Andrea K. El Meligi[*], Nicoleta A. Matei[**], Francesca Severini[*], Claudio Socci[*]

Convenient policy structures for the Romanian health care system

1. *Introduction*

Health care expenditure has the potential to trigger the production processes of other relevant industries in an economic system and to provide alternative indicators for measuring growth. Substantial amount of literature highlights the importance of the Health care sector as a driving force of the economy whose expenditure is able to stimulate a wide number of other industries including manufacturing, construction, computer programming and financial services[1].

In this context, where the complexities of the income distribution phases and the production processes need to be emphasized, an economic model that covers the multi-industry, multi-commodity and multisectoral analysis is a suitable tool as to support this type of policy evaluation, with static and dynamic application. In this way, interindustrial links can be highlighted in order to be able to assess the direct and indirect effects of policies on the entire economic system.

* University of Macerata, Department of Economics and Law.

** European Commission, Joint Research Center, Spain. The views expressed are purely those of the authors and may not in any circumstances be regarded as stating an official position of the European Commission.

1 M. Ciaschini, R. Pretaroli, F. Severini, C. Socci, *Health Care Services and economic impact: a dynamic CGE approach*, Quaderno di Dipartimento n. 74, Università di Macerata Dipartimento di Economia e Diritto, 2014; R.E. Hall, C.I. Jones, *The value of life and the rise in health spending*, «The Quarterly Journal of Economics», 122, 1, 2007.

The present study proposes the construction of a Social Accounting Matrix (SAM) based on the 2013 national accounts, which represents the starting framework for the development of a dynamic extended multisectoral model[2]. Moreover, a further policy assessment is studied through the Macro Multiplier approach[3], showing the convenient structures of the final demand on the base of the policy target set.

The use of modelling related to the assessment of public policy is required in three different phases of the evaluation process: ex-ante, on-going and ex-post analysis, having as a reference different temporal dimensions (short, medium and long term) and considering the adequate mix between the micro and the macro scale.

The aim of this contribution is to provide the economic impact of the European structure policy for the Romanian Health care system, highlighting in this way the decisive role of the policy tools and instruments as to support the decision making process and to evaluate national and European programmes and funds. According to the *Mapping of the use of European Structural and Investment funds in health in the 2007-2013 and 2014-2020 programming periods* report of the European Commission, in 2014 Romania was last among the EU Member States in terms of health expenditure as a share of the GDP (Romania 5,14%; EU-28 8,40%, Eurostat, 2014).

A case study, which involves the European Structural and Investment Funds (ESIF) and the co-financed part carried by the Romanian Government for the years 2014-2020, is considered in order to demonstrate the suitability of this instrument for assessing the direct and indirect economic effects on the Health care system, the ICT industries and the rest of the economic activities in Romania. Furthermore, the modelling introduced aim at evaluating the impact of the ESIF and the national co-fi-

[2] M. Ciaschini, A.K. El Meligi, N.A. Matei, R. Pretaroli, C. Socci, *European Structural Funds and Labor Force Requirement in Romania*, «Romanian Journal of Economic Forecasting», 18, 4, 2015.

[3] C. Socci, M. Ciaschini, A.K. El Meligi, *CO2 emissions and value added change: assessing the trade-off through the macro multiplier approach*, «Economics and Policy of Energy and the Environment», 2, 2014.

nancing expenditure on the GDP and employment in a multisectoral framework.

The paper will proceed as follows. Section 2 describes briefly the dynamic extended multisectoral model while Section 3 presents the Health care investment promoted by the ESI Funds 2014-2020. Section 4 introduces the higher order effects results of the study with particular attention on the direct stimulated industries and their cascade effects in the two scenarios proposed. Section 5 offers the results proposing different policy in order to obtain a more accurate impact, and finally concluding remarks are given in Section 6.

2. *Dynamic extended multisectoral model*

The main purpose of this paper is to evaluate the evolution of the GDP and value added by industry triggered by the ESIF in Health and the associated national co-financing for the period 2014-2023. The assessment is performed by making use of a multisectoral set of tools in the circular flow of income[4].

The study presents a dynamic extended multisectoral model inspired by the circular flow of income and built on the 2013 SAM of Romania, where through the development of a production block, commodities and industries are differentiated considering a "commodity-industry" approach. In this context, in which the Make and Use tables are separates, an industry by industry matrix has been defined under the Industry Technology Assumption (ITA)[5].

The main equations of the extended multisectoral model are introduced below[6]:

[4] K. Miyazawa, *Input-Output Analysis and Interrelational Income Multiplier as a Matrix*, Series *Lecture Notes in Economics and Mathematical Systems* 116, Berlin, Springer Verlag, 1976.

[5] All commodities produced by an industry are assumed to have the same input structure (R.E. Miller, P.D. Blair, *Input-output analysis: foundations and extensions*, Cambridge, Cambridge University Press, 1985).

