Data:	Thu, 15 Feb 2024 10:10:27 +0100 [15/02/2024 10:10:27 CET]
Da:	piera.cascioli@unich.it
A:	colantonio@unich.it
Oggetto:	Fwd: DECON 2021_2022
Parte(i):	📄 2.0 Messaggio Inoltrato 8 KB
	📄 2.2.0 Messaggio Inoltrato 7 KB

📋 1 sconosciuto 0 KB

Buongiorno Prof.,
ecco la mail.

Data: Mon, 12 Feb 2024 09:24:51 +0100
Da: piera.cascioli@unich.it
A: dario.dingiullo@unich.it
Oggetto: Fwd: DECON 2021_2022

📋 2.1 sconosciuto 0 KB

Data: Thu, 13 Jul 2023 13:52:52 +0200 (CEST)
Da: DECISION ECONOMICS <info@decision-economics.net>
A: piera.cascioli@unich.it
Cc: Donatella Furia <donatella.furia@unich.it>
Oggetto: Re: DECON 2021_2022

📧 2.2.1 sconosciuto 3 KB

Dear Dr. Cascioli,

We apologise for the inconvenience you have had to endure: We, ourselves, are going through similar inconveniences and challenges. Despite ourselves, simply put, we are still grappling with a post-pandemic bottleneck with publishing operations, but we are already headed in the right direction regarding the publications you care about.

While waiting to start the typographic phase and proceed with the final operations preceding the publication, we report below the two bibliographic references concerning your participation in DECON 2021 and 2022:

DECON 2021: Cascioli, P., Colantonio, E., Furia, D., & Quaglione, D. (forthcoming). Health and school dropout: Uncertainty or reciprocity? In E. Bucciarelli, S.-H. Chen, J. Parra, & J.M. Corchado (eds.), Decision Economics: Reckoning with Radical Uncertainty and its Multifarious Forms. Cham (Switzerland): Springer-Nature.

DECON 2022: Cascioli, P., D'Ingiullo, D., Furia, D., & Quaglione, D. (forthcoming). Does regional well-being affect the NEET phenomenon? Evidence from Italy. In E. Bucciarelli, S.-H. Chen, J. Parra, and J.M. Corchado (eds.), Advances in Decision Economics and its Interdisciplinary Foundations. Cham (Switzerland): Springer-Nature.

Of course, you can rely on these bibliographic references for almost any need you might encounter for yourself and your co-authors, too. This official email from the organisation that presides over the international scientific conference on Decision Economics certifies the above.

Thanking you for your understanding, we look forward to hearing from you at your earliest convenience.

Sincerely,

Decision Economics 2023 Secretariat
On behalf of the Organising Committee
J.P.D.

On 11/07/2023 10:41 CEST piera.cascioli@unich.it wrote:

Good morning,
I am Piera Cascioli, I am writing for information about the status of
the publication relating to the Conference held in 2021 and in 2022.
Thank you in advance.

Best regards

Piera Cascioli

Health and school dropout: uncertainty or reciprocity?

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Abstract. It is well known that education plays a central role in modern globalized economies, and it is a strategic strength for the knowledge-based economy. For this reason, among other determinants, early school leaving, otherwise known as dropout, contributes to hindering the development of human capital. Although in Western economies it is common practice to reach a third-level degree, in Italy the phenomenon of dropout, especially at secondary school level, is widespread. It is closely linked to the socio-economic context, which involves aspects of culture and local habits that characterize many regions of the country, specifically in the southern area. The aim of the paper is to deepen knowledge of this topic with regard to obesity as an indicator of poor physical and psychological health which, especially in recent years, has become an important issue involving increasing numbers of young people. We employed a panel vector autoregressive (PVAR) model in first differences to test the dynamic relationships between dropout rate, obesity, and other indicators. The study involved 20 Italian regions for the period 2004 to 2017 (the Italian National Institute of Statistics - ISTAT). The results of our analysis confirm that obesity can lead to an early abandonment of studies since it is known that overweight people are often victims of bullying and, consequently, are prompted to live in isolation.

Keywords: School dropout · Health · PVAR

1   Introduction

The importance that society attaches to education is the basis for the development of its human capital. Indeed, education is one of the major factors capable of increasing the productivity and competitiveness of a country, generating economic growth as the first material result, and representing a fundamental need for expanding the number of people able to participate in an inclusive, social life.

In this regard, the problems related to education and human capital and, more generally, of economic development are some of the most crucial concerns at the international level, attracting not only growing attention from the institutions of underdeveloped countries but arousing just as much concern among the advanced countries.

