should account for this long-term expenditure growth pattern and reform in the efficiency and effectiveness of health and pharmaceutical care is necessary if health outcomes are to be improved and at the same time the economic and financial sustainability of the European universal welfare model is to be preserved and inequality avoided.

Keywords: Universal Coverage, Pharmaceutical Expenditure, Total Healthcare Expenditure, Gross Domestic Product, Long-term Economic and Financial Sustainability

Background

The member states of the European Union guarantee near-universal health coverage (Mean=99.15%; Standard Deviation=1.46%; Variation Coefficient=1%) [43][45] and equity of access to healthcare services and pharmaceutical active principles approved by the European Medicines Agency and national Agencies for reimbursement [6][15]. However in 2013 [44] the enduring effects of the 2008 financial crisis, in terms of recession, growing sovereign debt [1] and Financial consolidation [46], have risen concerns [44] about the long-term [42][44] sustainability [49] of the European welfare model.

The research question of this paper is whether the Per Capita Real Average Annual Growth Rate (PCR-AAGR) of pharmaceutical expenditure in the European Union in the period 2000-2010 (PCR-AAGR=3.5%; STDDEV=3.0%; VC=0.9) will be economically and financially sustainable in the long-term, i.e. in the period 2011-2060, on the basis of the OECD estimate of the growth of the Gross Domestic Product in such period of (PCR-AAGR=1.6%; STDDEV=0.5%; VC=0.3) (Exhibit 1).

In order to assess systematically across the EU the joint economic and financial sustainability of pharmaceutical expenditure in the periods 2000-10 and 2011-60, the present

paper has applied the World Health Organization's conceptual framework outlined by Thomson, S., Foubister T. and Mossialos E. (WHO 2009).

Exhibit 1: Per Capita Real Average Annual Growth Rate of GDP, Total Health Expenditure and Total Pharmaceutical Expenditure in the European Union (N=21) in the periods 2000-2010 and 2011-2060

EU 21	GDP 2000-2009	THE 2000-2010	TPE 2000-2010	GDP 2011-2060
Mean	1.7	4.2	3.5	1.6
Standard Deviation	1.4	2.4	3.0	0.5
Variation Coefficient	0.8	0.6	0.9	0.3

Source: Authors' elaborations on OECD Health Data 2011

Legenda:

PCR AAGR – Per Capita Real Average Annual Growth Rate

GDP – Per Capita Real Gross Domestic Product;

THE – Per Capita Real Total Healthcare Expenditure

TPE - Per Capita Real Total Pharmaceutical Expenditure

Methods

Thomson S., Foubister T., and Mossialos E. (WHO 2009) [53] define economic and Financial sustainability as:

- Economic sustainability specifically refers to growth in public health financing as a proportion of gross domestic product (GDP). Financing on health is sustainable up to the point at which the social cost of health financing exceeds the value produced by that financing. If health financing sufficiently threatens other valued areas of economic activity, health financing may come to be seen as economically unsustainable. In order to exemplify, every dollar spent on health care represents one fewer dollars spent on education, national defense, housing, subsidies. The more we spend on health care, the less we are able to spend elsewhere;
- Financial sustainability of a health system relates specifically to public financing on health care. A health care system may be economically sustainable and yet Financially unsustainable if internal public revenue is not sufficient to meet public financing.

In the present research we will adapt the WHO definition of Financial and economic sustainability in a such a way that pharmaceutical expenditure, as any other expenditure, in order to be sustainable must be first of all financially *and* then economically sustainable. In other words, if a category of expenditure is not financially sustainable, its economic sustainability cannot be assessed since Financial consolidation and pervasive reform make predictions regarding the direction of economic restructuring unreliable.

In conditional terms, if:

- PCR-AAGR is the per capita real annual average growth rate;
- GDP the gross domestic product;
- THE is total healthcare expenditure and;
- TPE is total pharmaceutical expenditure:

then pharmaceutical expenditure of a health system is:

- Financially Sustainable =if $\{PCR-AAGR TPE \leq PCR-AAGR GDP\}$ and Not Sustainable otherwise;
- Economically Sustainable =if $\{PCR-AAGR TPE \leq PCR-AAGR GDP\}$ and $\{PCR-AAGR TPE \leq PCR-AAGR THE\}$ and Financially Sustainable otherwise.