[6] See Table 4 in the Appendix for a complete list of the variables employed in this article.

$$\mathbf{x_t} = \mathbf{D}\mathbf{q_t} \tag{1}$$

$$\mathbf{q_t} = \mathbf{B}\mathbf{x_t} + \mathbf{e_t} \tag{2}$$

with $\mathbf{B} = \mathbf{U}(\hat{\mathbf{x}}_\mathbf{t})^{-\mathbf{1}}$ and $\mathbf{D} = \mathbf{V}(\hat{\mathbf{q}}_\mathbf{t})^{-\mathbf{1}}$. In order to solve the model for the industy output , the equation 2 is substituted into equation 1 obtaining:

$$\mathbf{x_t} = \mathbf{DB}\mathbf{x_t} + \mathbf{D}\mathbf{e_t} \tag{3}$$

or alternatively,

$$\mathbf{x_t} = [(\mathbf{I} - \mathbf{DB})^{-1}\mathbf{D}]\mathbf{e_t} \tag{4}$$

The vector $\mathbf{q}_t$ is determined by pre-multipling the intermediate consumption matrix B[m, m] with the output vector $\mathbf{x_t}$, and adding the final demand vector $\mathbf{e_t}$. The latter is composed by the $\mathbf{f^c_{t-1}}$ vector which introduces the endogenous final demand formation and the exogenous final demand vector $\mathbf{f^0_t}$.

$$\mathbf{e_t} = \mathbf{f^c_{t-1}} + \mathbf{f^0_t} \tag{5}$$

A diagonal matrix L[m, m] is constructed in order to define the components that determine the generation and allocation of the value added, where each coefficient is defined as $l_j = 1 - \sum_{i=1}^{n} db_{ij}$. The total value added by industry $\mathbf{v^{io}_t}$ is obtained by further post-multiplying the matrix L by the output vector $\mathbf{x_{t\text{-}1}}$.

$$\mathbf{v^{io}_t} = \mathbf{L}\mathbf{x_{t-1}} \tag{6}$$

At a later step, by using a matrix of share factors W[f, m], the value added is disaggregated into its components (factors).

$$\mathbf{v^c_t} = \mathbf{W}\mathbf{v^{io}_t} \tag{7}$$

Finally, by employing the distribution of primary income $\mathbf{P}[h, f]$ each component is attributed to the institutional sectors.

$$\mathbf{v_t^s} = \mathbf{P}\mathbf{v_t^c} \tag{8}$$

After this stage, the transfers among institutional sectors, usually defined as secondary distribution of income need to be allocated. For this purpose, the matrix **T** is introduced which takes into consideration the income tax and other intersectoral transfers. In other words, to complete the phase of the disposable income formation in the secondary distribution, the matrix $\mathbf{T}[h, h]$ represents the share of net transfers between institutional sectors,

$$\mathbf{y_t} = (\mathbf{I} + \mathbf{T})\mathbf{v_t^s} \tag{9}$$

that can also be expressed as a function of the domestic industry output.

$$\mathbf{y_t} = [(\mathbf{I} + \mathbf{T})\mathbf{PWL}]\mathbf{x_{t-1}} \tag{10}$$

The final demand formation that determines the two components of final demand consumption starting from disposable income is represented in **F1C**. This matrix shows the constant share for final demand formation and it is composed by $\mathbf{F1}[m, h]$, that transforms the consumption expenditure per institutional sectors in I-O consumption, multiplied by the matrix $\mathbf{C}[h, h]$, which presents the average propensity to consume of the institutional sectors.

$$\mathbf{f_{t-1}^c} = [\mathbf{F1C}(\mathbf{I} + \mathbf{T})\mathbf{PWL}]\mathbf{x_{t-1}} \tag{11}$$

Finally, the final demand in its exogenous components is introduced, in order to close the loop of the circular flow of income. To this end, the investment shares demanded in the SAM are defined by vector $\mathbf{k}_t[m, 1]$.

The difference obtained between exports $\mathbf{f_t^x}$ and imports $\mathbf{f_t^m}$, generates the vector of net exports $\mathbf{f_t^0}$ that closes the exogenous part of the extended multisectoral model.

$$\mathbf{f_t^0} = \mathbf{k_t} + (\mathbf{f_t^x} - \mathbf{f_t^m}) \tag{12}$$

The structural form of the model can be expressed by replacing the equations 11 and 12 in equation 4, as follows:

$$\mathbf{x_t} = (\mathbf{I} - \mathbf{DB})^{-1}\mathbf{D}\{[\mathbf{F1C}(\mathbf{I} + \mathbf{T})\mathbf{PWL}]\mathbf{x_{t-1}} + [\mathbf{k_t} + (\mathbf{f_t^x} + -\mathbf{f_t^m})]\} \tag{13}$$

The reduced form of the model can be finally obtained by substituting the two groups of matrices $(\mathbf{I} - \mathbf{DB})^{-1}\mathbf{D}$ and $[\mathbf{F1C}(\mathbf{I} + \mathbf{T})\mathbf{PWL}]$ with R with G, respectively:

$$\mathbf{x_t} = \mathbf{R}(\mathbf{G}\mathbf{x_{t-1}} + \mathbf{f_t^0}) \tag{14}$$

The results in terms of value added impact can be formalized as follows:

$$\mathbf{L}\mathbf{x_t} = \mathbf{L}[\mathbf{R}(\mathbf{G}\mathbf{x_{t-1}} + \mathbf{f_t^0})] \tag{15}$$

3. *ESI Funds 2014-2020 for Health care system*

Health is a relevant issue in the new programming period 2014-20[7], indeed the overall health-related allocations being about 9,1 billions of euro, with a prevalence in the new Member States.

