The burden of obesity in Italy: a generational approach

by

V. Atella, F. Belotti, J. Kopinska, A. Piano Mortari

Centre for Economic and International Studies
CEIS TOR VERGATA

Tulouse, School of Economics
Oct 14th 2016

Outline

- **The big picture: the sustainability problem**
- **Why a “generational” approach?**
- **Facts about generations: trends and heterogeneity**
- **Data sources: ISTAT vs. Health Search**
- **Empirical results**
  - Descriptive statistics
  - Cost analysis
- **Research agenda**
- **Some tentative conclusions**

The big picture: the sustainability problem

- **Future demographic and epidemiological trends are constantly challenging the sustainability of health care systems around the world (WHO, 2013)**
- **In response to these challenges, optimal sustainable health policies/strategies MUST consider the evolution of demand and supply of health:**
  - DEMAND: it is necessary to foresee population health needs trends with the relative health care services utilization in the medium and long-run.
  - SUPPLY: it is necessary to foresee technological trends which are responsible for both health outcomes and health care costs (we know today which are the research pipelines)

The big picture: the sustainability problem

- **If today policymakers do not acknowledge these trends, health care sustainability will be under serious threat**
- **Repeating the same policy mistakes of the past should be avoided**
- **Past examples of policy negligence which are still being paid today or will be paid in the future are:**
  - Pensions schemes designed in the past without taking into consideration future demographic trends: from the very beginning it was clear that they would not be sustainable in the future!!
  - Pension schemes designed today for young generations will represent a time bomb in the next 30 years: it is already clear that this generation will be poor when they retire if measured according to today standards

The big picture: the sustainability problem

- **Given the pool of experience, expertise and research findings, todays policy makers should be urged to design dynamically efficient policies**

Why a “generational” approach?

- **Individuals born between 1980 and the mid-90s (known as Generation Y) are cut off from the wealth generated in Western societies, as suggested by a survey conducted by The Guardian on the prospects of the Millennial Generation**
- **30 years ago young adults were able to earn more than the national average, BUT today in many countries their salaries are 20% lower than average**
- **On the contrary, pensioners have seen their incomes rise**
- **Growth of income of a couple in their 20s and 30s is placed at lower levels wrt the averages recorded in the last 30 years in 7 major economies of North America and Europe (Luxembourg Income Study (LIS))**
- **Disposable income of Millennials is slightly higher in real terms than that of their peers 30 years ago, while the rest of the population has experienced substantial gains in USA and Italy**

Why a “generational” approach?

- **For the first time in the history of industrialized countries (with the exception of war times), the income of young adults has been reduced compared to the rest of society**
- **For the first time in France, the new pensioners have generated more disposable income of households headed by a person under 50 years**
- **Italian families under 35 have become poorer wrt those of pensioners under 80**
- **In the midst of the crisis in 2013, US households under 30 had less income wrt those aged 65-79**

Why a “generational” approach?

- **The combination of all these factors can cause major changes in the life cycles of different generations, with indefinite effects at both micro and macro scale**
- **If one accepts the hypothesis that health status indicators such as morbidity and life expectancy are affected by employment, income and access to health care, it is clear that the health of todays young adults will negatively affect the average health of the population and the overall health expenditure**

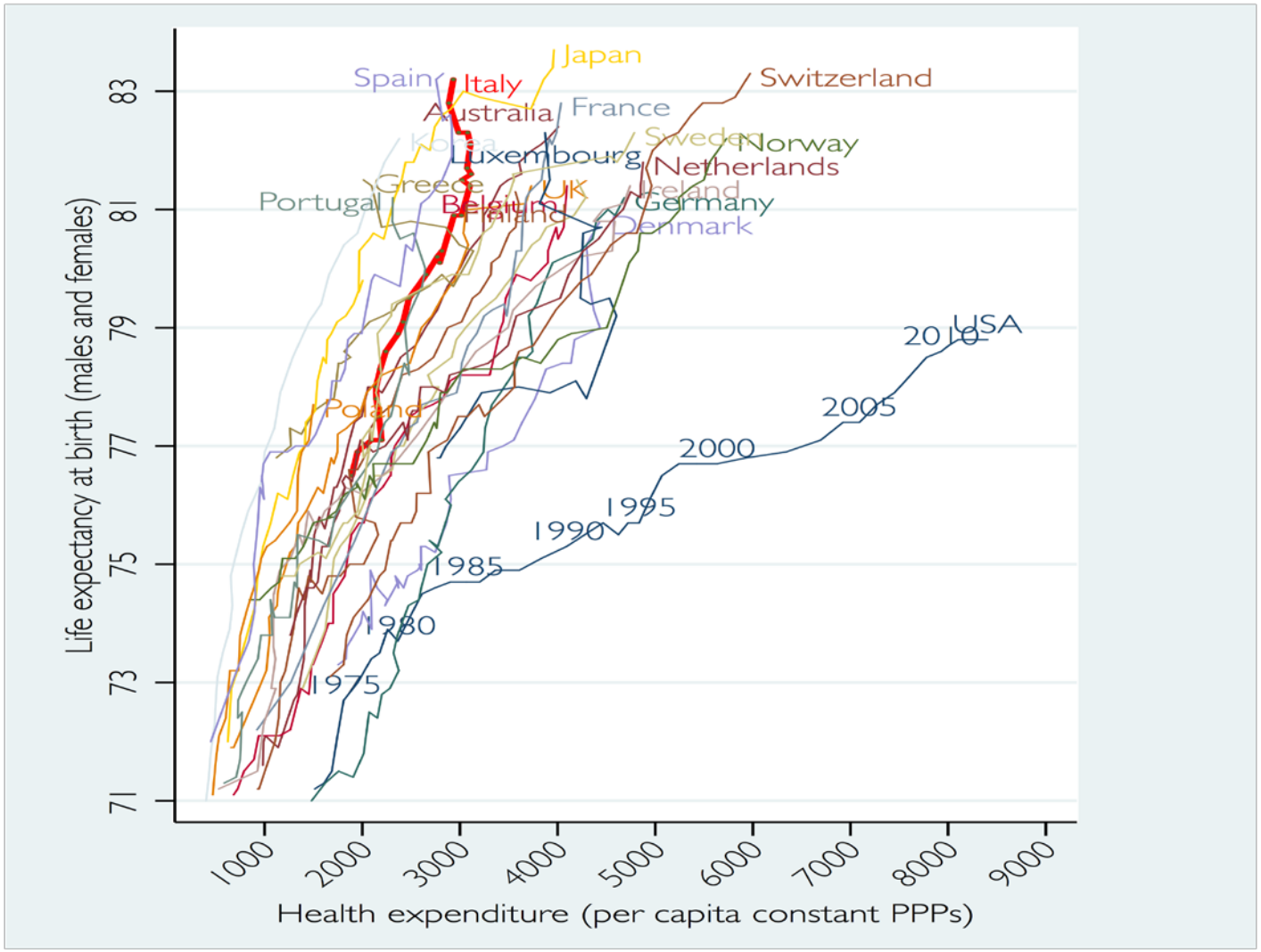
Why a “generational” approach?

- **About 30 years ago, Gruenberg (1977), Manton (1982) and Fries (1980) pointed out that mortality decline at older ages could be due to:**
  - an expansion of morbidity (people live longer, but less healthy)
  - a compression of morbidity (death is delayed, disease starts later)
  - a dynamic equilibrium between increased prevalence of disability and a reduction in its severity.
- **To what extend the ongoing socio-economic changes can make these hypotheses fail in representing the future?**

The “double expansion” hypothesis

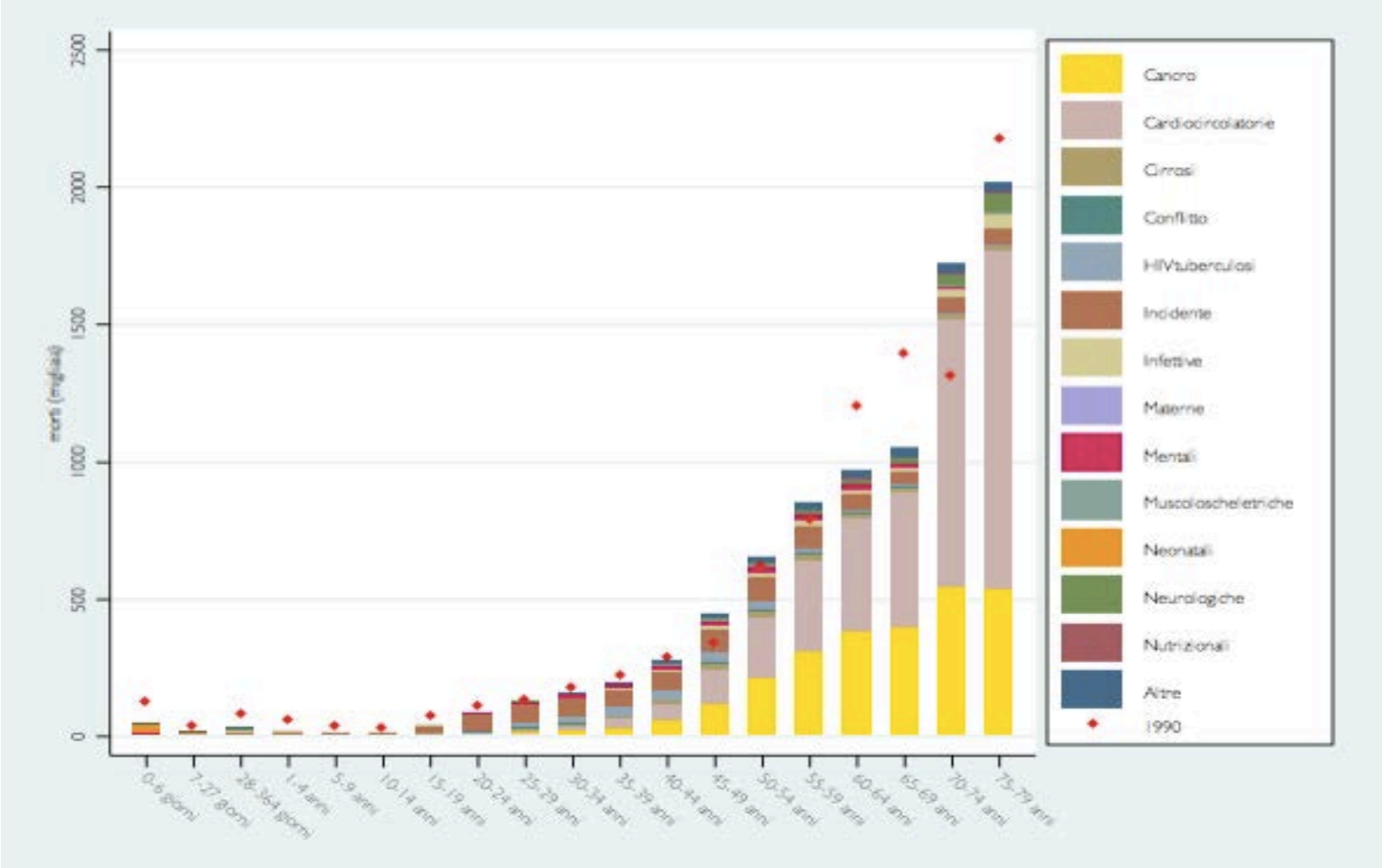
- **The recent decades of epidemiology lend support to the “expansion of morbidity” hypothesis**
- **As suggested by expansion of morbidity hypothesis, people live longer, but in worse health**
- **This is likely due to better treatment, preventive measures, and increases in education levels which have all contributed to the declines in mortality and increments in life expectancy**
- **An expansion of morbidity has clearly appeared in Europe and other developed regions**

The “double expansion” hypothesis



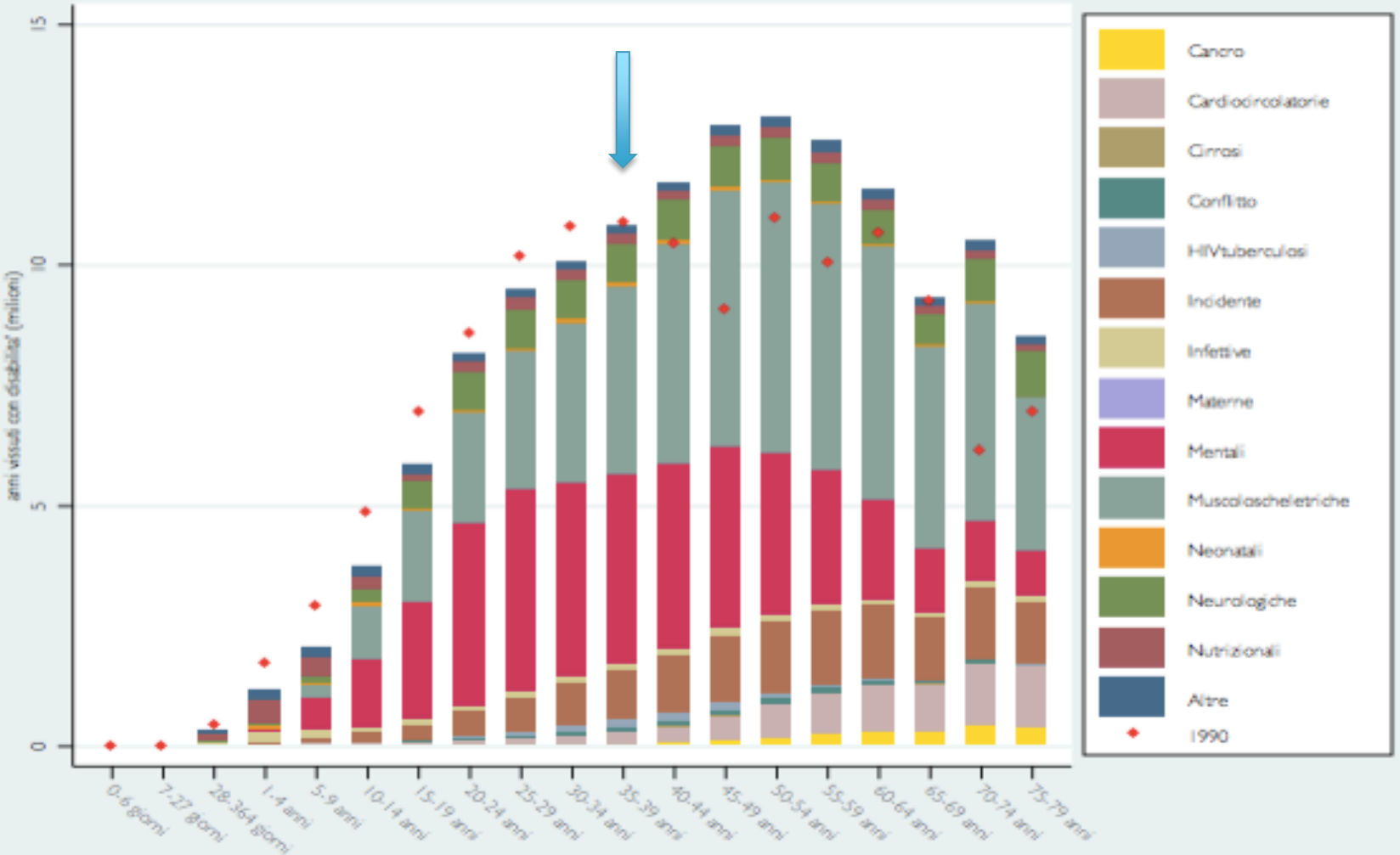
Source: Health Data OECD

No. of deaths by cause and age class (2010) and total deaths (1990) - **EU**



Source: Institute for Health Metrics and Evaluation - 2014

No. of years spent with disabilities by cause and age class (2010) and total (1990) - **EU**



Source: Institute for Health Metrics and Evaluation - 2014

Why a “generational” approach?