Among the latter, Italy is currently struggling with a 'new' industrial revolution triggered by digital technologies. Education plays a key role in this context due to the growing importance of the information age and the knowledge economy. Accordingly, it is essential to reconcile the speed of the technological changes taking place with the slower pace of education. This is aimed at widening the audience of those who complete the education cycle in order to avoid falling behind and increasing the educational gaps between countries. Although in Western economies it is common practice to reach a third-level degree, in Italy the school dropout rate, especially at secondary school level, is widespread and closely linked to the socio-economic context which involves aspects of culture and local habits that characterize many regions of the country, specifically in the southern area [1]. This negatively reflects the level of education achieved. Indeed, about 44.5% of young people aged between 25 and 35 reach the third level of education in the most developed countries; this percentage drops to 27.7% in Italy (OECD database). This data is alarming due to the negative effects of school dropout in terms of economic growth and development.

According to the relevant literature [e.g., 2, 3, 4, 5], the causes of school dropout are attributable mainly to the family environment and, in particular, to the lack of family support of young people, the role and quality of institutions and the school system, the teachers' distrust of students that inevitably affects the teacher-student relationship, the absence of didactic and educational programmes especially for children with disabilities, inequalities affecting educational attainment, the local economic situation, crime and consequent marginalization, social capital and social participation, and health, especially referring to the use of alcohol and drugs. As regards the latter, there are programmes, including the "Empowerment Theory" and the "Youth Empowerment Solutions for Positive Futures" (YES-PF), which promote actions to improve the health conditions of young people by helping them to gain confidence, think critically, take action to address stressful situations, and reduce drug use [6, 7, 8].

Some recent studies have investigated the effect of obesity on the level of education achieved by identifying an association between childhood obesity and low educational level in early adulthood, also with reference to gender differences [9, 10, 11].

The aim of the paper is to investigate the most important factors that can lead to an increase in school dropout, focusing, in particular, on the role of obesity as an indicator of poor physical and psychological health which, especially in recent years, has become an important issue involving more and more young people.

2 Empirical analysis

2.1 Methodology and model specification

The purpose of the analysis is to highlight the role of some determinants of the dropout phenomenon, specifically obesity, as an indicator of poor physical and psychological health, in a panel of 20 Italian regions, using the longest timespan possible from 2004 to 2017. Our empirical strategy is based on the PVAR approach, combining the traditional VAR, which treats all the variables in the system as endogenous, with the panel

data approach, which borrows strength from the cross-sectional dimension and focuses on bidirectional effects. Following the previously revised literature, we have introduced a model based on the variables listed in Table 1.

Table 1. Data description and sources.

Variable	Definition	Source
DROPOUT	Dropout rate at the end of the first year of upper secondary school (dropouts are based on the total number of students enrolled in the first year of upper secondary school) (%)	ISTAT
VOLUNT	Persons aged 14 years and over who have carried out free activities for voluntary associations in the last 12 months (%)	ISTAT
GDP	GDP per capita using constant 2010 prices (euros)	ISTAT
SPEDU	Final expenditures on education by public administrations divided by the total population (euros)	ISTAT (per capita values)
CRIME	Perception of families regarding the risk of crime in the area in which they live, namely, families who feel very or fairly uncomfortable regarding the risk of crime in the area where they live out of the total number of families	ISTAT
OBESITY	Standardized proportion with the European population in 2013 of people aged 18 and over overweight or obese on the total of people aged 18 and over. The indicator refers to the World Health Organization (WHO) classification of the Body Mass Index (BMI: ratio between weight, in kg, and the square of height in meters).	ISTAT

We are aware that the variables chosen are not an exhaustive explanation of the phenomenon of school dropout. It is, however, a preliminary analysis which provides a basis for a future deeper investigation of the subject. The limitations of this study suggest, in fact, the adoption of further indicators to focus on the investigation of the relationship between school dropout and health.

Following Love and Zicchino [12], we introduced the specified PVAR model:

$$X_{it} = f_i + \Gamma(L)X_{it} + \varepsilon_{it}, \tag{1}$$

where X_{it} represents the vector of stationary variables in our analysis, $\Gamma(L)X_{it}$ is a square matrix of polynomials in the lag operator, and ε_{it} is the random error term (later, Δ denotes the first difference operator). The descriptive statistics for the variables are reported in Table 2.

Table 2. Descriptive statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
DROPOUT	280	9.44	2.94	4.03	19.24
VOLUNT	280	9.80	3.93	4.40	23.96
GDP	280	25961.50	6579.89	15309.73	36892.29
SPEDU	280	1846.52	170.68	1365.68	2366.22
CRIME	280	25.87	10.82	5.15	53.91
OBESITY	260	45.42	4.43	36.70	54.40

For obesity, there are only 260 comments, as one observation is missing for each of the 20 regions. Missing data, however, are not a problem for the econometric analysis (PVAR).