The current European Union allocation for the cohesion policy for 2014-2020 adds up to 351.8 billions of euro, from which Romania's share equals 22.9 billions of euro, being the fourth biggest beneficiaries after Poland, Italy and Spain.

[7] In the new programming period the level of support available for the Member States (the maximum co-financing rates) will be 85% in less developed regions and up to 80% in more developed regions. Romania has seven regions considered as less developed, and one defined as more developed (Bucharest-Ilfov).

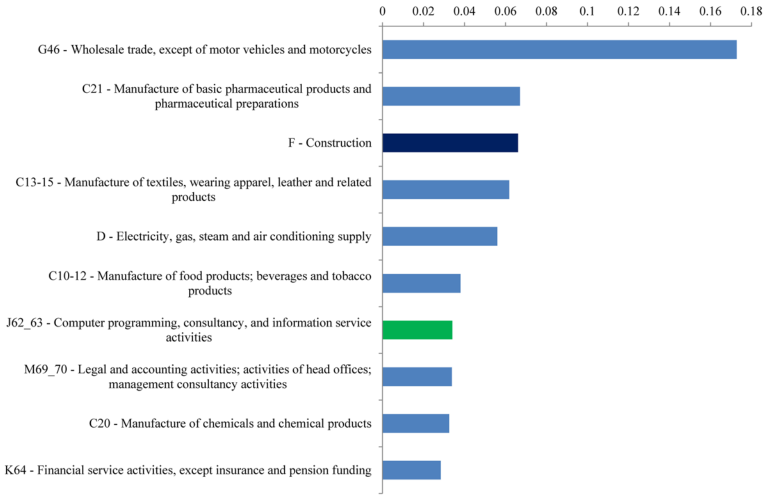


Figure 1. Top ten activities Leontief multipliers for the Human health final demand.

Romania is also the second member states for health-related allocation after Poland.

The investments in *Human health activities*[8], as mentioned before, has the potential to trigger the production processes of other relevant industries in a context of interconnected economic systems. In our case, a measure of this effect, produced by *Human health activities*, can be provided as looking at the Leontief multipliers given by the **R** matrix. In this respect, Figure 1 shows a ranking of the first ten industries activated when the *Human health activities* receives a unitary increment in the final demand[9].

The rank shows that the most stimulated industry is the *G46 – Wholesale trade, except of motor vehicles and motor-*

[8] The health care activities are located in the Statistical Classification of Economic Activities in the European Community, Rev. 2 (2008) in the industry "Q86 – Human health activities" which includes three subcategories: Hospital activities, Medical and dental practice activities, Other human health activities.

[9] Miller and Blair, *Input-output analysis: foundations and extensions*, cit.

cycles, followed by the pharmaceutical industry *C21 – Manufacture of basic pharmaceutical products and pharmaceutical preparations*. The *F – Construction* industry occupying the third place is one of the triggered sectors, following the categories in Table 1, that are meant to be funded by the health investment together with one of the ICT industry *J62_63 – Computer programming, consultancy and related activities; Information service activities*.

Programmes	Health allocation	Category	Specific objective
Regional OP	€ 319.15	053 - Health Infrastructure	Investing in health and social infrastructure which contributes to national, regional and local development, reducing inequalities in terms of health status.
Human Capital OP	€ 457.10	112 - Enhancing access to affordable, sustainable and high-quality health care	Increasing the number of people receiving health programs and services aimed at prevention, early detection (screening), early diagnosis and treatment for major diseases
Competitiveness OP	€ 30.00	081 - Strengthening ICT Applications including e-health	Strengthening ICT applications for e-government, e-learning, e-inclusion, e-culture and e-health
Administrative Capacity OP	€ n/a	107 - Active and healthy ageing	Various activities designed to help elderly people to remain active and healthy and prevent social exclusion of elderly people are to be supported.
Total:	€ 806.25		

Table 1. Financial allocation from EU which include the health care investments (in millions of euro).

Table 1 illustrates an overview of the financial allocation addressed to fund the Health-related activities, per category and operational programme.

The Health care system in Romania is funded by 3 Operational Programmes (OP): Regional, Human Capital and Competitiveness with a total amount of 1,215 millions of euro (806,2 from UE and 409,5 co-financed by the Government).