- **The aim of this research is to offer a novel approach to intergenerational differences in morbidity prevalence, entailing a new perspective on trends in life expectancy and morbidity**
- **We formulate a “DOUBLE EXPANSION OF MORBIDITY” hypothesis and present preliminary evidence in support of this view**
- **In particular, we justify this new perspective showing that the dynamics of health status across generations is different**
- **Furthermore, we provide evidence on the main channels favoring the “DOUBLE EXPANSION OF MORBIDITY” hypothesis**

The “double expansion” hypothesis

- **Health demand is changing across generations in a way that is unprecedented if we look at the last 200 years:**
  - Life expectancy has expanded mostly due to technological change and better public health policies
  - However, the ageing population induced by the increase in life expectancy has expanded the prevalence of non-communicable diseases (NCDs) and comorbid conditions
  - Furthermore, lifestyle changes have exacerbated AND anticipated the insurgence of NCDs: younger generations feature lower health status wrt to the previous generations
  - Excess body weight is one of the main causes of the phenomenon

FOCUS ON OBESITY

OBESITY AS ONE OF THE MAJOR CHANNELS RESPONSIBLE FOR DOUBLE EXPANSION OF MORBIDITY

Why to focus on OBESITY?

- **Despite recent increases in education and reductions in smoking rates, OBESITY continues to spread among new generations**
- **Obesity is a well-known contributor to type 2 diabetes, cardiovascular disease, disability and premature death**
- **New cohorts reach excess body weight earlier and carry the extra weight for longer periods over their lifetime**
- **Italian children are the 2° heaviest generation of OECD countries (1° Greece, 5° USA!!!)**
- **Obese CHILDREN are more likely to become obese adults**
- **The socio-economic obesity gradient is becoming heavier as a result of prolonged economic crisis, with mounting youth unemployment**

OBESITY across generations: a review of the literature

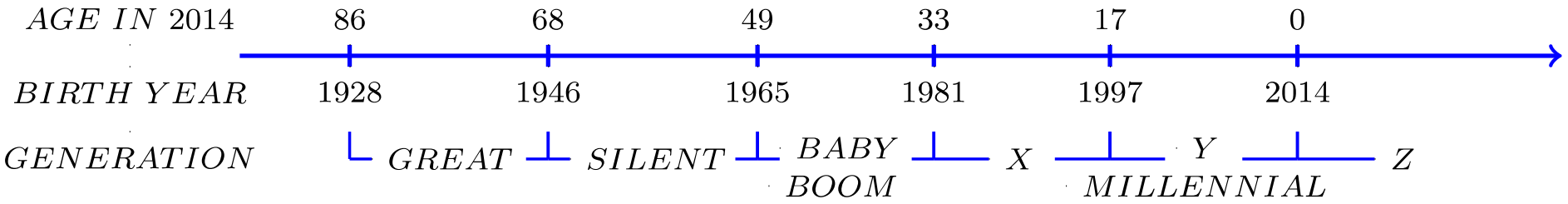
- **Younger cohorts develop obesity and related chronic conditions earlier in the life course [Leveille et Al AJPH 2005, Lee et Al. IJO 2010, Robinson et Al. IJO 2013, King et Al. JAMA 2013]**
- **At the same relative age, Baby Boomers in the USA [King et al. 2010] and the UK [Allman-Farinelli et al. 2008, Eur J Clin Nutr 2008] have higher prevalence of obesity wrt the silent generation (born 1926–1945), causing more disability and chronic conditions, including diabetes and hypertension**

OBESITY across generations: a review of the literature

- **In younger US cohorts, obesity is occurring earlier in life course, accompanied by premature development of conditions such as type II diabetes and arthritis, in the past considered to be diseases of ageing. [Lee et Al. (IJO 2010)]**
- **Prevalence of overweight and obesity is much greater in the recent Australian generations, net of age, period and cohort effects [Pilkington et al. (2014)]**

DEFINITION OF GENERATIONS

Definition of generations



Source: PEW Research, 2015

CEIS TOR VERGATA Centre for Economic and International Studies

THE DATA

Data used

- **The empirical analysis is based on different data types:**
  - ISTAT population data
  - ISTAT health survey – MULTISCOPO Survey
  - Health Search data

OBESITY data in ITALY - ISTAT

- **Yearly Multipurpose survey on "Aspects of everyday life" (Indagine Multiscopo ISTAT sugli aspetti della vita quotidiana) collected by the Italian National Institute of Statistics – ISTAT**
  - Is a nationally representative sample of 50,000 individuals and 20,000 hhs
- **The information on weight and height, necessary to compute BMI index (as well as other health related information) is self-reported, not objectively measured (which may be a problem, Cawley (1999) points out that females tend to underreport weight, whereas men over-report height).**
- **We analyze health status information for the period of 1993-2012, while the BMI index is available only for the 2001-2012 period**

OBESITY data in ITALY – HEALTH SEARCH

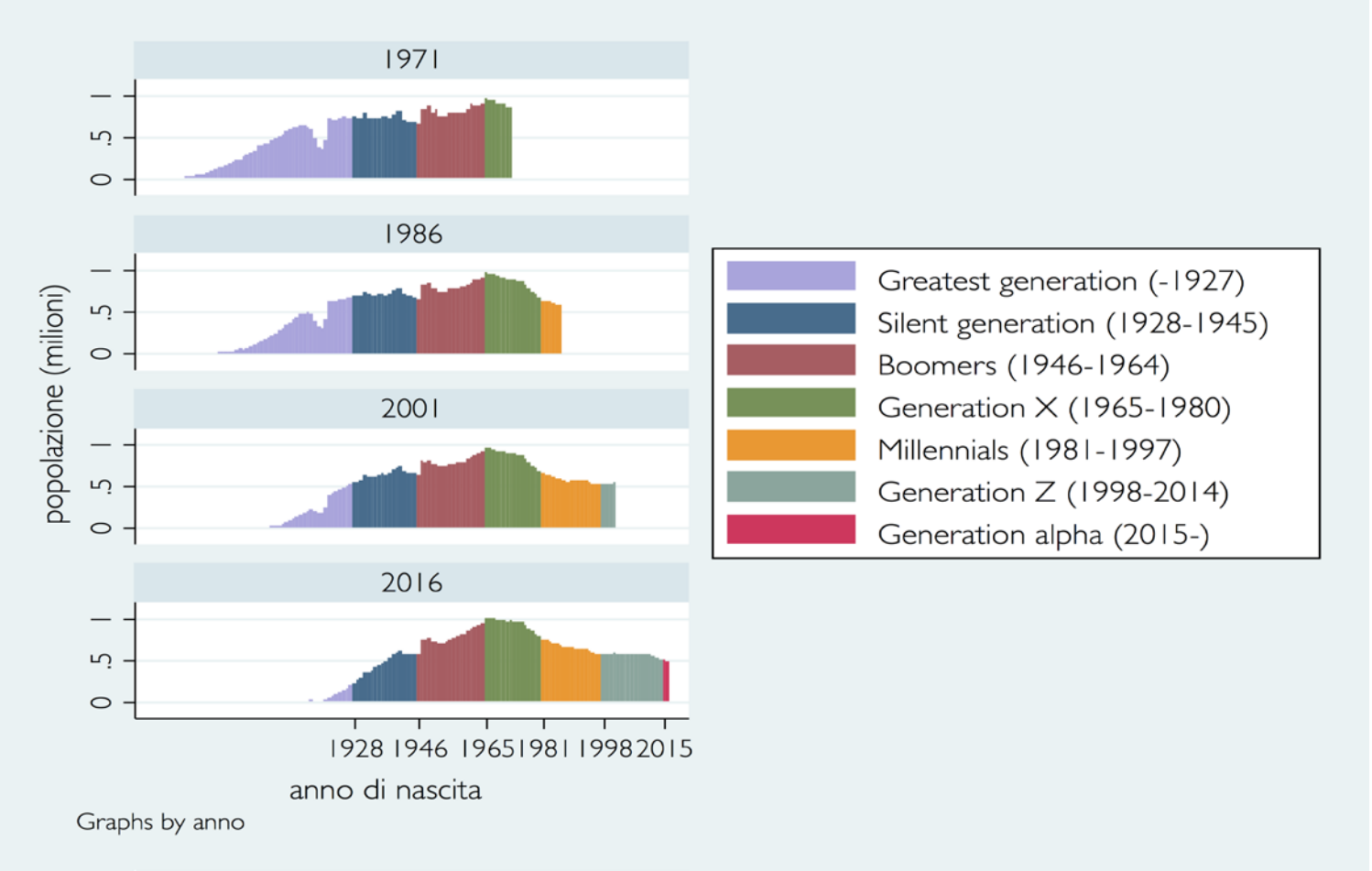
- Health Search/CSD Patient Database (HS) - Italian general practice registry of computer-based patient records collected by a selected group of 900 general practitioners (GPs),
- Rapresentativeness accross all Italian regions
- Patient population of over a 1.8 million between 2001-2014
- GPs are selected in order meet “up-to-standard” quality criteria in terms of the levels of coding, prevalence of several diseases, mortality rates, and years of recording (Fabiani et al 2014) complying with the European Union guidelines on the use of medical data for research
- Objectively measured information on: individual diagnoses, clinical events, prescribed tests, diagnostic results, drug prescriptions, hospital admissions, causes of death and health expenditure data.