This approach is synthesized in Exhibit 2. The red line represents $f(x)=1$ along which per capita real average annual growth rate of the GDP (x axis) is equal to the growth rate of total

health and pharmaceutical expenditure (y axis). The reduction in variability in the growth rate of the GDP across the EU in the period 2011-60 can be seen in terms of the clustering of datapoints around the mean. The effects of this variation of the GDP growth rate in terms of the divergence of the regression lines of total health and pharmaceutical expenditure can also be visualized together with the reduction in the values of the coefficients of determination (R^2) from 2000-10 to 2011-60 of both health expenditure (from 0.66 to 0.31) and pharmaceutical expenditure (from 0.44 to 0.66).

This paper analyzes the OECD healthcare and pharmaceutical expenditure and reimbursement datasets for the period 2000-2009 and the OECD report on long-term economic growth in the period 2011-2060.

For definitions and comparability we refer in full to the: “OECD, Eurostat, World Health Organization: A system of health accounts – Edition 2011”. The OECD defines pharmaceutical expenditure as:

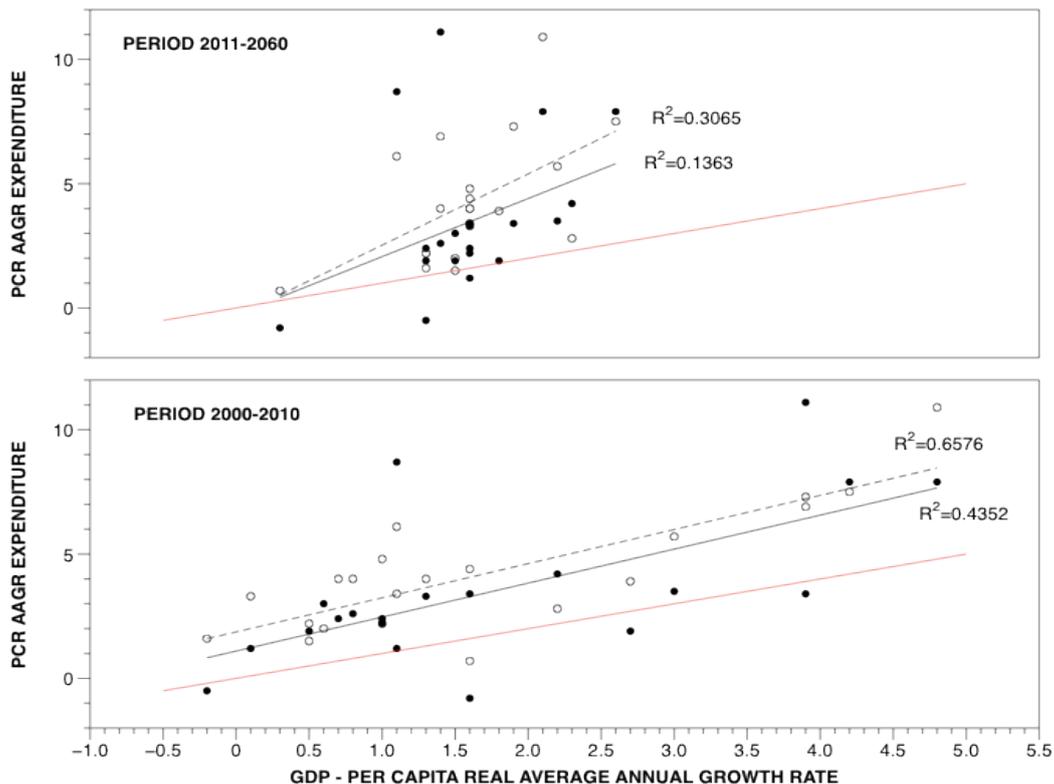
Pharmaceutical expenditure covers spending on prescription medicines and self-medication, often referred to as over-the-counter products. For some countries, other medical non-durables such as syringes, bandages, etc. may be included in the total. It also includes pharmacists’ remuneration when the latter is separate from the price of medicines. Pharmaceuticals consumed in hospitals are excluded (on average they account for around 15% of total pharmaceutical spending). Final expenditure on pharmaceuticals includes wholesale and retail margins and value-added tax.

The 21 countries of the European Union analyzed have been selected on unbiased grounds as the only countries for which all information was available and homogeneous in the OECD databases.

Per capita real data have been utilized to account for the demographic dividend and inflation.

