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"No man is an island: the impact of Social Capital on Health"

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Firma dello studente

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Chapter 1

Introduction

It might be said, mixing and matching the incipit of a famous novel written two hundreds years ago and a maxim of Aristotelian philosophy, that: it is a truth (almost) universally acknowledged that humans are by nature social beings.
Given that it is clear that for economic analysis is not negligible to keep in mind that, despite the fact that theory preaches individuals are entirely guided in their action by utilitarian reasonings, people in reality are not pure rational, maximising utility, selfish beings[1] but instead they prove to be cooperative and socially proactive.
To have a clearer representation of this claim, it is sufficient to consider the textbook case of prisoner's dilemma: overall cooperation would be the social best equilibrium but, since if just one player unilaterally cheats and deviates from cooperation equilibrium he or she will benefit at expense of other(s) player(s), no one has incentive to stick to cooperation strategy and everyone would deviate reaching the only possible equilibrium: no-cooperation (i.e., the outcome characterized by lower social pareto level).
However, moving from theory to empirical evidence, many studies contradict the idea of humans as perfectly rational and selfish beings and they do observe, instead, empirically cooperation.
Reasons for this inconsistency between theory and practice can be multiple. According to Guiso, Sapienza and Zingales, this may be the result of a tendency to regard economic theory as purely normative theory while it is in fact a positive theory of human behaviour[2] (Guiso, Sapienza, and Zingales 2011).
Nevertheless, another possible explanation for such a deviation from perfect rationality can be a certain taste for trust, reciprocity and cooperation in general which are all features of the so-called social capital. Regardless of the fatigue to find a shared definition for this peculiar type of capital, the common thread between different definitions is the emphasis placed on the role of social capital in inducing individuals to cooperate for the collective benefit rather than being exclusively interested in the individual advantage.
The perks of social capital for the economy are multiple. Let's think about a society in which general trust and reciprocity are guaranteed by the informal push of social

[1] At the heart of this vision of human nature lies the utilitarian philosophy of which Jeremy Bentham is the main exponent. According to it, the neoclassical economy has built the marginalist theory that the economic agent is a selfish and competitive being who has as its guiding principle to achieve pleasure by avoiding all forms of suffering.

[2] Authors, for example, notice how it is almost impossible not to see a normative judgement in the statement that the rational strategy in a public good game is to not contribute whereas cooperation is an irrational strategy.

norms and expectations, such a society is more efficient than a society in the grip of mistrust because exchanges can take place in a more fluid manner and at a lower transactional cost as it is not necessary to prepare contracts that are too rigid and meticulous in order to be protected against pre-contractual information asymmetries and/or post-contractual moral hazards (Putnam 2004).
World Bank strongly supports the vision of social capital as a pivotal element for development and growth, too. Through the work of its Social Capital Initiative, World Bank points out that "without social capital, society at large will collapse" and no sustainable growth (i.e., a growth that provides future generations with at least as many opportunities as we currently have) can be pursued. In fact, several studies performed from the SCI have underlined the relevance of social capital proving that it directly impacts income and facilitate access to services (Grootaert and Bastelae 2001).
From what has just been said, it is easy to see the complexity and vastness of the matter. It is important to keep this in mind so as not to forget throughout the discussion that although the focus will be on a specific aspect, the impact of social capital is simultaneously on various aspects of our lives and to remember that social capital can positively impact society not only in its entirety but also individually.
The focus of this thesis is in fact on a particular sphere of influence of social capital: individual state of health. That is to say: should social capital be included in the determinants of health similarly to other non-medical determinants like SES variables or healthy behaviours? Furthermore, if social capital does influence health will it be for better or for worse?
To convincingly answer to those questions is not only relevant to satisfy an altruistic and empathetic desire that everyone can be in good health enjoying, broadly speaking, well-being (although this may already be a sufficient motivation) but also because individual state of health has heavy repercussions on aspects such as: individual productivity (and consequently general productivity of a country) and the dramatic increase in health spending that is causing increasing concern about the resilience of welfare state systems and their ability to ensure high life standards to people.
The importance of good health for development has been acknowledged also by the UN which has included good health as the third goal in the list of the 17 Sustainable Development Goals.
The interest for the association between health and social capital, even before the definition of social capital had been created, has a long-standing tradition even outside economics playground. The first to talk of social isolation as a risk factor for health was Emile Durkheim in the XIXth century and since that time social scientists as well as epidemiologists have contributed to the developing a thriving literature.
The structure of the present research would be the following: chapter two will be entirely dedicated to review literature on how to properly define social capital and literature assessing the link between social capital and health; chapter three will introduce data used coming from the NCDS, models that will be estimated in the two following chapters and will discuss the use of Two-Stage Least Squares technique to assess the impact of social capital on health; chapter four will present results for baseline models and a robustness check on exogeneity of the instrument used; chapter five will broaden analysis considering other variables and analysing results for my baseline models in two sub-samples; finally, chapter six will draw conclusions and final remarks.