CEIS Centre for Economic and International Studies
TOR VERGATA

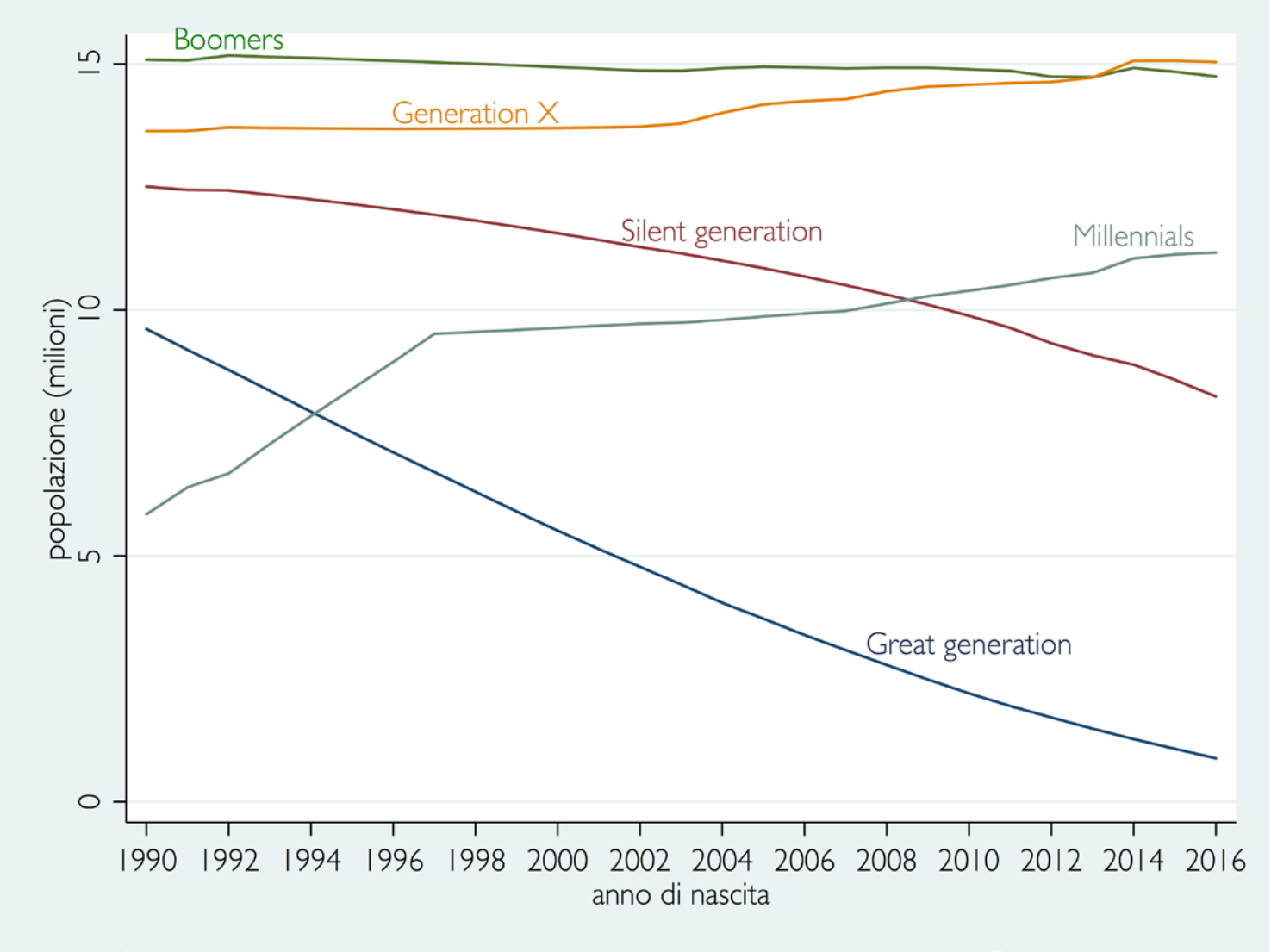
EMPIRICAL ANALYSIS 1

DESCRIPTIVE STATISTICS OF ISTAT DATA

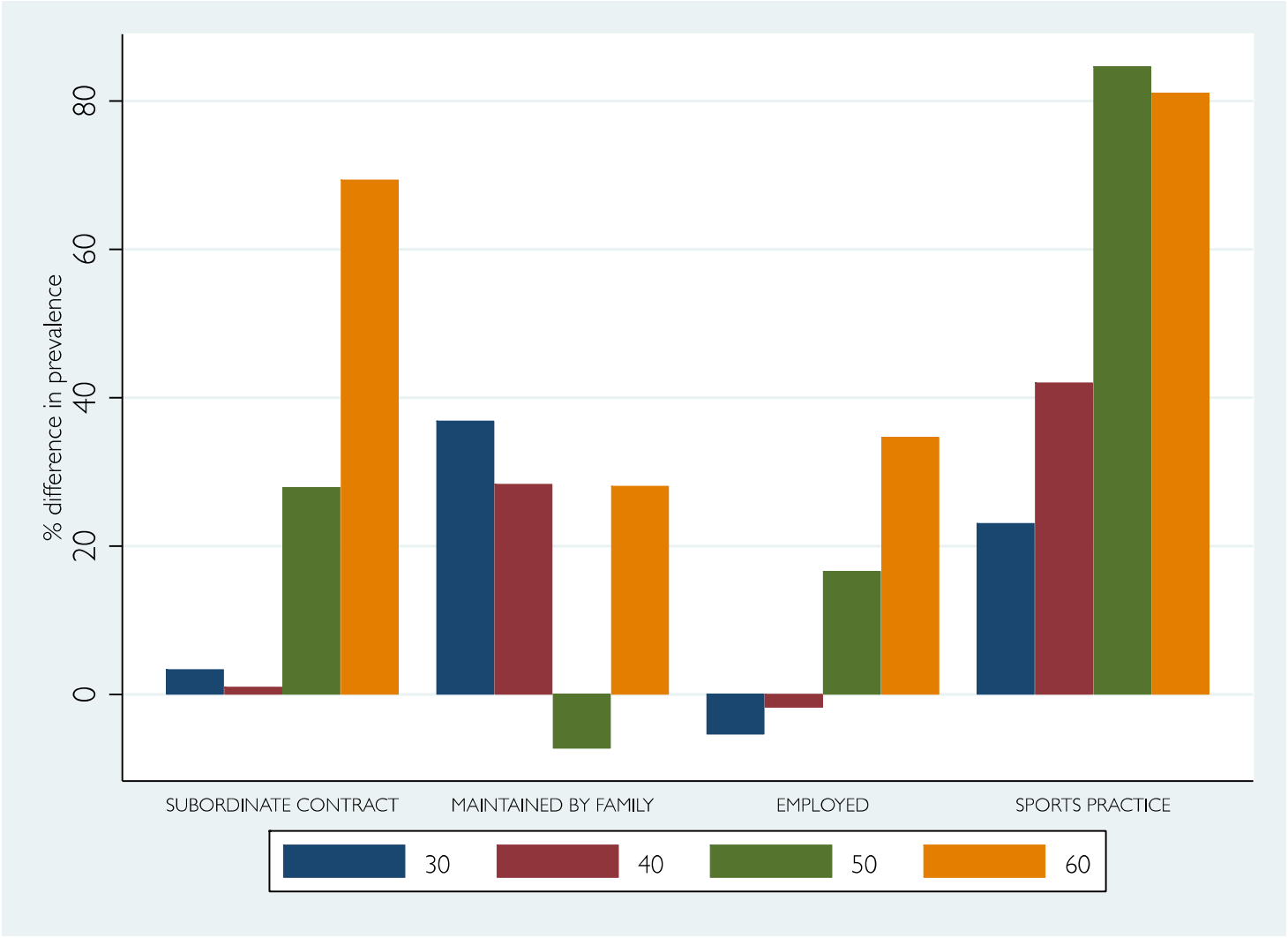
Generations composition in Italy (1971-2016)



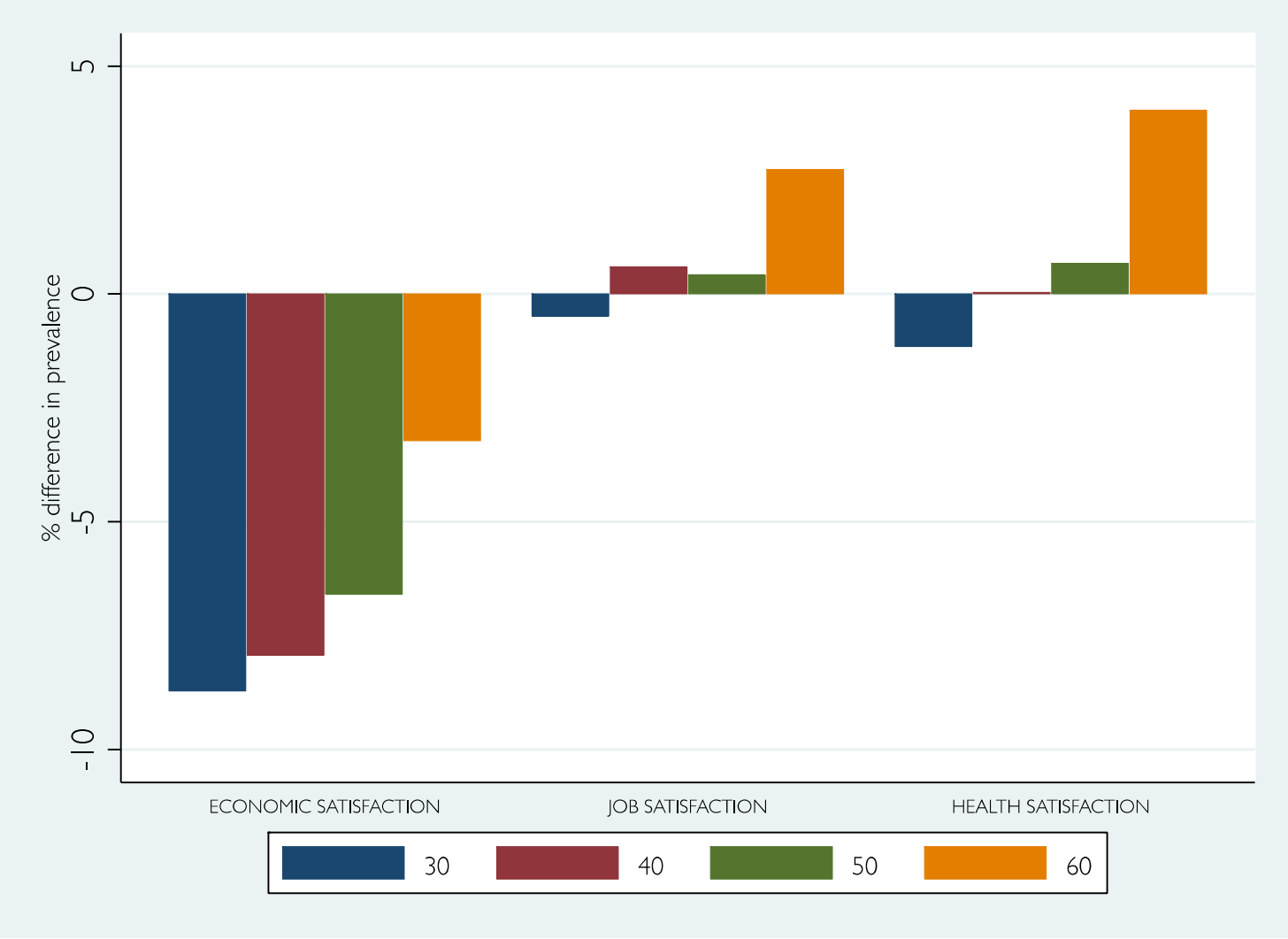
Population generation trends in Italy (stocks)



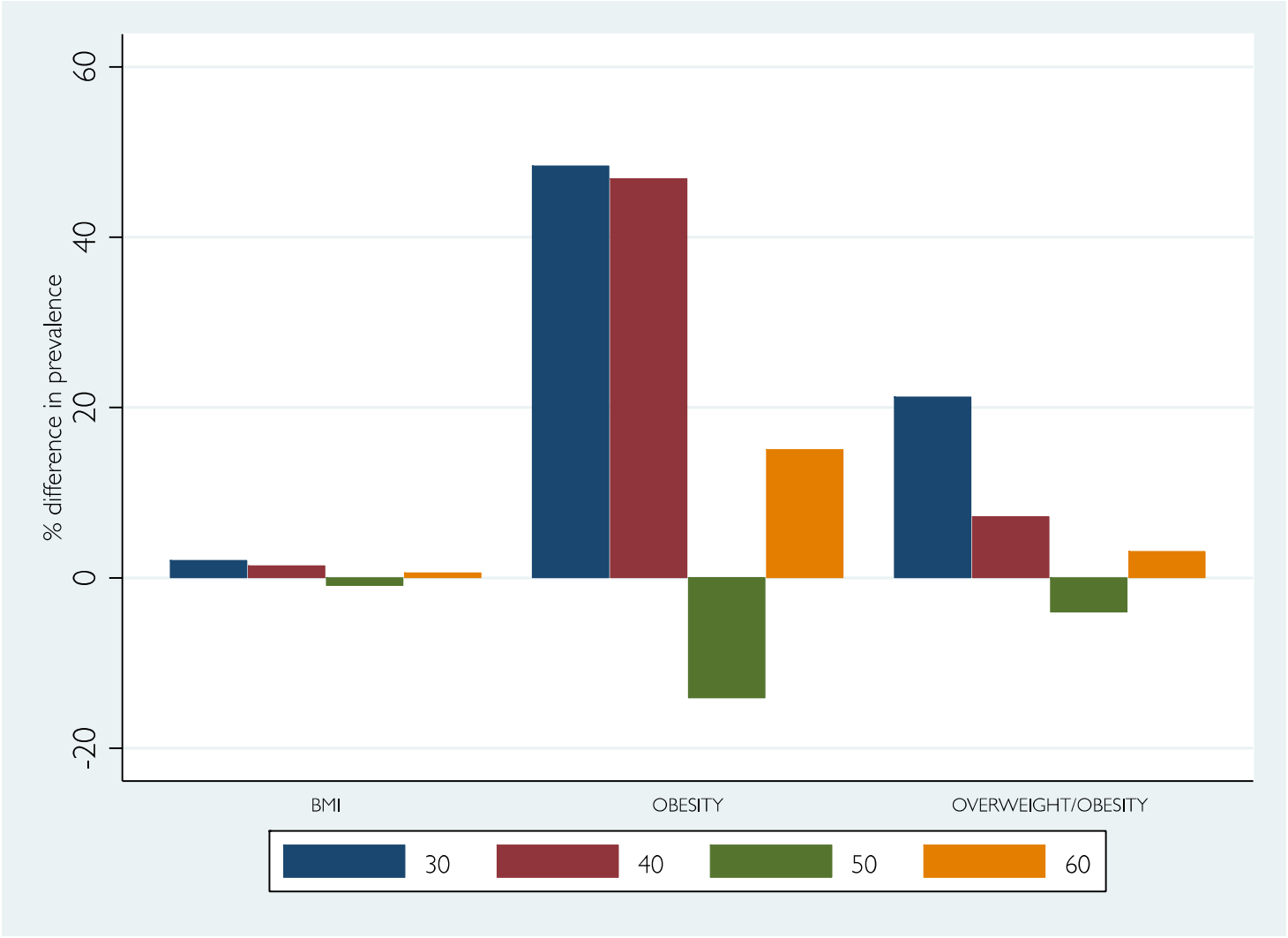
Evidence on social and health trends for individuals 30,40,50 and 60 year-olds (1993-2012) - ISTAT