The Regional OP funds the health infrastructure that contributes to the national, regional and local development. The Human Capital OP aims at the prevention, early detection (screening), early diagnosis and treatment for major diseases. The last OP is the one that considers investments on strengthening ICT Applications including the e-health.

Operational Programmes	Fund	2014	2015	2016	2017	2018	2019	2020	TOTAL
Regional	ERDF	0	80.8	40.7	48.1	48.6	49.8	51.2	319.1
Human Capital	ESF-YEI	54.5	58.4	62.5	65.8	69.0	72.0	74.9	457.1
Competi-tiveness	ERDF	3.5	3.8	3.9	4.2	4.6	4.8	5.3	30
Regional	ERDF	0	81.0	40.8	48.2	48.7	49.9	51.3	319.8
Human Capital	ESF-YEI	10.0	10.7	11.5	12.1	12.7	13.3	13.8	84.1
Competi-tiveness	ERDF	0.7	0.7	0.7	0.8	0.8	0.9	1.0	5.6
TOTAL	-	68.8	235.4	160.1	179.1	184.4	190.6	197.4	1215.8

Table 2. Ex-ante allocation of the Health care investments per year (in millions of euro).

The present study is developed on two scenarios which show the GDP trend based on two different assumption. The first one is based on an ex-ante allocation of the funds following the time schedule provided per each OP, where the total amount of the programmes is considered to be spent.

In the second one only 90.2% of the total amount is assumed to be spent, following the expenditure of the previous programming period, 2007-2013. Moreover for the 2017 and 2018 the existing opened and closed calls have been considered, while for the projection of the last five years the annual expenditure share of the previous programming period has been taken into account.

Operational Programmes	Fund	2017	2018	2019	2020	2021	2022	2023	TOTAL
Regional	ERDF	0.0	33.0	23.5	47.4	72.9	37.2	79.5	293.6
Human Capital	ESF-YEI	54.7	23.6	15.5	99.7	16.5	102.8	89.1	402.0
Competitive-ness	ERDF	0.0	0.0	2.5	5.0	7.7	3.9	8.4	27.6
Regional	ERDF	0.0	31.7	23.6	47.7	73.5	37.5	80.1	294.2
Human Capital	ESF-YEI	10.1	4.4	2.9	18.3	3.0	18.9	16.4	74.0
Competitive-ness	ERDF	0.0	0.0	0.5	0.9	1.4	0.7	1.6	5.1
TOTAL	-	64.7	92.7	68.4	219.1	175.1	201.2	275.1	1096.4

Table 3. Ex-post assessment of the allocation Health care per year, (in millions of euro).

Each annual amount has been allocated per industry, considering the categories listed in Table 1 and has been divided as capital or current expenditure in the final demand, following the purpose of each specific objective.

4. *Results*

The outcome of the proposed approach shows two distinct scenarios, the first with the ex-ante allocation of the Health care investments and the latter that follows the on-going expenditure plus a projection trend assessed on the base of previous programming period.

Figure 2 illustrates the trend of the GDP percentage variation for the two scenarios, where a different expenditure ratio allows describing the two different impacts. The ex-ante trend follows the dynamic of the investment that starts from the year 2014 and ends up in the 2020. After that period there is no more injection by the ESIF and the Government but the system still benefits from the previous investments boost.

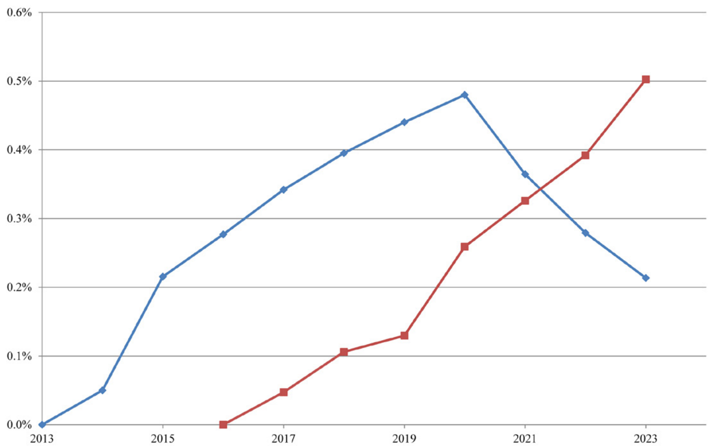


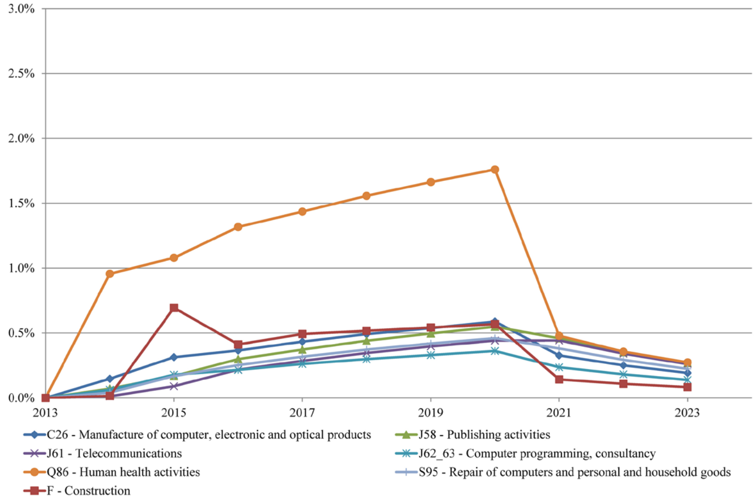
Figure 2. GDP percentage variation from the benchmark.