Chapter 2

Literature review

There is no doubt that social capital has been and still is such a topic to cause rivers of ink to flow.
For the purpose of the present work, it is important to take into consideration two main debating issues: first, what we can refer to when we talk of social capital (and what therefore has not to be consider social capital) and, then, whether and how social capital has (major) effects on health.
In the first part of literature review, I will focus on the first aspect; then I will move to recall what has been written about the effects of social capital on health.

2.1 What is social capital?

In the beginning, there have been reams on paper written in order to settle the dispute about what should have been defined social capital between experts of different fields of social sciences.
Let's start saying it is not immediate like for other forms of capital to find a definition that proves to be able of subsuming different social phenomena (like creation and compliance with social norms, trust and reciprocity and social participation) occurring at different stages of our lives.
The spread and subsequent success of the this concept, as a matter of fact, has been achieved at the expense of a shared and unambiguous definition of this concept starting from reaching consensus on its very nature: namely, social capital has to be considered a positive, a negative or a mixed phenomenon?
The World Bank talks of social capital as "the glue that holds societies together and without which there can be no economic growth or human well-being" (Grootaert and Bastelae 2001).
OECD defines it as "networks together with shared norms, values and understanding that facilitate co-operation within or among groups" (OECD 2001).
Pierre Bourdie, instead, describes it as "the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationship of mutual acquaintance and recognition".
As sociologists in general, Bourdie focuses his attention on benefits and opportunities for individuals arising from membership in a community that offers a "credential which entitles [group members] to credit, in the various senses of the word" (Bourdie 1986).
To make a long story short, the interest in social capital originally spread in sociology and political science but soon it got increasing attention from economists because of its role in transactions. Among the many interesting views, it is important to

pay an honourable mention to the contributions provided by Coleman, Putnam and Guiso, Sapienza and Zingales.

The work of the sociologist James Coleman has the great merit of trying to heal the rift between economists and other social scientists about the rationale for social action. He shows how, starting from apparently too far apart depictions of social action, a unitary explanation can be reached considering social action as the maximizing utility move taken in a socially shaped and constrained context. On one hand, this definition gets rid of the individualistic assumption proper of economists; on the other, it adds to the explanation of sociology an intrinsic ratio for acting: that of having and pursuing own personal purposes.
Thus, moving from such premises, social capital can be seen as a specific asset available to individuals in a context in which, he says, they do behave rationally and have "control over certain resources and interests in certain resources and events".
Social capital, then, consists of a variety of entities related by two elements: they shall all involve some aspects of social structure and they shall facilitate actions within this very structure.
In Coleman's vision social capital affects the structure of relations both between and among individuals so it is ultimately about: obligations, expectations and trustworthiness of social facilities; social relations that turn to be useful in the transmission and provision of information (working as a system of sensors for an individual); prescriptive norms and effective sanctions that are common and enforced in a community.
With respect to the former and latter aspects, the social structure' s closure is pivotal as it allows the proliferation of obligations and expectations.
Another interest aspect of his work is the attention on arguing independence of social capital from human capital. Scholars have for a long time struggled in differentiating them and, in particular, in lending its own dignity to social capital. According to Coleman, the dividing line between these two forms of capital lies in that: human capital originates in mutations (e.g., new skills, knowledges or competences) within people while social capital in changes in the relations among people. Therefore, the former opens up new possibilities by providing the tools to act in ways that are always new and more suited to the context (of action), the latter facilitates the actions to be taken.
Having said that, he notes that, at least in his formulation of social capital, one remarkable effect of social capital is the role it plays in the creation and transmission of human capital[1] in future generations (Coleman 1988).