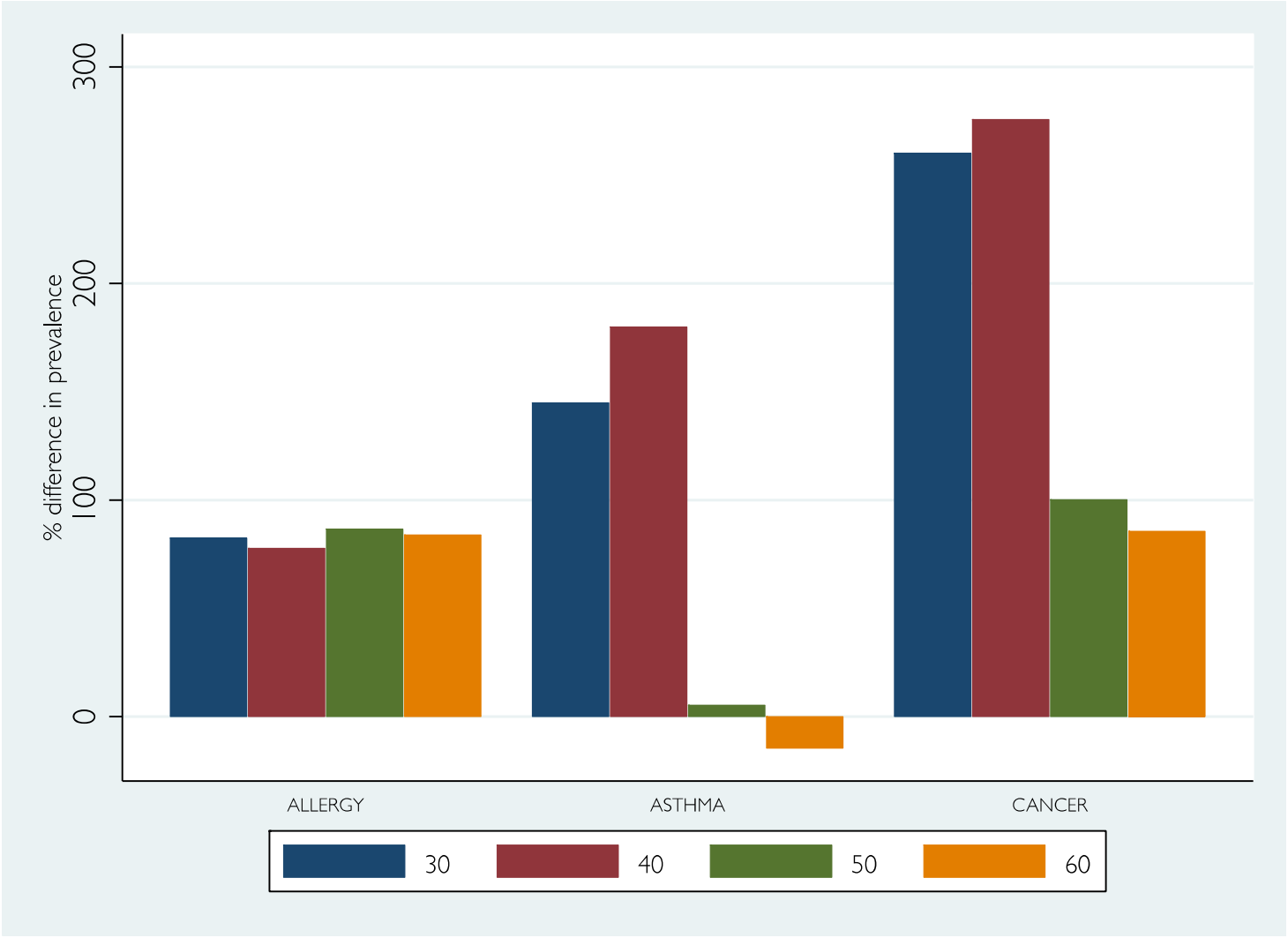
Evidence on social and health trends for individuals 30,40,50 and 60 year-olds (1993-2012) - ISTAT



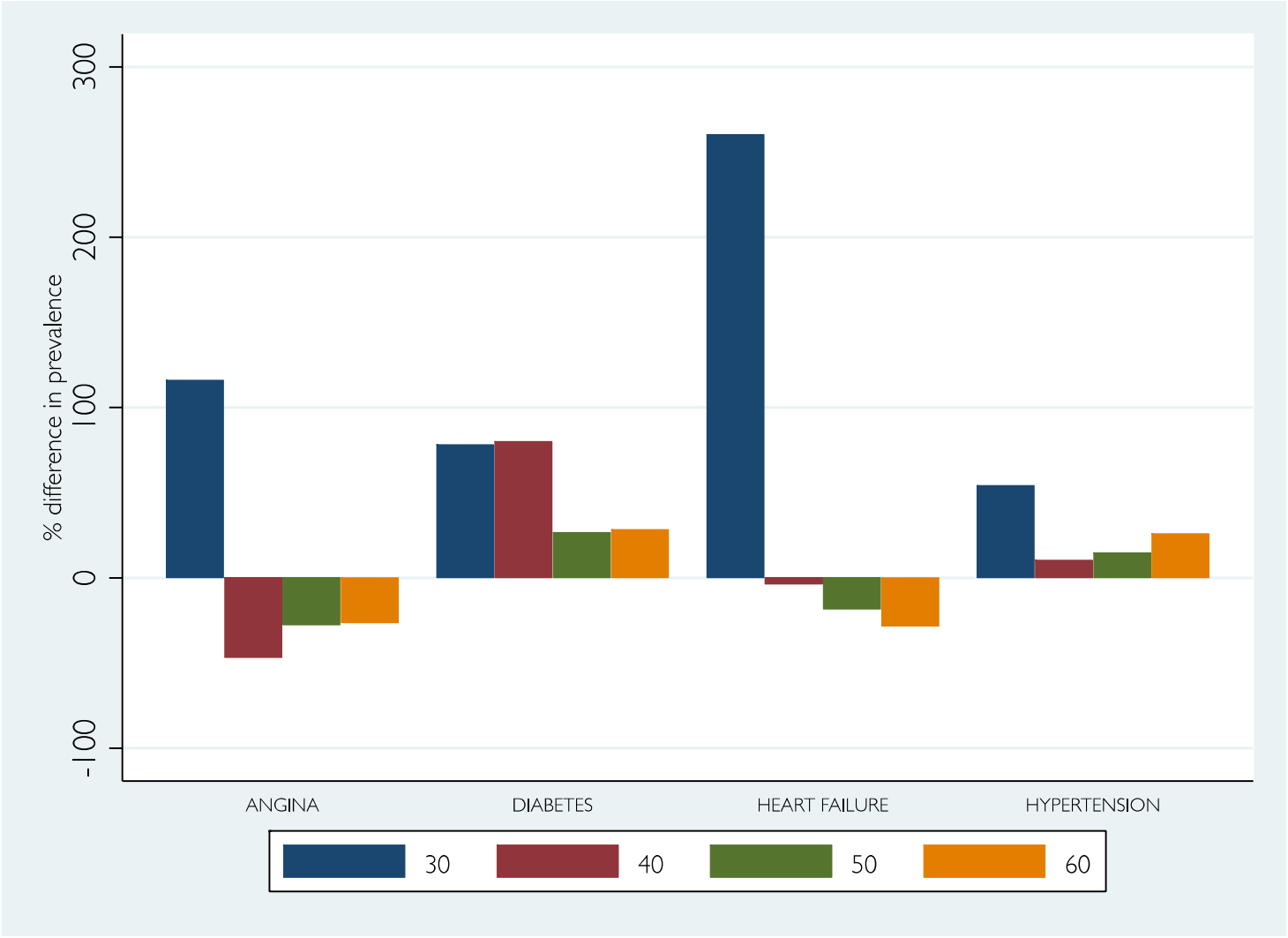
Evidence on social and health trends for individuals 30,40,50 and 60 year-olds (1993-2012) - ISTAT



Evidence on social and health trends for individuals 30,40,50 and 60 year-olds (1993-2012) - ISTAT



Evidence on social and health trends for individuals 30,40,50 and 60 year-olds (1993-2012) - ISTAT



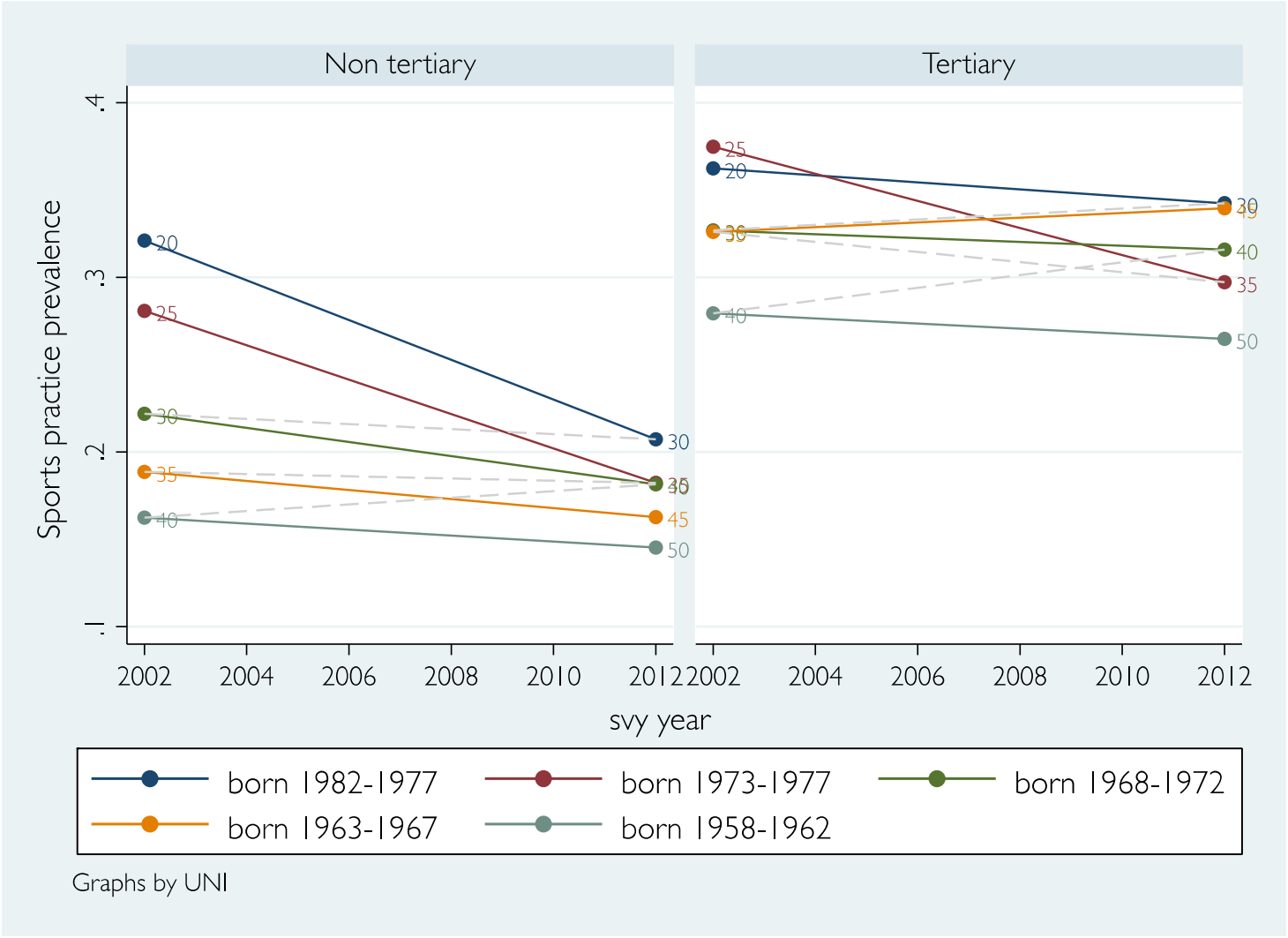
A PROBLEM IN THE PROBLEM

THE SOCIO-ECONOMIC GRADIENT

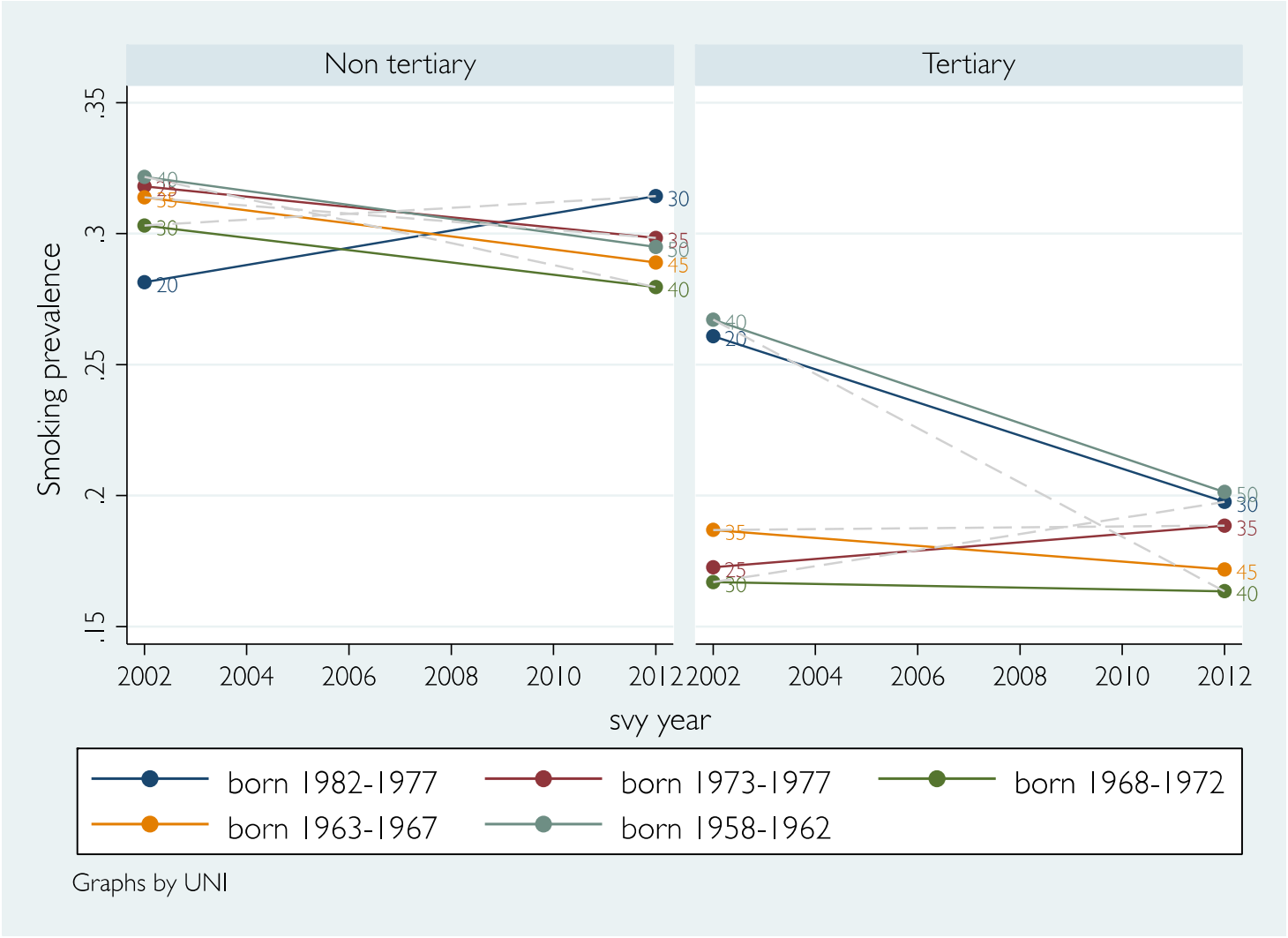
EDUCATIONAL GRADIENT IN OBESITY

Obesity is more prevalent among those without tertiary education, with more pronounced weight gains associated with aging