2.2 Empirical testing

Macroeconomic variables are usually characterized by non-stationarity, which can cause spurious results in the context of VAR and panel analyses. A possible solution is the use of the first-difference transformation. The first step of the empirical analysis is to check the stationarity of the various series using both first and second generation unit root tests. Specifically, the IPS tests [13, 14], the MW tests [15] and the Pesaran tests [16] have been used. All tests are characterized by a null hypothesis that assumes a unit root. The results of these panel unit root tests are reported in Table 3 (variables in level) and Table 4 (variables in first differences).

Table 3. Unit root tests: variables in level

Variable	IPS W-t-bar	MW	Pesaran Z-t-bar
DROPOUT	1.6597	14.633	-4.768***
VOLUNT	-4.1831***	63.648***	-4.835***
GDP	1.1299	23.593	0.485
SPEDU	-7.9675***	128.653***	-2.9***
CRIME	-4.2462***	80.035***	-1.505**
OBESITY	-7.4205***	70.711***	-4.42***

Note: *$p < 0.1$; **$p < 0.05$; ***$p < 0.01$

Table 4. Unit root tests: variables in first differences

Variable	IPS W-t-bar	MW	Pesaran Z-t-bar
ΔDROPOUT	-10.5101***	126.143***	-7.259***
ΔVOLUNT	-15.7823***	222.103***	-6.355***
ΔGDP	-7.201***	134.151***	-1.511**
ΔSPEDU	-6.5411***	123.482***	-5.578***
ΔCRIME	-10.5467***	190.414***	-5.787***
ΔOBESITY	-13.7277***	181.971***	-4.728***

Note: *$p < 0.1$; **$p < 0.05$; ***$p < 0.01$

The results show that not all the variables are stationary in level. However, all the chosen variables are stationary after the first difference: all the series are integrated of order one (I(1)).

Table 5 shows the results of the cointegration tests introduced by Westerlund [17]. These tests assume the null hypothesis of no cointegration, which cannot be rejected based on the results of all four tests. Therefore, the empirical characteristics of the chosen variables require estimation in first differences, as the variables in level are not cointegrated.

Table 5. Cointegration tests

Statistic	Value	p-value
G_τ	-6.013	0.49
G_α	-0.378	0.34
P_τ	-4.673	0.41
P_α	-0.344	0.40

Note: p-value are robust critical values obtained through bootstrapping with 100 replications

We examined the correlation matrix and the variance inflation factor (VIF) to assess whether collinearity and multicollinearity were a concern for our analysis. The statistics are shown in Table 6 (ΔDROPUT is used as dependent variable). Given the low correlation values and the low VIF and mean VIF values, we can conclude that collinearity and multicollinearity were not a concern.

Table 6. Correlation matrices and VIF statistics

	ΔDROPOUT	ΔVOLUNT	ΔGDP	ΔSPEDU	ΔCRIME	ΔOBESITY
ΔDROPOUT	1.000					
ΔVOLUNT	0.159	1.000				
ΔGDP	0.038	0.114	1.000			
ΔSPEDU	0.215	0.101	0.042	1.000		
ΔCRIME	-0.010	0.161	0.174	-0.024	1.000	
ΔOBESITY	0.009	-0.011	-0.062	0.083	-0.119	1.000
VIF		1.05	1.04	1.02	1.07	1.02
Mean VIF	1.04					

The final preliminary step is lag order selection. Following the econometric literature, the optimal lag length should minimize the moment model selection criteria developed by Andrews and Lu [18]: the Moment Bayesian Information Criterion (MBIC), Moment Akaike's Information Criterion (MAIC), and Moment Hannan and Quinn Information Criterion (MQIC). Based on the three model selection criteria, a first order PVAR model was chosen.

Table 7. Lag order selection criteria

Lag	MBIC	MAIC	MQIC
1	-283.993	-62.581	-152.489
2	-118.699	-7.994	-52.948

We removed the deterministic fixed effects f_i in Eq. (1) by using the first-difference transformation. As well known, this method may generate the so-called Nickell bias [19] due to the correlation between the first-differenced lag and the first-differenced error term, which both depend on ε_{it-1}. In this context, estimating the model using OLS will produce biased and inconsistent results [20]. We used forward mean-differencing, also referred to as the Helmert transformation [12, 21] to overcome this problem. The system may thus be estimated using the Generalized Method of Moments and the lagged values of regressors can be used as instruments.

2.3 Results and discussion

The first order PVAR results are shown in Table 8.