Political scientists debating on the issue of how possibly define social capital were particularly concentrated on the levels of cooperation and compliance with the law. According to some scholars that would be a major flaw given that those aspects are likely to be outcomes more than inputs (Guiso, Sapienza, and Zingales 2011).
Robert Putnam's definition of social capital as "features of social organization such as networks, norms and social trust that facilitate coordination and cooperation for mutual benefit" offers an emendation to such a flaw (Putnam 2000).
His thesis is that: social networks, interpersonal relationships and norms of reciprocity and trust (i.e, social capital) have an autonomous value and increase productivity similarly to a working tool (i.e, physical capital) or a specific set of knowledges

[1]Considering, for example, a family, he argues that no intergenerational transmission of human capital from parents to children can happen if parents do not possess social capital to some extent.

(i.e., human capital).
In his book, *Social capital and individualism*, Putnam offers a comprehensive image of how social capital is embedded in our lives and how it can improve them.
First of all, it facilitates the resolution of collective conflicts and problems like the tragedy of commons, the prisoner's dilemma or free riding problems.
Social capital also oils mechanisms that makes transactions, both social and business ones, less costly allowing communities to progress. In fact, once you have constant and repeated interactions with people, you do not need to waste resources to ensure compliance with the agreements made and to set up sanctions and disincentives for opportunistic behaviours.
Finally, it increases our awareness of mutual interdependence and facilitates the transmission of information and the creation of networks. Being part of a group offers the possibility to verify the truthfulness and reliability of our opinions about others aside from making us more empathetic and tolerant.
A crucial aspect in Putnam's analysis is the distinction among different types of social capital.
A general categorisation of social capital distinguishes between three types: bridging, bonding and linking. They all matter for health and well-being but in slightly different respects (Putnam 2004).
Bridging social capital refers to the connections among people despite they may belong to different socio-economic groups. This form of capital enhances solidarity, perception of social justice and trust.
Bonding social capital relates to the unspoken ties between members of a close group who share similar values and objectives; it matters the most in providing the feeling of protection due to social support.
Linking social capital is a subset of bridging social capital that connects common people to powerful individuals. Clearly, this type is pivotal for the successful mobilization of institutions (Poortinga 2006).
In view of the above, it is clear why it is important to distinguish between the first two types of social capital which, although not mutually exclusive, are to some extent unexchangeable because generate different outcomes. Bridging social capital is an asset that allows communities to open up to the outside with generalized confidence creating inclusive social networks; bonding social capital, instead, further strengthens existing bonds of a community on the basis of specific reciprocity and strong internal solidarity (Putnam 2004).

The third definition considered is the one of Guiso,Sapienza and Zingales.
They identifies social capital in values and beliefs fostering cooperation; more precisely they call it civic capital which they define "those persistent and shared beliefs and value that help a group overcome the free riding problem in the pursuit of socially valuable activities".
This definition has some similarities with the approach of political scientists (in particular Putnam) but with respect to them it has the merit of shifting the attention to those very values and beliefs which are helpful in getting rid of collective action problems and which are long-lasting and shared in the community through intergenerational transmission, education and socialization.
Besides that, it has many other merits including its robustness to Solow critique that I will discuss in the following section.
First of all, an undeniable virtue of authors' definition is the possibility to claim civic capital as the missing ingredient in explaining the persistence of economic develop-

ment and in support of this claim they recall the studies on the level of economic development in Northern and Southern Italy.
Furthermore, this formulation excludes negative forms of social capitals as criminal organisations that strongly relies on strict ties bonding group's members[2].
Finally, speaking of social capital in terms of civic capital makes easier to distinguish human and social capital. In fact, differently from human capital which usually entails an individual investment, civic capital implies both an investment at individual and even more so one at the collective level of the community. It is sufficient to reflect on the fact that components themselves of the group transmit shared beliefs and values and and if this transmission does not take place there cannot be civic capital at all (Guiso, Sapienza, and Zingales 2011).