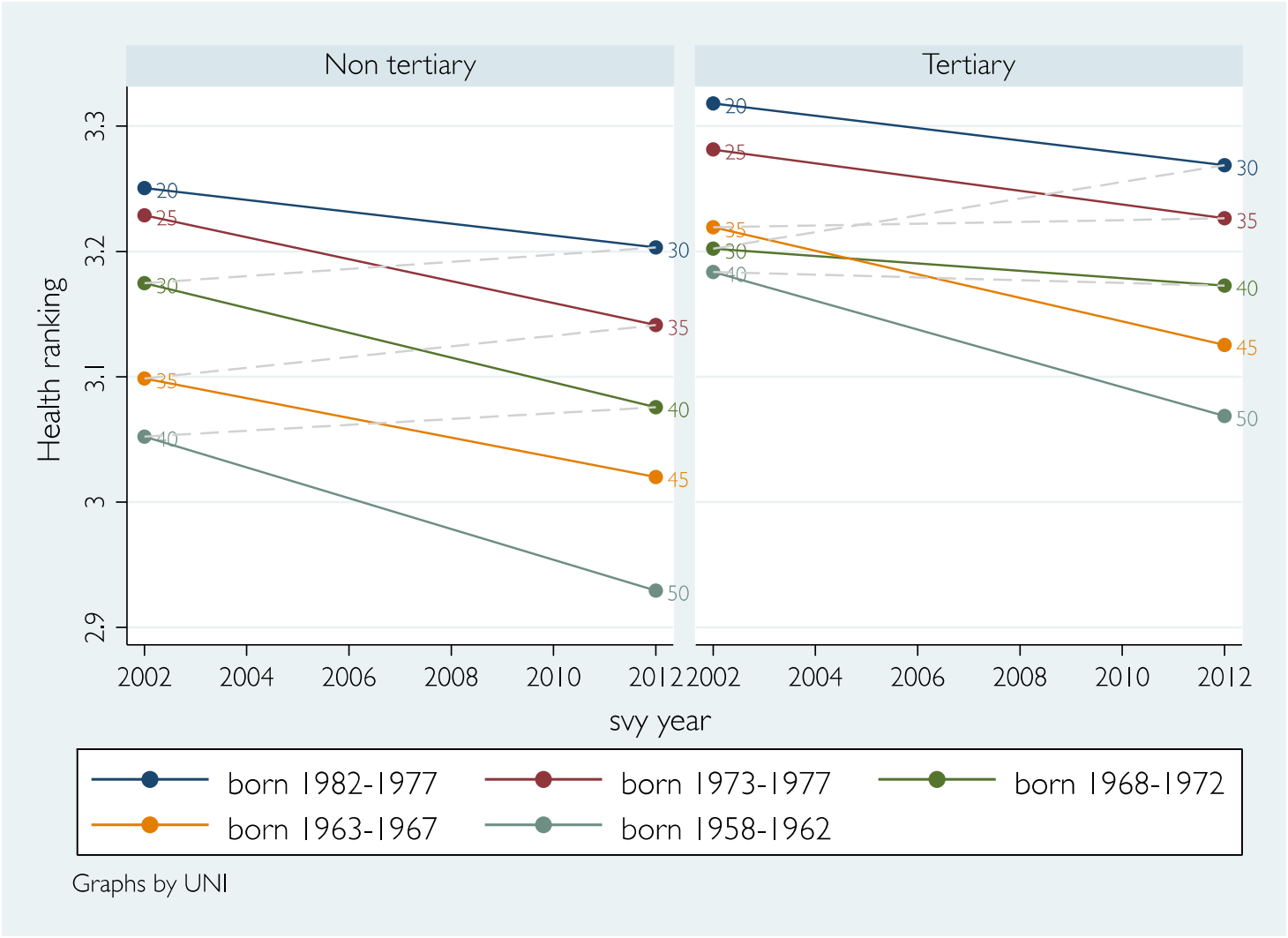
Individuals with tertiary education tend to practice more sports and are more likely to persist in doing so along their lives



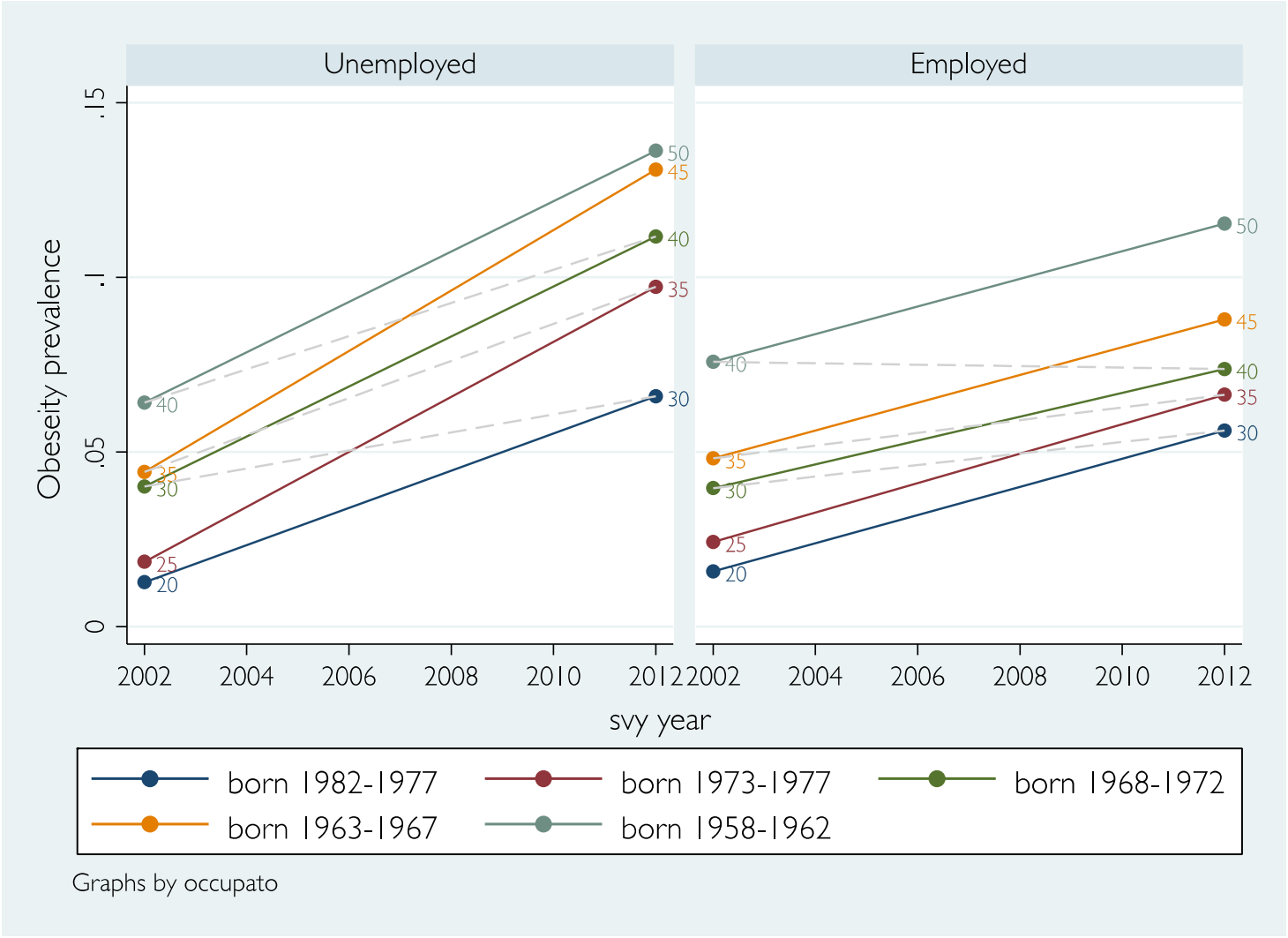
Tertiary education is also associated with lower smoking rates



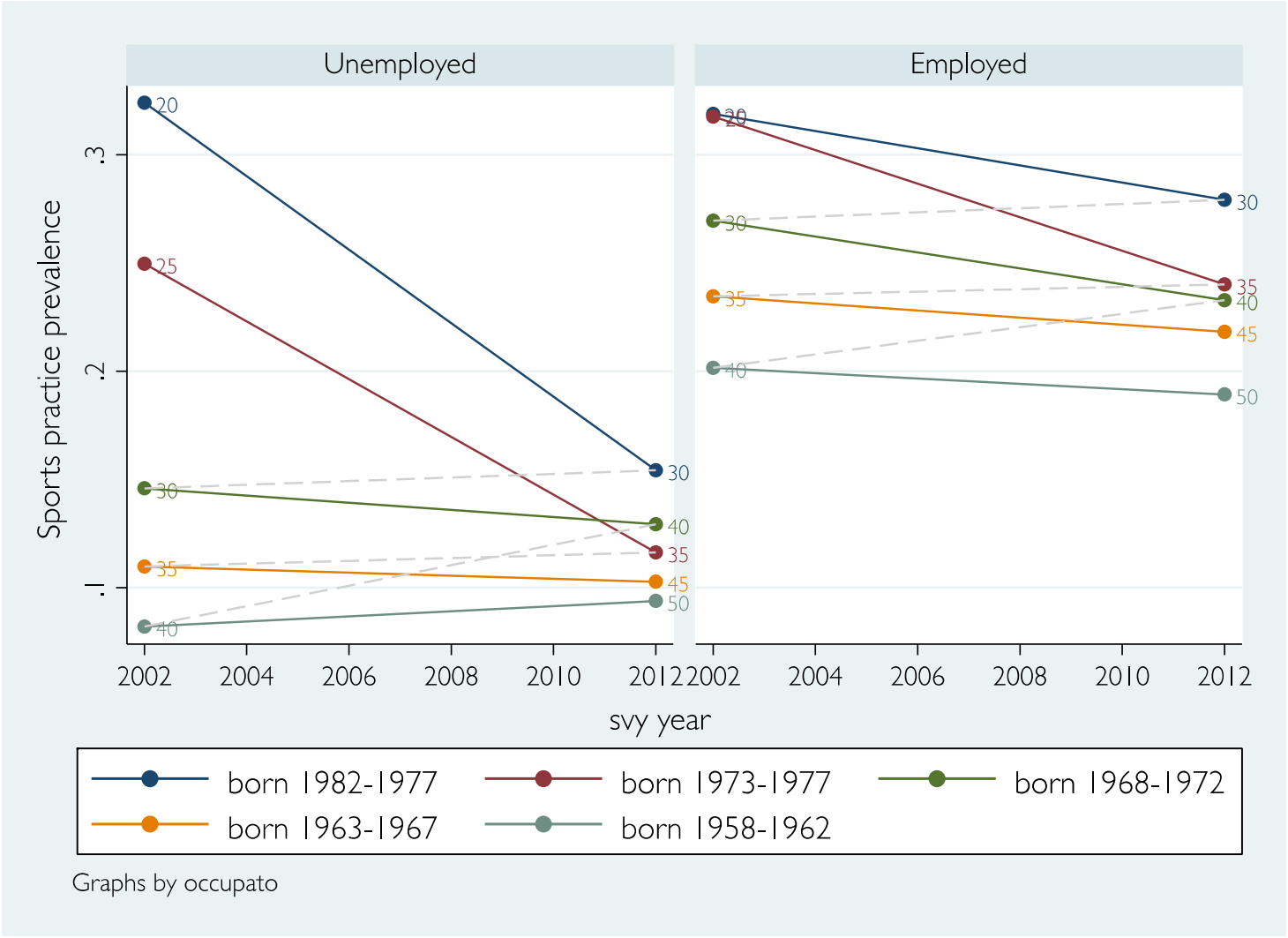
Overall, the more educated are also more satisfied with their health



Also the occupational status mitigates obesity rates – they start at the same level but evolve differently