In a different way the *on-going plus projection* allocation describes a different trend which starts in the 2017 until 2023, the last date to allocate and fund the projects and where, in this case, the concentration of investments is bigger the closer it gets towards the end of the funding programme. Even though the total amount of the *on-going plus projection* scenario is lower than the ex-ante, the trend reaches 0.5% in the 2023.

When going into details of the value added, Fig. 3 and 4 highlight the results in disaggregated terms of both *ex-ante* and *on-going plus projection* allocation. The first one underlines the results on the direct prompted industries, as the Health care activities, the Construction and the five ICT industries, while the latter shows the effects on the other industries, hereinafter referred to as no prompted industries, derived by the injection of the direct prompted industries.

It should be noted in Fig. 3 a) and b) the interesting dynamic of the impact of the *Q86 – Human Health activities* which proceeds along the trend portrayed by the *C21 – Manufacture of basic pharmaceutical products* industry in Fig. 4 a) and b).

a)



b)

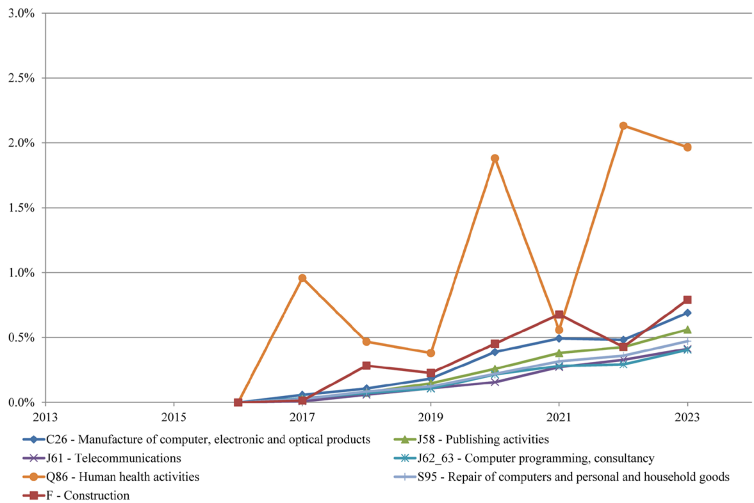


Figure 3. Value added variation from the benchmark on *prompted* sectors, *a)* ex-ante and *b)* On-going + projection allocation

The scenarios a) and b), in both Figures 3 and 4, also show how the results of the *Human health activities* industry and the others triggered sectors, differently reacting to the two different allocation creating a fluctuating trend, especially in the Figures 3 b) and 4 b). Another interesting trend is the one described by the Construction industry that trigger indirectly the *B – Mining and quarrying* industry and the *C23 – Manufacture of other non-metallic mineral products* industry, being the highest among the top five industries and reaching an increase of 2.8% in both scenarios.

Please note that with AVG 65 is indicated the average trend of the 65 industries.

5. *Policy scenario*

A different policy assessment can be addressed through the Macro Multiplier approach[10], selecting and/or combining structures for the final demand that can be oriented on the health care and ICT activities growth.

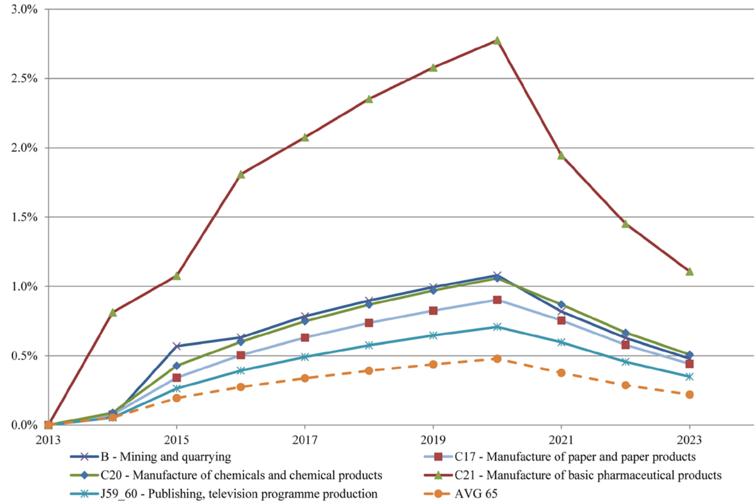
The Macro Multipliers (MM) approach is based on the identification of the structures of the control variable, compatible with the target set by the decomposition of the structural matrix in the reduced form of the model. In particular, the decomposition of the matrix R is the following:

$$\mathbf{R} = \mathbf{O}\,\mathbf{Z}\,\mathbf{M}' \tag{16}$$

The right matrix (**M'**[*m*,*m*]) identifies the composition of the policy control (final demand), the central matrix **Z** represents