It might be noteworthy to underlines that many scholars recognise also a public dimension to social capital drawing attention on externalities generated by social capital. This is an aspect of primary importance in order to properly answer the question about what is social capital.
In fact, alongside the individual dimension there is the collective one: many forms of social capital, at least to some extent, do show "public goods" characteristics meaning they are good not perfectly excludable or rival in consumption.
People create relationships from which they benefit but not all the costs and benefits of these relationships go to the person who has created those relationships, creating the typical case for talking of externalities.
The fact of producing externalities implies that individuals do not optimally invest in social capital because those who create social capital in first place are not the only ones experiencing the consequences of it whether they are positive, as it happens in the majority of cases, or negative accordingly to the type of social action undertaken.
Paul Collier in "Social Capital and Poverty" lists three types externalities through which social capital is beneficial for the efficiency of the economic system. On one hand, social capital facilitates the transmission of knowledge about the behaviour of others and so reduces the problem of opportunism; on the other hand, it also encourages the transmission of knowledge about technology and markets that reduces market failures in information. Furthermore, social capital reduces the problem of free riding facilitating collective action (Collier 1998).
In conclusion, it is useful to emphasise that social capital, in all its articulations, can be analyzed through the use of other categories. Besides the already discussed distinction between private and public dimension, social capital can be considered also on the level of society at which its influence operates (i.e., micro, meso or macro level) as well as on the kind of resources considered. This is the case for the distinction between structural and cognitive social capital where the first refers to the more tangible structure of interpersonal relations and therefore entails procedures, rules, precedents and roles, the second, instead, to the more intimate and intangible sphere of values, attitude and beliefs (Grootaert and Bastelae 2001).

2.1.1 A capital question: the Solow critique

In 1995, replying to an article by Fukuyama, the nobel prize winner Robert Solow objected that the attribute "capital" had been conceded far too easily as, to quite

[2]The concern about the adverse influences of social capital is a major theme in Alejandro Portes' writings, I will tackle this issue later in this chapter.

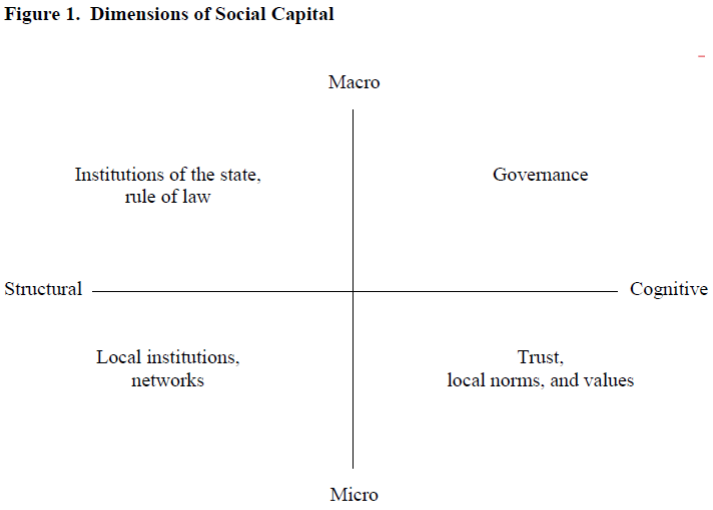


Figure 2.1: Grootaert and Bastelae 2001

rightly deserve the name "capital", some conditions must be fulfilled.
First of all, a capital ought to be accumulated and de-cumulated namely, it must be possible for individuals to increase (decrease) their stock of capital as a consequence of positive (negative) shocks and as a consequence of their actions; secondly, the stock should be measurable in some (even) inexact way and transferable between individuals; third, it has to stand independent from other forms of capital; finally, it must yield a positive return to its owner[3].
Against this critique, many voices have been heard which have shown how social capital shall be fully-fledged considered a form of capital.
The Social Capital Initiative of World Bank has underlined that social capital has several shares characteristics with other forms of capital as well as some peculiarities.
With respect to the similarities, social capital as well as physical capital requires a certain level of investment both for its production and maintenance. Clearly, the investment at stake is not necessary, and as a matter of fact usually it is not, monetary but it likely entails commitment and time.
A common feature of social and human capital is that accumulation of them is a consequence of their use. So, it can be said that social capital is both an input and an output of collective action.
Nevertheless, social capital has of course distinctive traits. The main peculiarity is that it cannot bloom in isolation since it requires the existence of human interactions to be created and activated. But, there is at least another interesting attribute of social capital proved by the studies of the Social Capital Initiative: social capital yields a positive return complementing other forms of capital so to increase their productivity and enhance production in general (Grootaert and Bastelae 2001).
However, one of the clearer and more effective reply to Solow's criticism remains the one provided by Guiso, Sapienza and Zingales. In fact, their definition of social capital as beliefs about the willingness to cooperate of others has the advantage of being based on personal experiences and being updated according to them as well as of being easily transferable. The crucial point is to set whether or not, and even-

[3]This aspect has become in recent time less crucial. In fact, as interest rates pinned down to 0 the argument of providing some sort of yield appears marginal.