To the same extent as it impacts physical activity



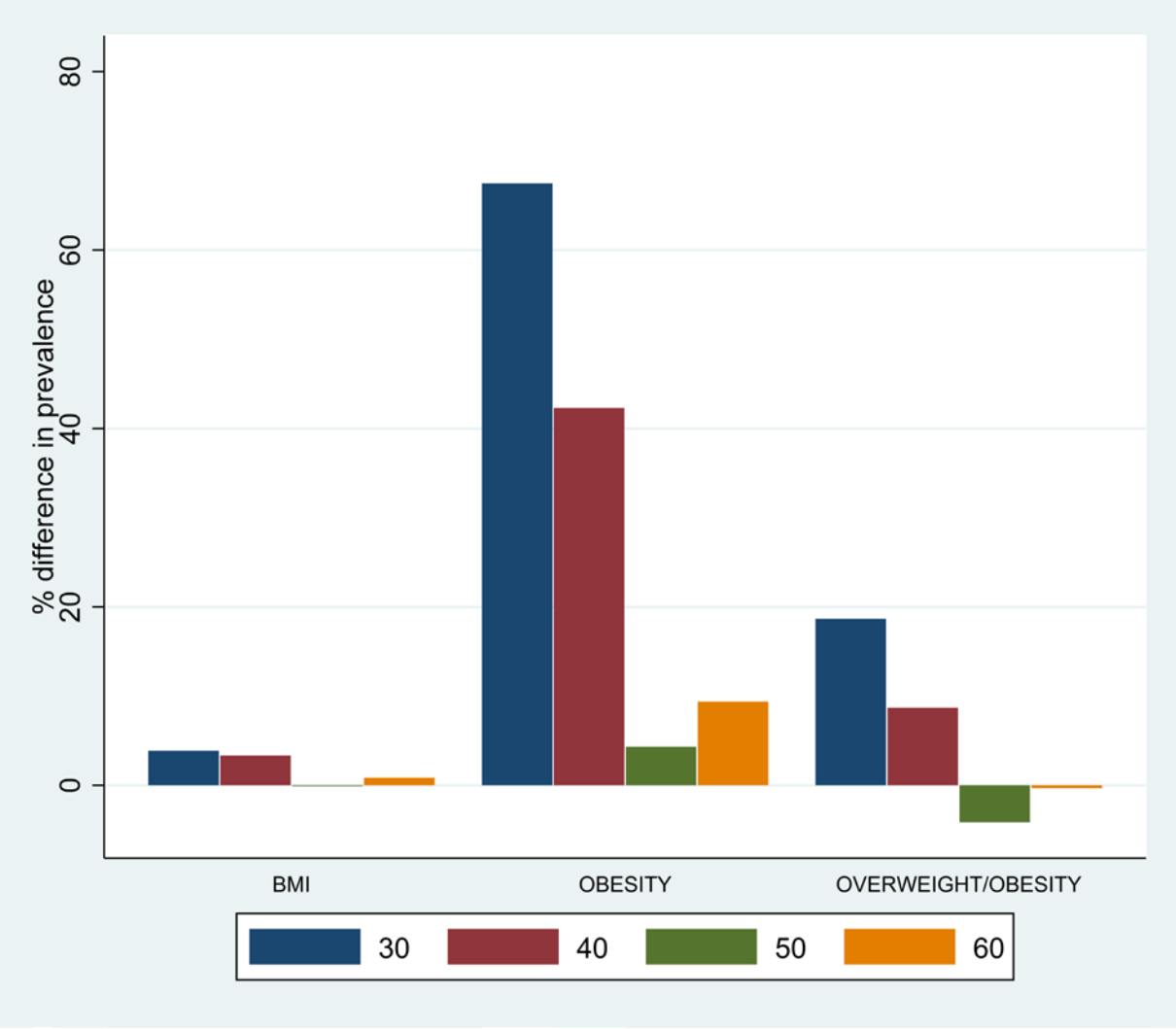
And the overall health satisfaction

CEIS Centre for Economic and International Studies
TOR VERGATA

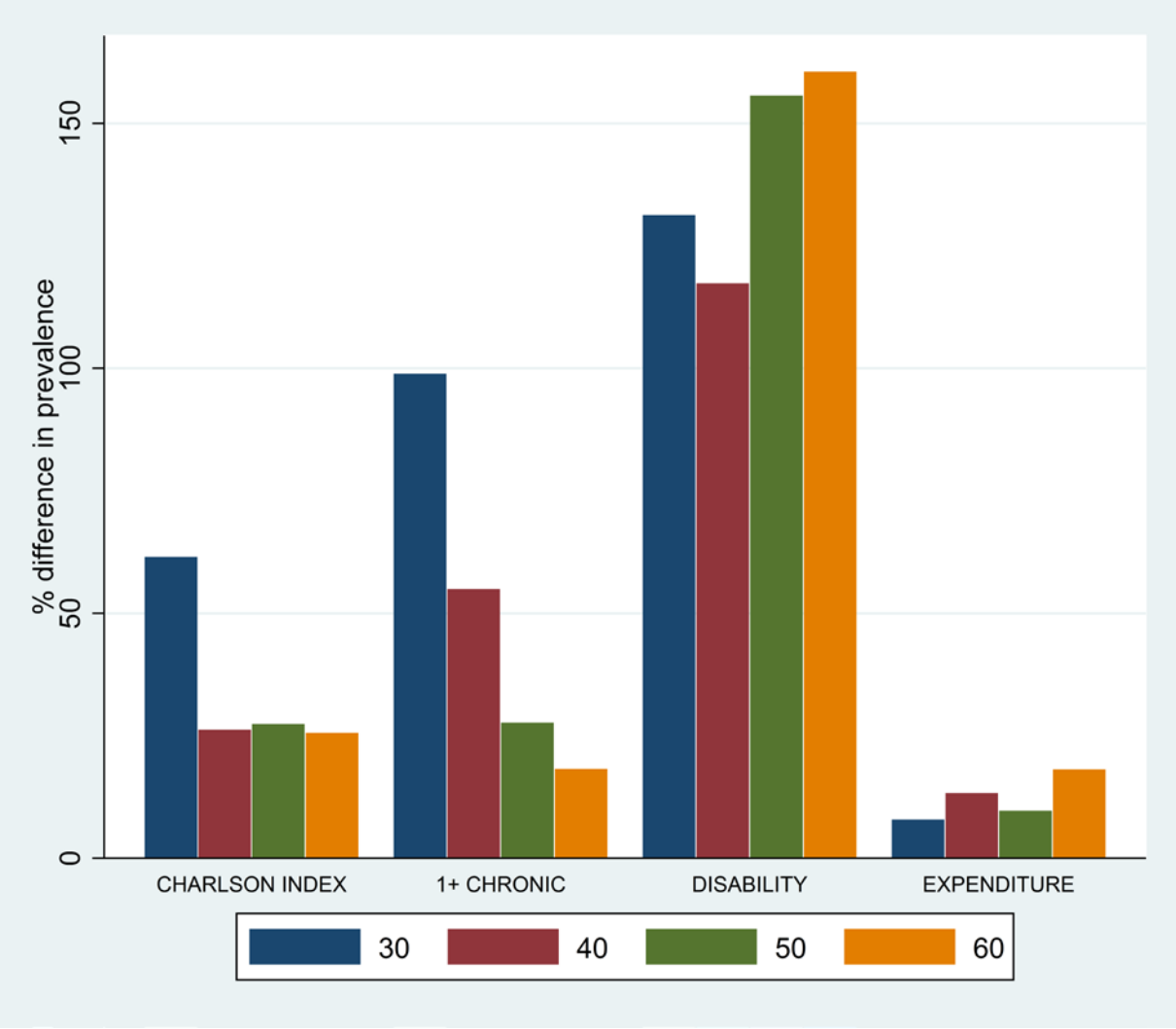
EMPIRICAL ANALYSIS 1

DESCRIPTIVE STATISTICS OF HS DATA

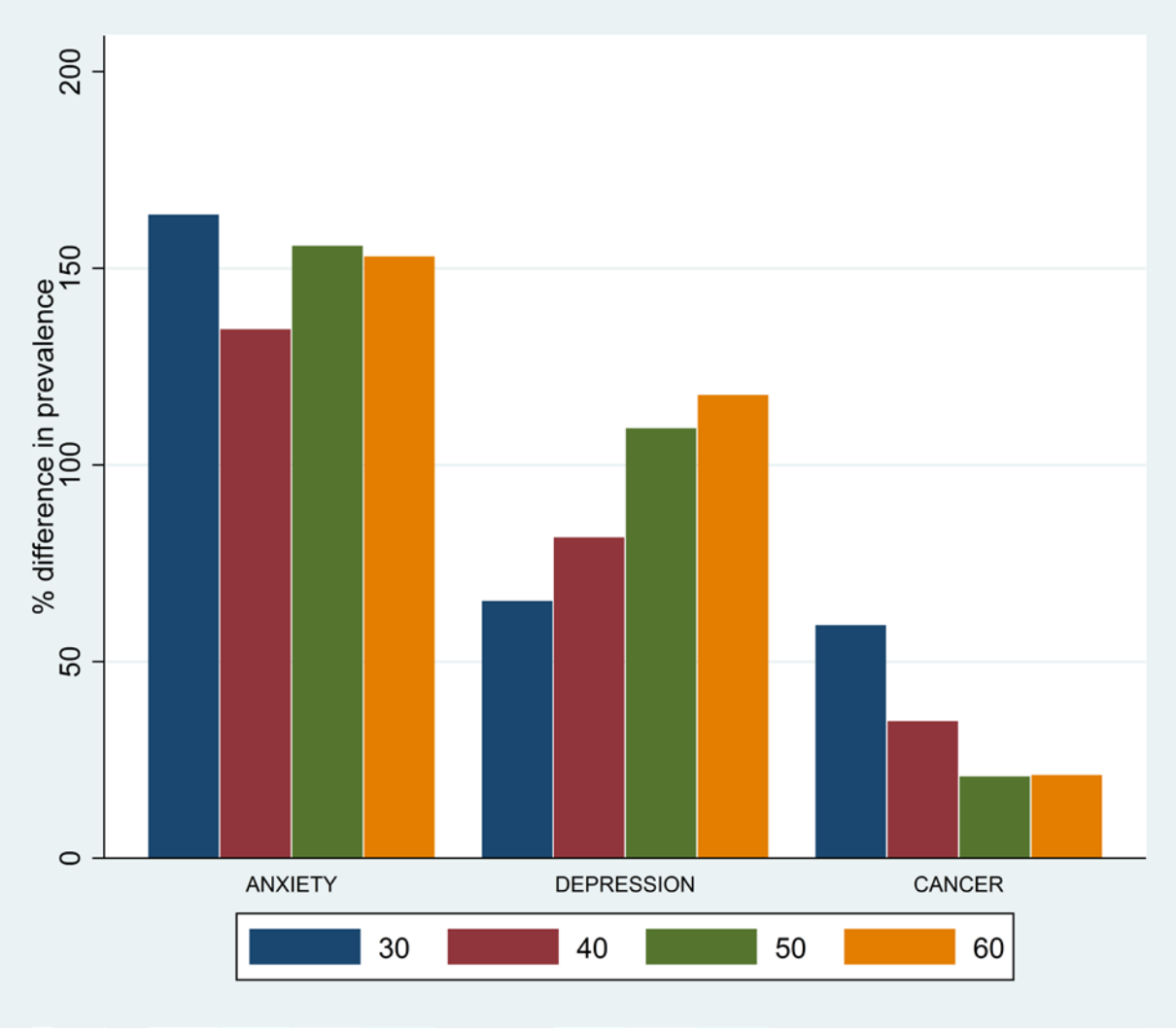
Changes in health status for individuals 30,40,50 and 60 year-olds (2002-2014) - HS



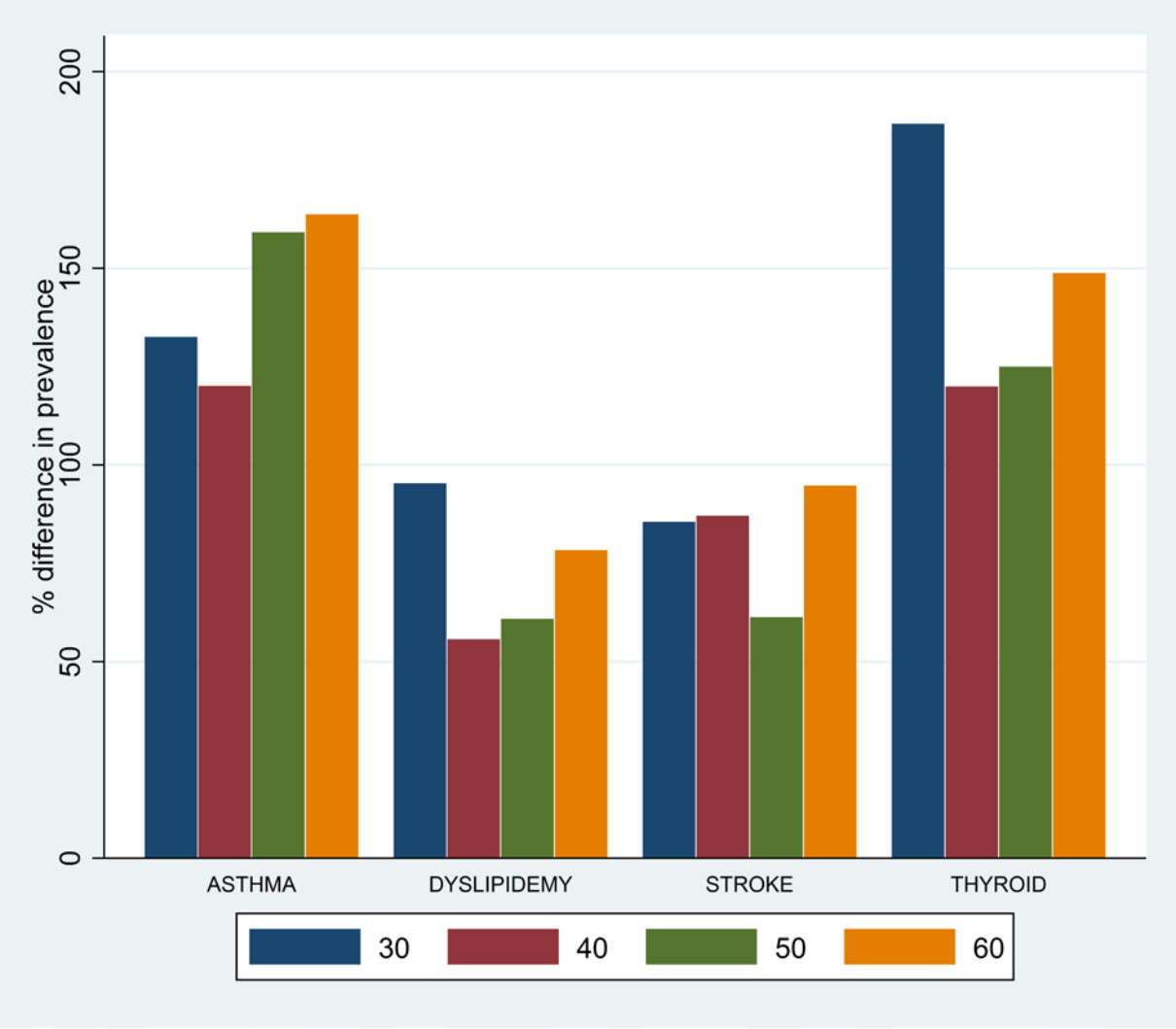
Changes in health status for individuals 30,40,50 and 60 year-olds (2002-2014) - HS