Table 8. PVAR results

Independent Variables	Dependent Variables					
	ΔDROP	ΔVOLU	ΔGDP	ΔSPEDU	ΔCRIME	ΔOBESITY
ΔDROP	-0.234**	-0.219**	33.445	13.322***	1.809***	0.143*
ΔVOLUNT	-0.500***	-0.574***	-520.338***	-27.768***	0.722	-0.340***
ΔGDP	0.000	0.000**	0.680***	-0.001	0.002	0.000
ΔSPEDU	0.007**	0.002	-0.350	-0.001	-0.027	0.005*
ΔCRIME	0.016	-0.143***	-134.455***	3.696***	-0.608***	-0.058*
ΔOBESITY	0.754***	0.005	-597.608***	19.649***	-5.236***	-0.621***

Note: *$p < 0.1$; **$p < 0.05$; ***$p < 0.01$

An increase in volunteering seems to counteract the dropout phenomenon; conversely, an increase in education spending seems ineffective. This result offers a number of points to consider and deserves further study. In fact, it suggests that school dropout has deeper roots and an increase in expenditure on education itself is not enough to combat it unless it is properly targeted and finalized. Together with the other results of the model, it may be appropriate in future research to consider the above expenditure

in its two components, cash transfers and benefits in kind, to assess which is more effective, or also to consider the delayed effects of an increase in expenditure on education. An increase in obesity seems to favour the increase in dropouts, probably due to isolation, discrimination, and bullying. An increase in dropouts also generates a reduction in voluntary activities, as well as a higher crime rate. Volunteering is instead favoured by the increase in income. Crime and obesity (or more generally psycho-physical discomfort) can cause an economic slowdown. A higher number of dropouts should increase spending on education. However, this has been ineffective so far against the phenomenon, as previously stated before. Finally, the increase in the number of dropouts is also associated with an increase in obesity.

Table 9 reports the variance decomposition, which assesses the relative weight of shocks in one variable to variation in other variables over time. The forecast error variance decomposition follows the Cholesky decomposition method and was performed using 1000 Monte Carlo simulations for ten periods. The table shows that each variable is mainly influenced by its lag. In particular, DROPOUT is mainly determined by OBESITY (39%) on average during a ten year period.

Table 9. Variance decomposition analysis

Response Variable	Impulse Variable					
	ΔDROPOUT	ΔVOLUNT	ΔGDP	ΔSPEDU	ΔCRIME	ΔOBESITY
ΔDROPOUT	0.43	0.03	0.09	0.01	0.05	0.39
ΔVOLUNT	0.14	0.33	0.06	0.01	0.16	0.29
ΔGDP	0.18	0.07	0.25	0.00	0.10	0.40
ΔSPEDU	0.21	0.08	0.08	0.24	0.06	0.32
ΔCRIME	0.25	0.02	0.12	0.01	0.16	0.44
ΔOBESITY	0.17	0.04	0.10	0.01	0.07	0.61

Note: Variation in Response Variable explained by the Impulse Variables in the columns (10 periods ahead)

3 Conclusions and policy implications

The above findings confirm that school dropout is a multidimensional process. In this regard, one could argue that school dropout is a phenomenon or a series of symptoms that might be explained based on a variety of reasons, none of which are compartmentalized. There is relatively little research to determine the reasons why so many people, especially children, drop out of schools in Italy. This, in turn, might lead to a tendency to point to single causes or explanations. Nevertheless, our analysis shows that an increase in volunteering seems to counteract the phenomenon of early school-leaving, most likely due to social initiatives promoting training, even if a high school dropout rate negatively affects participation in social activities and, at the same time, leads to a higher crime rate. On the contrary, an increase in spending on education seems ineffective and, even if existing, often the investments made are not functional in terms of quality. Obesity also causes an increase in school dropout, probably due to situations of isolation, bullying, and discrimination.

It is important, therefore, that the State invests in the teachers' training. They are key figures in schools, especially in lower grades, which makes them able to recognize and deal with situations of distress, help children in difficulty, and encourage them to continue their studies.

The State should also better support, at an economic level, all those families that have the desire to educate their children, but because of scarce finances and, as unfortunately happens today, the lack of employment, fail to provide adequate health care. The relationship between psycho-physical hardship and education, especially at non-low levels of education, can push children to lead a criminal life. This has negative consequences at a microeconomic level, drastically reducing the opportunities for a better individual life, and at a macroeconomic level, slowing down the process of development of the country.

The limit of this analysis is that the indicators considered are not exhaustive to explain a complex phenomenon such as school dropout as different and additional aspects may push young people to leave school early. However, the results of the analysis specifically highlight the existence of a two-way relationship between obesity and school dropout that deserves further investigation.

Future research may implement different models to consider other factors that can slow the dropout rate in Italy, a theme partly treated in a recent work with particular reference to additional indicators of the state of health of young people.

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