tually how, we can invest in social capital to increase our stock and, symmetrically, depreciate the stock we possess.
Guiso et al. claims there are three ways in which accumulation takes place: intergenerational transmission of values and beliefs, formal education and socialization; and three ways in which depreciation takes place: major changes in economic and social factors, salient historical events or episodes that modify people's beliefs and the perceptions of what is morally acceptable.
Moreover they underline that social capital requires a longer period of time to accumulate than human and physical capital and it has increasing return to scale because the payoff is positively related to the level of social capital in the collectivity. That means returns are not exclusively dependent from individual willingness to cooperate but are contingent to community's beliefs and behaviours.
Furthermore, it is noteworthy that such a process of accumulation is consistent with methodological individualism postulated by economists. In fact, the effort that each individual takes to reprime anti-social behaviours and transmits certain values and beliefs it is motivated by the awareness that a minority of free riders can potentially smash a cooperative equilibrium depriving the whole community of the benefits coming from cooperation (Guiso, Sapienza, and Zingales 2011).

2.2 Why is it relevant for health?

The intuition that high levels of trust, reciprocity and social participation can have major impacts on health status is nothing new.
Although it has not been isolated a univic social process underlying the relation among health and social capital, literature contributions from diverse fields have contributed to explain how it can happen. It has emerged that an exhaustive response requires to simultaneously consider two dimensions: biological response to social exclusion/participation and emotional and psychological implications of it.
Starting from the work of Emile Durkheim on suicide[4] in the XIX century, it has been clear that there is no area of life in which social interaction has major importance as it has in health and well-being. Durkheim reportes that less socially integrated people were more likely to commit suicide (Putnam 2004).
In spite of this incontrovertible evidence, the discussion on how and why it does happen is still open.
Cacioppo et al., reviewing previous literature on endocrine response to social isolation both in animals and humans, provide a neurological explanation of it.
Since a long time before their article, social isolation had been counted among the main risk factors for broad-based morbidity (both physical and psychological) and mortality in humans.
Epidemiologists had formulated the so-called "social control hypothesis" to explain the well-recognized association between health behaviors and morbidity and mortality which hypothesized that obligations introjected towards the members of own target group (e.g. family or friends) and the influence of them on ourselves encourage us to have healthy behaviours (e.g. sleep, healthy diet, exercise) and discourage behaviours harmful for health (e.g. poor nutrition, alcohol and / or smoking abuse).
Authors draw attention to the brain which is "the key organ for forming, monitor-

[4]He found self-destruction is not only an individual tragedy but a socially predictable consequence based on the degree of integration in society. More rare among married people, in more compact religious communities, in periods of national unity and more frequent when the rapid social change disrupts the social structure.

ing, maintaining, repairing, and replacing salutary connections with others".
They find that perceived social isolation, whether it is real isolation or not, is a risk factor for morbidity and mortality due to "the activation of the hypothalamic pituitary adrenocortical axis" and this effect it is not, or better it is not mainly, a consequence of social isolation per sè but of disruption of a social bond (Cacioppo et al. 2015).
Other studies conducted in the US also report positive effects of social capital on health.
Yang and co-authors find that social integration is associated with better physiological functioning in both early and later life. Conversely, the lack of it increases "the risk of inflammation by the same magnitude as physical inactivity in adolescence and the effect on hypertension exceeds that of clinical risk factors such as diabetes in old age" (Yang et al. 2006). Muenning and co-authors also verify the association between social capital and better health. They record positive effects of structural social capital on intermediated health outcomes (namely, C-reactive protein, cholesterol, blood pressure, serum fibrinogen) and distal ones (namely, cardiovascular and all-cause mortality) (Muenning et al. 2013).
Finally, Giordano and Lindström citing previous researches point out that through a persistent increase in anxiety and level of stress (which activate the hypothalamic-pituitary adrenal axis) there is an increase in the level of cortisol in blood which, in turn, can cause cardiovascular disease and stroke, depression, metabolic syndrome, type 2 diabetes (Giordano and Lindström 2012).
Snelgrove and co-authors provide some evidence of positive and significant associations of individual general health and social capital both for individual and area-level social capital. Social capital is measured in terms of social trust through the use of generalized trust and civic participation expressed as participation in voluntary organizations. Interestingly, they find more encouraging results using the first measure with respect to the civic participation (Snelgrove, Pikhart, and Stafford 2009).
Petrou and Kupek also find robust results to different kind of health measures for the positive impact of social capital on individual health (Petrou and Kupek 2008).
Giordano and Lindström using longitudinal data estimate a dynamic model with lagged social capital and find that trust is a independent predictor of future health status. On one hand, the persistence in the incapacity of trusting or the acquisition of feeling of mistrust both translate into worsening health conditions; on the other hand, maybe unexpectedly, the gaining trust in other people over time increases the risk of health worsening for those reporting poor health whereas for those already in good health at baseline is significantly associated with health improvements.
Furthermore, they find that social participation is only relevant for health improvements whereas trust is also relevant for the risk of deteriorating health. So, the health policy advice given by authors is to look at factors determining trust to maintain a good level of health and those determining social participation to enhance present health level (Giordano and Lindström 2010; Giordano and Lindström 2012).
Tampubolon an co-authors focus their attention on neighbourhood social capital. Despite evidence of such a form of social capital on individual health has been found for USA, positive results had not been replicated in other countries included UK. But they find, using data coming from Wales, some effects on health like, for example, on smoking which appears to be negatively associated with neighbourhood social capital (Tampubolon, S. Subramanian, and Ichiro Kawachi 2013) .
Verhaeghe and Tampubolon find that social capital has a mediating effect in the