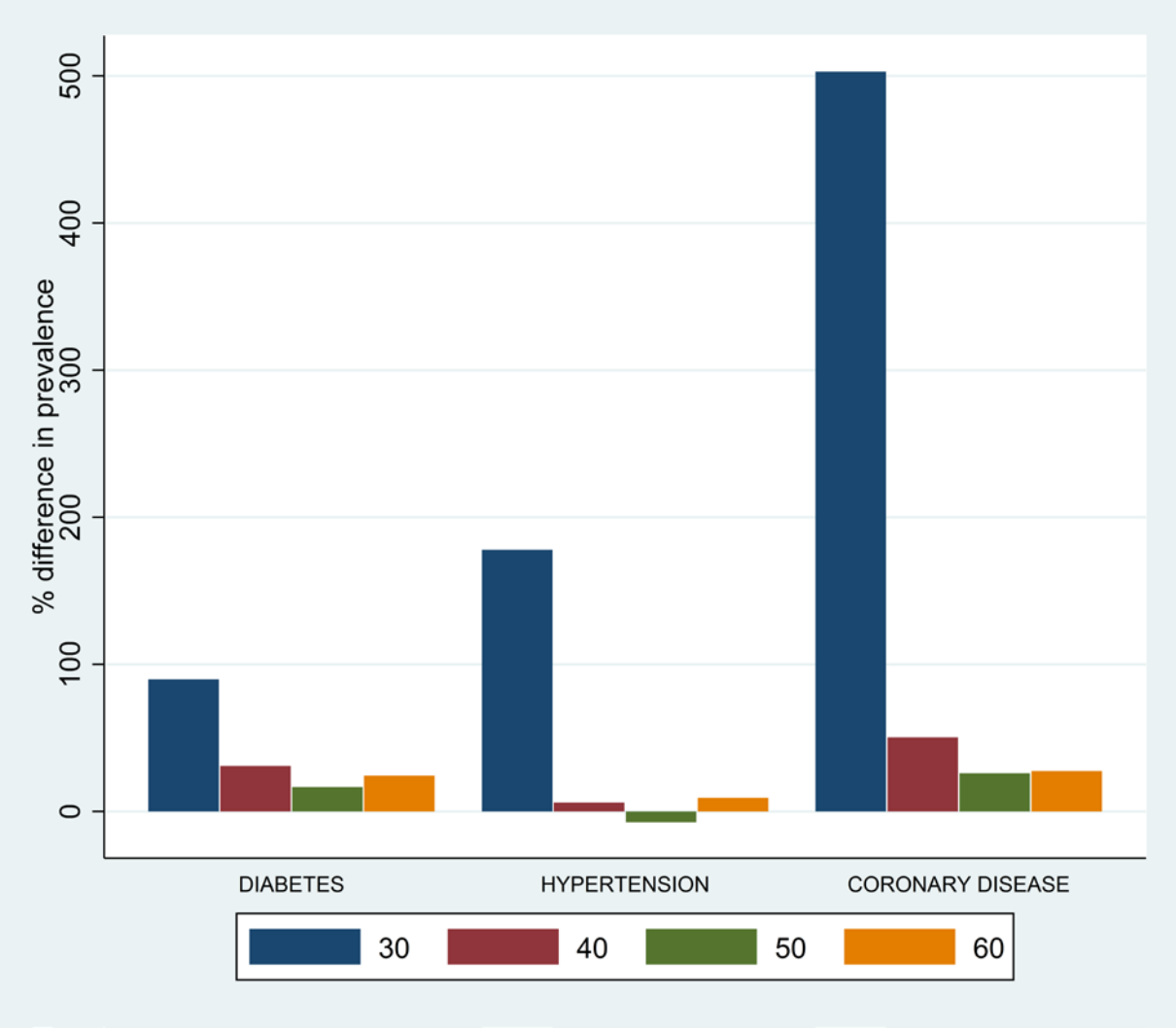
Changes in health status for individuals 30,40,50 and 60 year-olds (2002-2014) - HS



Changes in health status for individuals 30,40,50 and 60 year-olds (2002-2014) - HS



Changes in health status for individuals 30,40,50 and 60 year-olds (2002-2014) - HS



Full set of results

CEIS TOR VERGATA Centre for Economic and International Studies

	2004					2014					Ratio 2014/2004				
	35 to 50	51 to 65	66 to 80	over 81	tot	36 to 50	52 to 65	67 to 80	over 81	tot	36 to 50	52 to 65	67 to 80	over 81	tot
Age (mean)	42,3	57,7	71,6	87,3	55,2	43,1	57,7	72,5	86,0	59,6	1,9%	0,0%	1,3%	-1,5%	8,0%
Female	51,6	51,9	60,3	70,7	54,3	51,1	51,4	53,5	65,0	53,3	-1,0%	-1,0%	-11,3%	-8,1%	-1,8%
Hypertension	9,4	33,6	54,0	53,7	28,0	12,5	40,6	68,5	78,1	42,4	33,0%	20,8%	26,9%	45,4%	51,4%
Atrial Fibrillation	0,2	1,1	3,7	7,8	1,5	0,4	1,8	7,6	16,6	4,4	100,0%	63,6%	105,4%	112,8%	193,3%
Stroke	0,3	2,0	6,6	14,6	2,8	0,7	4,1	15,7	28,1	8,4	133,3%	105,0%	137,9%	92,5%	200,0%
Heart Failure	0,1	0,4	1,2	6,8	0,7	0,1	0,6	3,0	10,1	2,0	0,0%	50,0%	150,0%	48,5%	185,7%
Coronary Disease	0,6	3,9	8,7	12,9	3,8	0,7	4,6	12,6	18,1	6,7	16,7%	17,9%	44,8%	40,3%	76,3%
Hearth Attack	0,1	0,8	1,3	1,5	0,6	0,2	1,2	2,5	3,3	1,4	100,0%	50,0%	92,3%	120,0%	133,3%
Angina	0,1	0,6	1,4	1,7	0,6	0,2	0,9	2,3	3,1	1,2	100,0%	50,0%	64,3%	82,4%	100,0%
Other Hearth Disease	0,7	4,7	11,6	22,4	5,2	1,0	5,9	18,3	33,1	10,3	42,9%	25,5%	57,8%	47,8%	98,1%
Diabetes	1,7	8,1	13,2	12,1	6,5	2,1	9,4	21,5	22,0	11,4	23,5%	16,0%	62,9%	81,8%	75,4%
Cancer	6,9	12,4	15,6	14,3	10,7	18,9	26,8	34,1	31,7	26,6	173,9%	116,1%	118,6%	121,7%	148,6%
COPD	0,6	2,3	5,6	7,8	2,5	0,7	3,0	8,6	12,6	4,7	16,7%	30,4%	53,6%	61,5%	88,0%
Arthritis	7,3	22,4	36,6	35,6	19,2	7,7	26,6	50,0	59,9	29,8	5,5%	18,8%	36,6%	68,3%	55,2%
Parkinson	0,0	0,1	0,5	1,9	0,2	0,0	0,2	1,3	3,3	0,7	0,0%	100,0%	160,0%	73,7%	250,0%
Blind	1,0	1,6	2,2	2,2	1,5	4,6	6,8	8,8	8,9	6,8	360,0%	325,0%	300,0%	304,5%	353,3%
Deaf	1,6	3,5	6,4	8,1	3,5	4,1	8,1	16,5	24,6	10,7	156,3%	131,4%	157,8%	203,7%	205,7%
Prescriptions (mean)	2,1	3,5	4,8	5,4	3,4	2,2	3,6	5,8	6,8	4,5	4,8%	2,9%	20,8%	25,9%	32,4%
Prescriptions Duration (mean)	95,8	297,7	534,6	591,3	270,0	110,4	399,4	960,1	1121,7	521,3	15,2%	34,2%	79,6%	89,7%	93,1%
Visits (mean)	0,6	1,0	1,5	1,0	0,9	0,7	1,2	2,2	2,0	1,4	16,7%	20,0%	46,7%	100,0%	55,6%
Lab tests and diagnostic imaging (mean)	8,1	12,5	17,2	13,1	11,5	10,1	16,7	29,6	29,4	19,1	24,7%	33,6%	72,1%	124,4%	66,1%
Observations	229.805	177.000	101.230	26.021	**534.056**	211.165	203.978	158.982	69.741	**643.866**	-8,1%	15,2%	57,1%	168,0%	20,6%

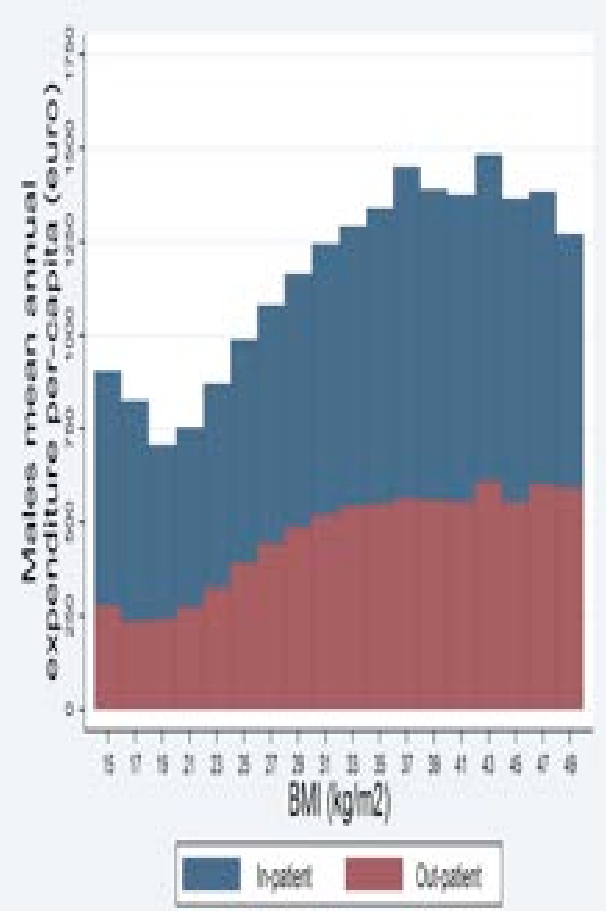
EMPIRICAL ANALYSIS 2

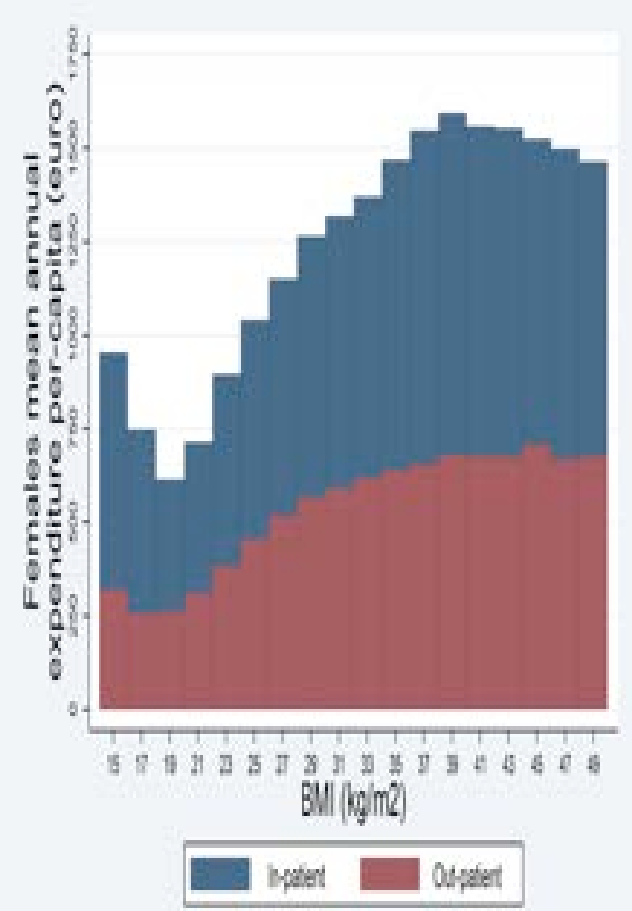
OBESITY AND COSTS

What about obesity associated costs?