All data has been downloaded in .csv formats and analyzed-plotted with R 3.0.1 software.

Exhibit 2: Per Capita Real Average Annual Growth Rate of the Gross Domestic Product, of Total Healthcare Expenditure and of Total Pharmaceutical Expenditure in 21 member states of the European Union in the period 2000-10 and 2011-60



Source: Authors’ elaborations on OECD Health Data 2011

Legenda:

BLACK DOTS - Per capita real Average Annual Growth Rate of Pharmaceutical Expenditure (TPE)
 HOLLOW DOTS - Per capita real Average Annual Growth Rate of Total Health Expenditure (THE)
 SOLID LINE – Regression Line of TPE
 DASHED LINE – Regression Line of THE
 RED LINE – $f(x)=1$

Notes:

Countries in decreasing order of AAGR GDP. EU $N=21$ out of $N=27$ member states have been analyzed for which the OECD datasets are consistent in the period 2000-2010 and 2011-2060 The original misalignment in the OECD datasets between the time period 2000-2009 of GDP growth and the time period 2000-2010 of Total Healthcare and Pharmaceutical Expenditure has been maintained for consistency with the OECD Health Data 2011 datasets.

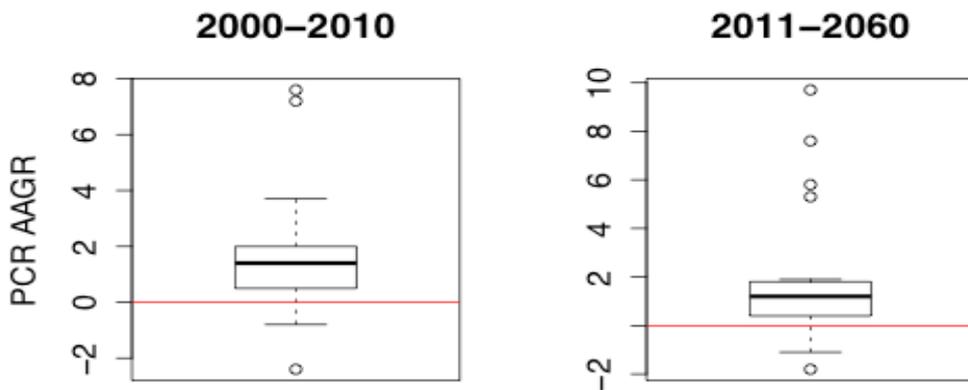
Findings

From an economic and financial point of view Exhibits 1 and 2 highlight the fact that, in the post-Euro currency period 2000-2010, in 21 member states of the European Union (EU 21) the per capita real Average Annual Growth Rate (PCR-AAGR) of Total Healthcare Expenditure (PCR-AAGR=4.2%; STDDEV=2.4%; VC=0.6) has been consistently higher than the PCR-AAGR of the national Gross Domestic Product (PCR-AAGR=1.7%; STDDEV=1.4%; VC=0.8), with the sole exception of Luxembourg. One country, Italy, highlights a positive growth of Total Healthcare Expenditure (PCR-AAGR=1.6%) even if the growth of the GDP is negative in the same period (PCR-AAGR=-0.2%).

As far as Pharmaceutical Expenditure is concerned, the situation is only slightly different (PCR-AAGR=3.5%; STDDEV=3.0%; VC=0.9), with only 2 members for whom the growth rate is lower than the growth rate of the GDP - Poland (PCR-AAGR=3.4%) and Slovenia (PCR-AAGR=1.9%) - and 2 for whom it is actually negative: Luxembourg (PCR-AAGR=-0.8%) and Italy (PCR-AAGR=-0.5%).

Exhibit 3 analyzes the difference between the growth rate of pharmaceutical expenditure and GDP (Financial Sustainability) in the two periods 2000-10 and 2011-60. In the long-term the difference in the EU 21 will be less uniformly distributed with a mean of 1.9% (STDDEV=2.8%) against the 1.7% (STDDEV=2.3%) of the period 2000-2009 and, as the OECD points out [32], only in the presence of ambitious policy changes, ambitious Financial consolidation efforts and deep structural reforms.