[10] M. Ciaschini, C. Socci, *Income distribution and output change: a macro multiplier approach*, in N. Salvadori (ed), *Economic growth and distribution. On the nature and causes of the wealth of nations*, Cheltenham-Northampton, Edward Elgar, 2006; M. Ciaschini, R. Pretaroli, C. Socci, *A convenient multisectoral policy control for ICT in the US economy*, «Metroeconomica», 60, 4, 2009; M. Ciaschini, R. Pretaroli, C. Socci, *Health-care in Europe as a driving force for output and GDP*, in A. Prinz, B. Steenge, G.-J. Hospers, M. Langen (eds), *Global Forces, Local Identity: The Economics of Cultural Diversity*, Berlin, LIT Verlag, 2011; C. Socci, M. Ciaschini, R. Pretaroli, F. Severini, *Health services as a key sector for income and employment change*, «Bulletin of the Transilvania University of Brasov», 3, 52, 2010.

a)



b)

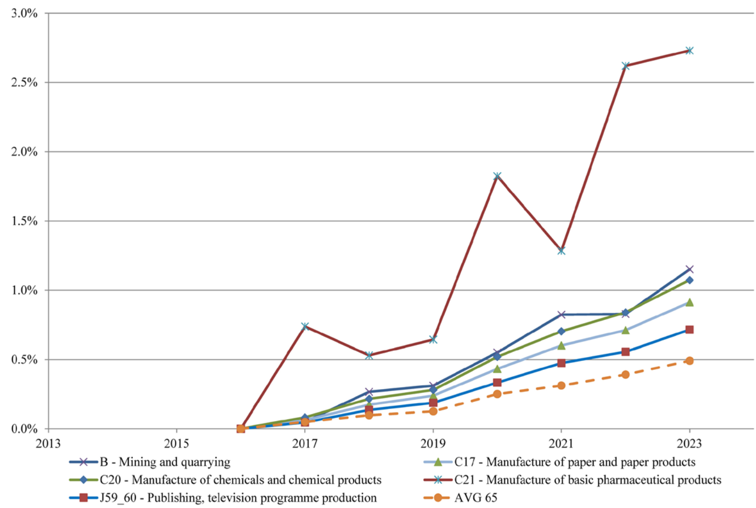


Figure 4. Value added variation from the benchmark on the top 5 *no-prompted* sectors, *a)* ex-ante and *b)* On-going + projection allocation

the scale factors and it's composed of m singular values and the left matrix ($\mathbf{O}[m,m]$) identifies the structures of the policy target variable.

The convenient policy structure will be given by the combination of two policy target structures, $[o_1 z_1]$, that is the dominant structure and the structure $[o_8 z_8]$ that is more suitable for the stimulated industries, Health care activities, Construction and the 5 ICT industries. This mix (equation 17) is determined among the elements of each row, a_1 and a_8, of the two selected policy control structures, where a_1 is $0<a_1<1$ and a_8 is $a_8=1-a_1$[11].

$$\mathbf{e}^* = \mathbf{m_1}\, a_1 + \mathbf{m_8}\, a_8 \tag{17}$$

Similarly, the result can be also expressed in terms of output using the policy target vector multiplied by the respective coefficients, so that:

$$\mathbf{x}^* = [\mathbf{o_1} z_1]\, a_1 + [\mathbf{o_8} z_8]\, a_8 \tag{18}$$

In order to obtain the results in terms of value added the same process explained in the equation 15 can be followed.

Figure 5 portrays the different impacts in terms of GDP percentage variation depending on the usage of three different structures of the final demand for the two scenarios, without changing the total amount invested. Clearly, the trends described by the dominant structure (str. 1) obtain the highest impact for both scenarios while, at the same time, the results achieved with the structure (str. 8), oriented to the health-related activities and ICT industries, are the lowest. On the contrary of what can be observed from the Fig. 5 the role of the structure eight is anything but pointless. In fact the combination of the two structures in disaggregated terms allows to address the complex task of achieving the growth of all the ICT sectors and at the same time obtaining positive results in the Health care activities, in the Construction and in all the other industries.

[11] Ciaschini *et al.*, *A convenient multisectoral policy control*, cit.