- **Atella et al. (2015) show that BMI differentials in health expenditure are heterogeneous accross ages, with the highest burden for the 45-64 aged individuals**
- **The most pronounced channels of the BMI associated costs accumulation is diabetes, hypertension, and cardiovascular diseases, implying that certain chronic conditions, due to obesity, may insurge early in life, anticipating the health expenditure.**

Primary health care costs differentials for females and males and BMI range





The empirical model

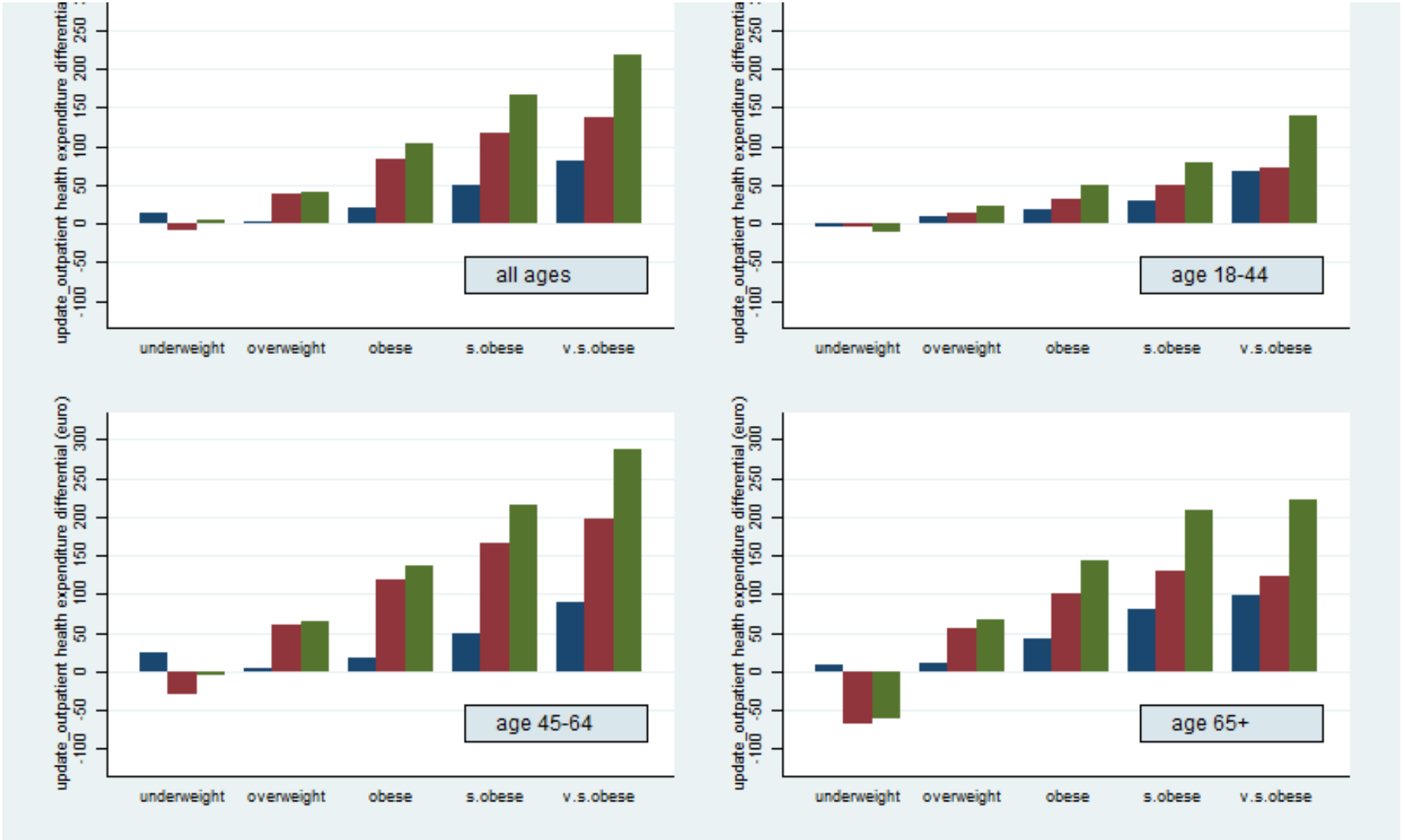
$$P_{jit} = \alpha_{j0} + \beta_j \, BMI_{it-1} + \delta_j X_{it} + \theta_j GP_{it} + \varepsilon_{jit}$$

$$HE_{it} = \theta_0 + \sum_{j=1}^{7} \lambda_j P_{jit} + \pi BMI_{it-1} + \rho X_{it} + \sigma GP_{it} + \boldsymbol{\eta}_{it}$$

where $j = 1,..,7$ represents the sets of pathologies, i stands for individuals, $t=2004,...,2010$ for years, and where P is the set of seven pathologies' indicator dummy variables, HE denotes health expenditure in euro per year, BMI is the vector of body weight dummy variables categories observed in the year preceding the diagnosis of pathologies and health expenditure realization; X is a set of control variables including age, gender, region of residence and year time dummies; and GP is a vector of variables including physician characteristics.

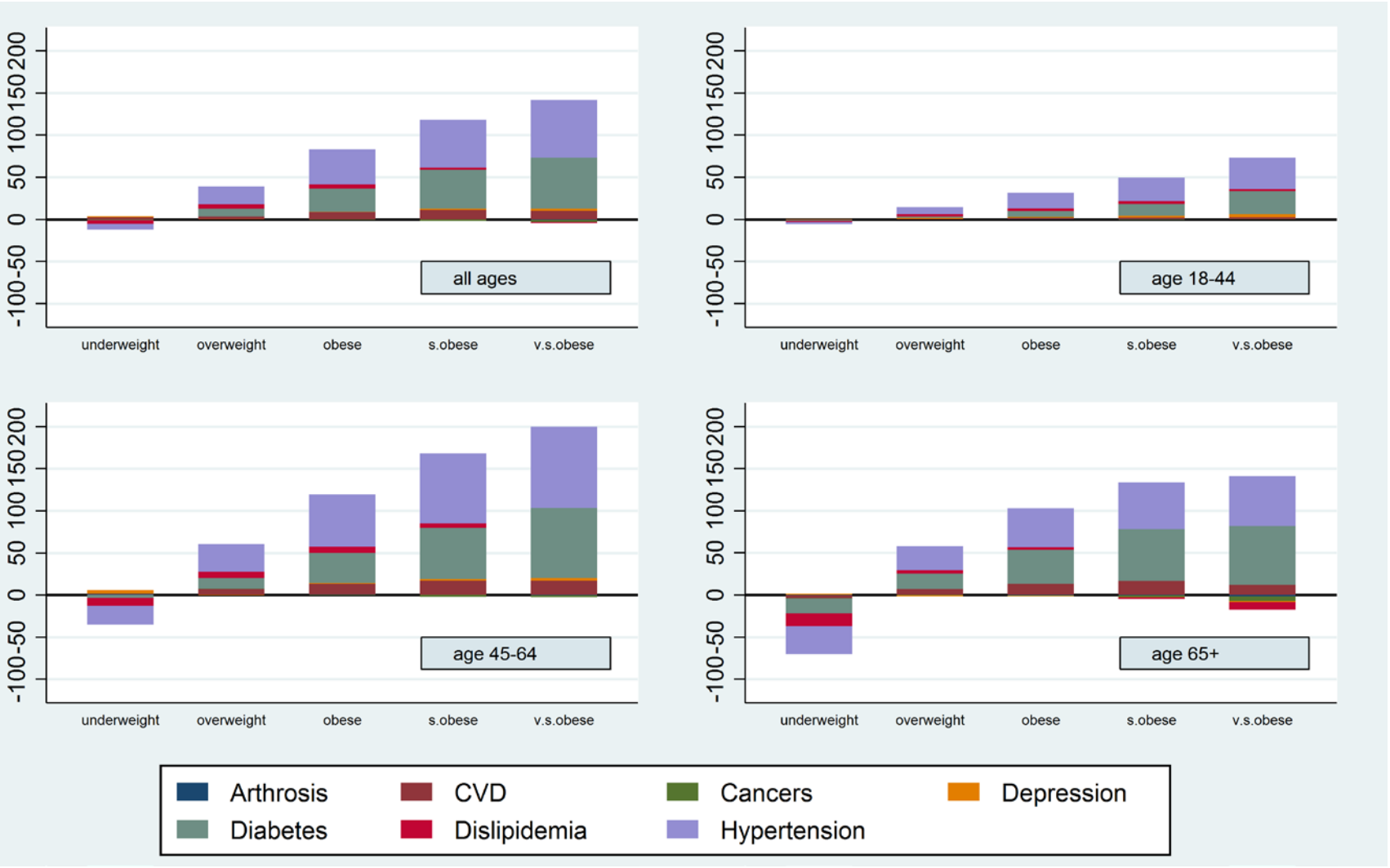
Finally, ε_{jit} and η_{it} are idiosincratic error terms. The assumption of the model is that error terms are independent across time, but may have cross-equation contemporaneous correlations. Thus we assume that $E[\varepsilon_{ir} \, \varepsilon_{is} \mid X] = 0$ whenever $r \neq s$, whereas $E[\varepsilon_{ir} \, \varepsilon_{jr} \mid X] = \sigma_{ij}$.

Atella et al. (2015) – age specific BMI health primary care expenditrue differentials (updated at 2014 data)



Atella et al. (2015) - channels of age specific BMI health primary care expenditrue differentials (updated at 2014 data

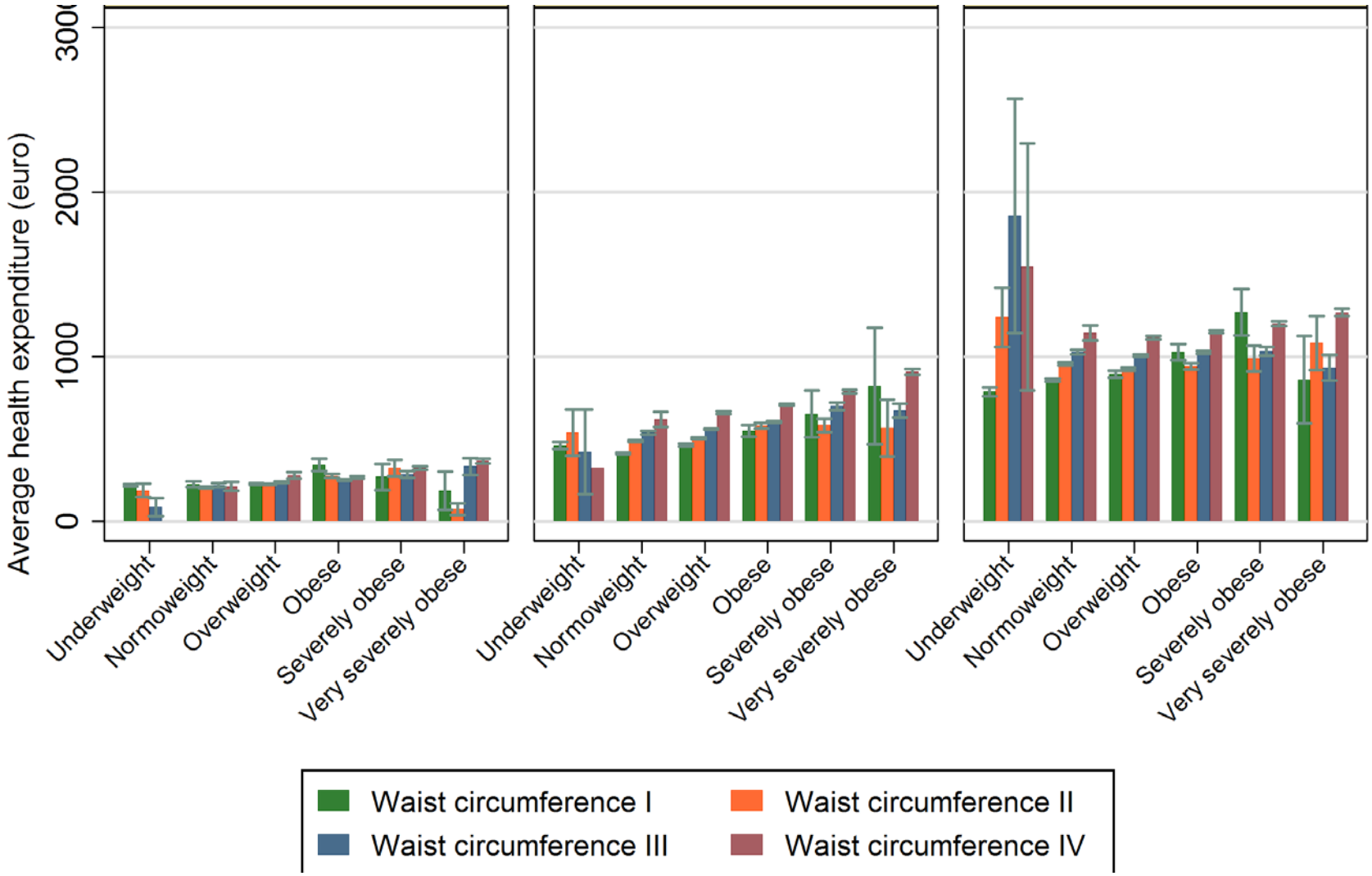
CEIS TOR VERGATA Centre for Economic and International Studies



What about waist circumference?

- **Clinicians argue that obesity associated health burden is strongly determined by the waist circumference.**
- **A high waist circumference is associated with an increased risk for type 2 diabetes, dyslipidemia, hypertension, and CVD, even after controlling for BMI**

Waist circumference penalization and age specific effects



Research Agenda

- **Use of IT-FEM microsimulation model to investigate the effect of these phenomena in the medium/long-term**
- **Other?**

Some tentative conclusions

- **Generations have been hit differently by socio-economic events**
- **Younger generations have been hit more than older generation**
- **This seems to have large impact on health status**
- **Studying these phenomena will be important to plan better for the future**
- **More research is needed in this direction**