Exhibit 3: Financial Sustainability of Pharmaceutical Expenditure in the European Union (N=21) in the periods 2000-2010 and 2011-2060



Source: Authors' elaborations on OECD Health Data 2011

Legenda:

PCR AAGR – Average Annual Growth Rate

Notes:

Software R 3.0.1 – boxplot()

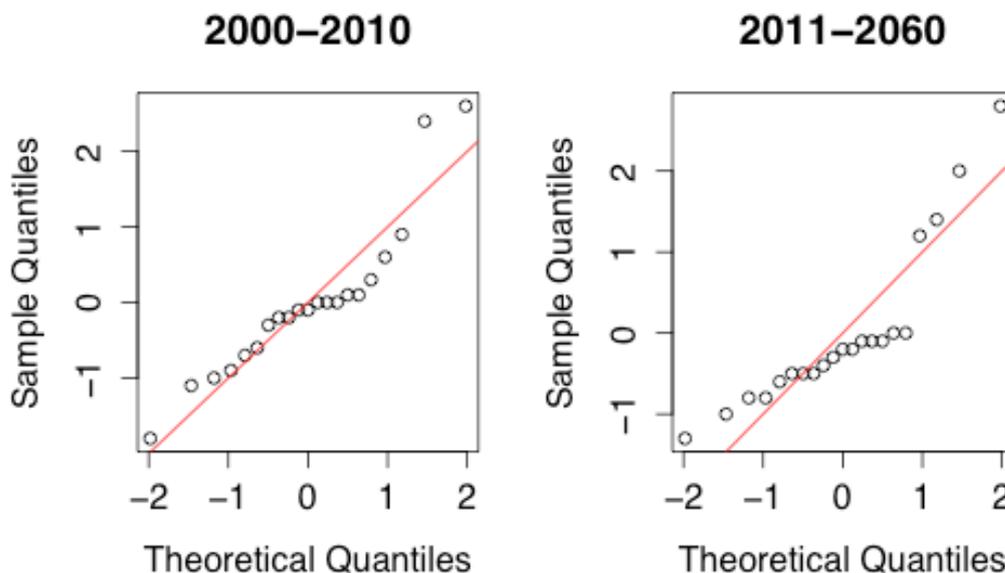
Conclusions

In the period 2000-10 all the 21 countries of the European Union analyzed have achieved near-universal health coverage (Mean=99.15%; Standard Deviation=1.46%; Variation Coefficient=1%) [43][45] and equity of access to healthcare services [6][15] but such goal has been achieved at a Not Sustainable rate (Exhibit 2), with total health expenditure growth (4.2%) exceeding the growth rate of the GDP (1.7%) by +2.5 percentage points on average and pharmaceutical expenditure (3.5%) exceeding the growth rate of the GDP by +1.8 points. Only 4 countries out of 21 have grown at a sustainable rate: Luxembourg, Slovenia, Italy and Poland.

In the period 2011-2060, in the 21 countries analyzed, the GDP is expected to reduce and stabilize its growth rate from an average of 1.7% (STDDEV=1.4%) to an average of 1.6% (STDDEV=0.5%): -0.1% (STDDEV=1.5%). More specifically, if the growth rate in healthcare and pharmaceutical expenditure of the period 2000-10 is not modified in the period 2011-60, only 4 nations will achieve economic and financial sustainability: Netherlands, Sweden, Denmark and Italy.

Exhibit 4 summarizes all conclusions: form a quasi-normal distribution in the period 2000-10 in the period 2011-60 the reduction in the variation of the real per capita GDP growth rate in the EU will for some countries skew the distribution of the difference between the growth rate of pharmaceutical expenditure and GDP (Financial Sustainability) to the left, making it more financially sustainable but, on the other hand, for some other countries, the reduction in the growth rate of the GDP will render pharmaceutical expenditure less financially sustainable in the long-term and skew their distribution to the right.

Exhibit 4: Normal Quantile-Quantile Plot (Z standardized variables) of the Financial Sustainability of Pharmaceutical Expenditure in the European Union (N=21) in the period 2000-2010 and 2011-2060



Source: Authors' elaborations on OECD Health Data 2011

Legenda:

AAGR – Average Annual Growth Rate

Notes:

Software R 3.0.1 – qqnorm()

We conclude that health policymakers in the European Union should account for this long-term expenditure growth patterns, and reform in the efficiency and effectiveness of health and pharmaceutical care is necessary if health outcomes are to be improved and at the same time the economic and financial sustainability of the European universal welfare model is to be preserved and inequality avoided.

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