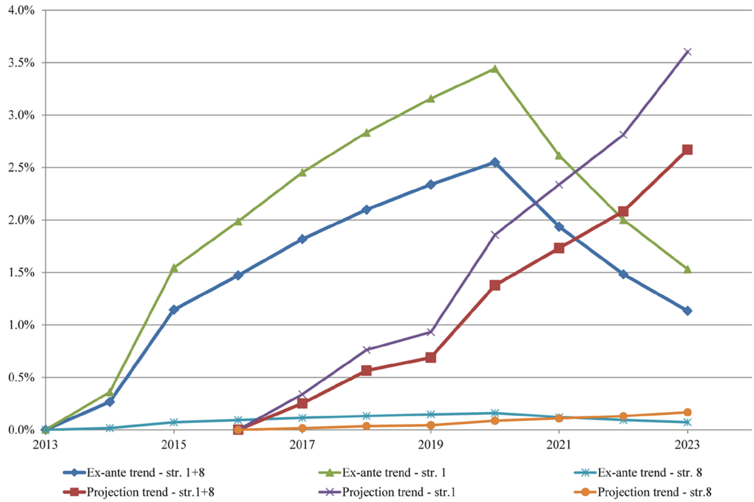


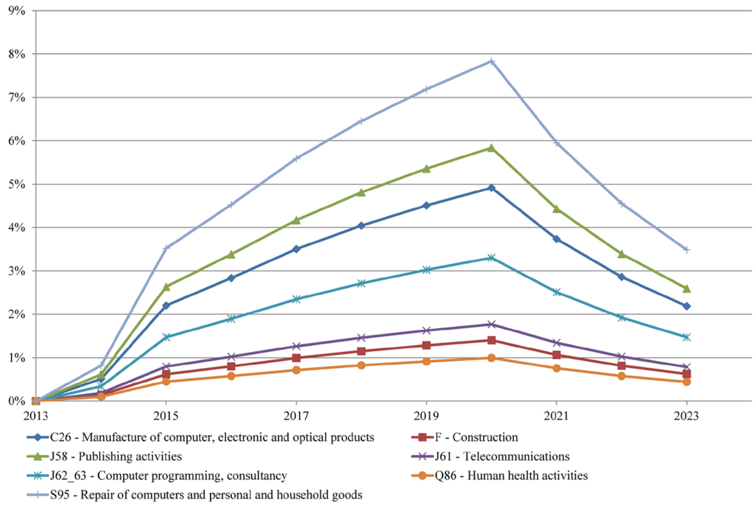
Figure 5. GDP percentage variation from the benchmark with the combined structure.

Indeed in both scenarios that show the impacts on the prompted industries the first five are the ICT industries, obtaining at the same time, a higher response in terms of value added growth when comparing the results with the ones obtained in Fig. 3 a) and b). Moreover the combined structure has higher positive results also in terms of indirect impact on the no-prompted industries as it is also shown when comparing Fig. 4 with Fig.7.

6. *Conclusion*

The sectoral policies and their related targets have the primary goal to support and stimulate the development through innovation processes related to the industrial improvement in terms of production and the strengthening of the interrelations among activities. In order to reach that target is crucial to dispose of a set of instruments able to evaluate the impacts

a)



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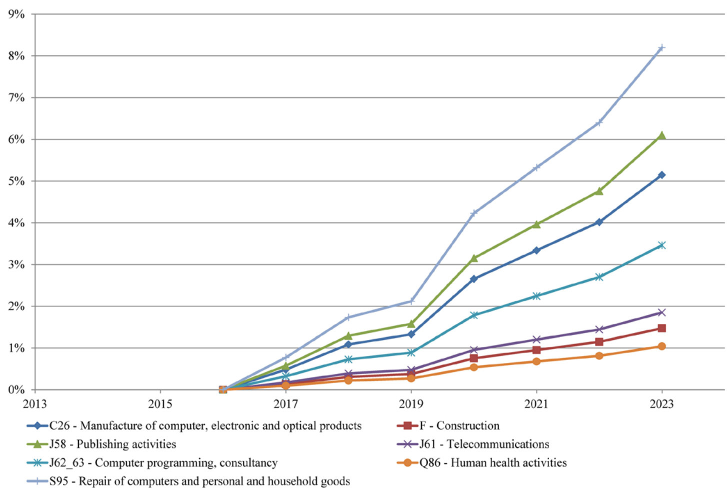


Figure 6. Value added variation from the benchmark on *prompted* sectors, *a) ex-ante* and *b) On-going + projection* allocation with the combined structure

when the different phases of the evaluation process require it, i.e. ex-ante, on-going and ex-post.

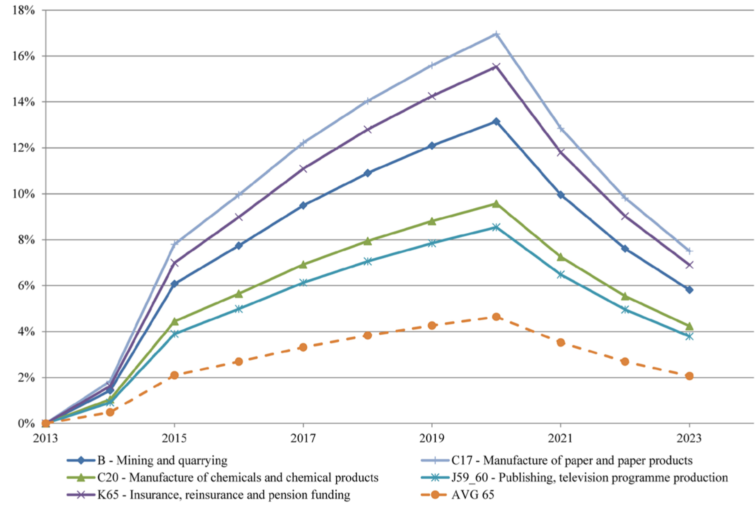
Furthermore, it is relevant to identify in disaggregated terms the convenient composition that this policy instrument have to assume in order to reach the pursued effect. The degree of integration of the Health care activities and the ICT industries cannot depends only on the interrelations created in the productive sphere but also considering the induced effects created by the primary and secondary income distribution, and the use of the disposable income for the new final demand formation.

The direct and indirect effects generated by the Health care investment contribute in stimulating the value added, the income and the employment of other sectors, such as the ICT which is one of the main targets of the current programming period.

The two hypothetical scenarios presented, compared with the benchmark clearly underline the difference between the no-intervention and the presence of this policy instrument. In aggregated and disaggregated terms, the results of the proposed model underline the importance of this instrument for achieving the European target and obtain a positive effect in terms of production and GDP for developing countries.

Finally, the combination of two structures among all those suggested by the Macro Multiplier approach, has permitted us to detect and calibrate the one geared to obtain the maximum impact and the one oriented to the health related activities and ICT industries. The result of this process has shown a way to support the decision making process, asserting the decisive role of these policy tools and instruments aimed at studying and evaluating national and European programmes and funds.

a)



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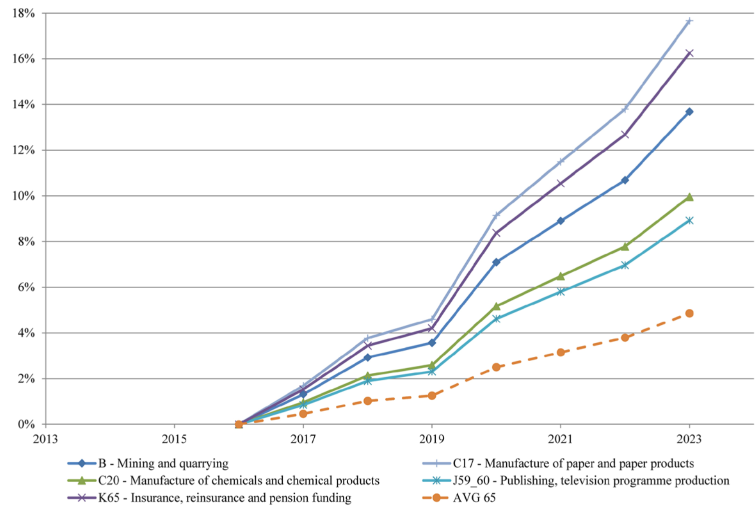

Figure 7. Value added variation from the benchmark on the top 5 *no-prompted* sectors, *a) ex-ante* and *b) On-going + projection* allocation with the combined structure

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Appendix

x_t	Output by industry, at time *t*.
q_t	Output by commodity, at time *t*.
D	Market shares matrix.
B	Shares matrix of the commodity output produced by each industry.
e_t	Final demand, at time *t*.
U	Use Table.
V	Make Table.
$\mathbf{f}_{t-1}^{c}$	Endogenous final demand, at time *t*-1.
$\mathbf{f}_{t}^{0}$	Exogenous final demand, at time *t*.
$\mathbf{f}_{t}^{x}$	Exports vector, at time *t*.
$\mathbf{f}_{t}^{m}$	Imports vector, at time *t*.
$\mathbf{v}_{t}^{io}$	Value added by industry, at time *t*.
$\mathbf{v}_{t}^{c}$	Value added by component, at time *t*.
$\mathbf{v}_{t}^{s}$	Value added by Institutional Sector, at time *t*.
L	Diagonal matrix of the value added coefficients.
W	Share matrix of the value added by component.
P	Share matrix of the value added by Institutional Sector.
y_t	Disposable income, at time *t*.
I	Identity matrix.
T	Share matrix of the transfer among the Institutional Sectors.
F1	Share matrix of the consumption expenditure by Institutional Sector.
C	Propensity to consume matrix by Institutional Sector.
k_t	Investment shares vector, at time *t*.
G	Structural matrix of the endogenous final demand.
R	Inverse matrix post-multiplied by D.
O	Matrix of the policy target variables.
Z	Diagonal matrix of the scale factors.
M	Matrix of the policy control variable.

a_i	Convenient coefficient for the new policy.
$\mathbf{m_i}$	Generic policy control vector.
$\mathbf{o_i} Z_i$	Generic policy target structure.
$\mathbf{e}^*$	The new final demand vector given by the combination of two policy control vectors.
$\mathbf{x}^*$	The new output vector derived by the combination of the policy target structures and the two convenient coefficients.

Table 4. List of the variables employed in this article.