existing negative link between neighbourhood deprivation and self-related health.
In fact, people living in a deprived neighbourhood are less trustful and have less benefits coming from social participation with neighbours as a consequence of the fact that residents belong to lower levels of social ladder with lower level of wealth. They estimate the mediating effect of social capital to be equal approximately to the five percent of the variation in self-rated health (Verhaeghe and Tampubolon 2012).

Nevertheless, as well as a (preponderant) evidence of positive effects of social capital, there exists some evidence of social capital's bad influence on health too.
In a famous work, Alejandro Portes warns against the temptation to put capital on a pedestal and presents at least four main negative consequences of social capital. Portes is particularly keen to dispel the myth that only positive things can come out from sociability. That to avoid the risk of going out the bounds of rigorous analysis and sink into moral judgements with the consequence of considering community networks, social control and collective sanctions as "un-mixed blessings" (Portes 1998). Those negative consequences constitute also major reasons for a bad influence of social capital on health: first, it might be the case that some people in the group may be damaged from excessive demand for support placed on them from other members; secondly, belonging to a community may limit individual liberties as a consequence of informal control; then, despite in many cases happens the reverse, it may happen that strong social capital leads to depress behavioural standards creating a trade-off between conformity to the group and individual best practises; and last but not least, bonding capital can be use to exclude out-group individuals.
Besides them, Villalonga-Olives and Kawachi find two further drawbacks of social capital: social contagion and cross-level interactions. The former refers to the possibility that unhealthy behaviours spread more easily as a result of the very existence of a network; the later regards the possibility that, although exposed to the same forms of social capital, people can be differently affected according to their personal characteristics (Villalonga-Olives and I. Kawachi 2017). Campos-Matos and co-authors., for example, using data covering 35 countries find that of course there is tight association between levels of interpersonal generalized trust and self-assessed health levels across most European countries but the effect of that association is not homogeneous.
In fact, having high average levels of trust at the country level may benefit people who have themselves high levels of individual trust and, at the same time, harm those who show low levels of individual trust in that context.
Interestingly enough, countries with comprehensive welfare states can create through them massive health inequalities positively impacting general population health and simultaneously harming low trust individuals. In this respect, social capital can affect health also producing discrimination against those who do not share same values and dispositions (Campos-Matos, S. V. Subramanian, and I. Kawachi 2016).

2.2.1 Keeping up with the Joneses: the Roseto effect

At the end of this chapter it might be useful to briefly look at a famous case study in health and social capital literature: the case of Roseto.
Roseto is a borough in Northampton County, Pennsylvania, United States. In the 1950s, researchers noticed there a lower incidence of heart attacks (calibrated on age) than in neighbouring communities. This evidence was even more surprising

in light of the fact that the inhabitants of Roseto presented some heart attack risk factors to a greater extent than their neighbours in other cities.
Thus, scholars turned their attention to social dynamics and discovered that Roseto had been funded by people coming from an homonymous small village in South Italy. Those people had created a cohesive and committed community in which people were discouraged from flaunting their own good fortune but were, instead, strongly encouraged to rely on one another for any kind of help (financial, emotional,...).
This tight bond among people and the incredibly high level of social cohesion had provided a shield against the onset of cardiovascular conditions and so, once those community life patterns disappeared, the incidence of cardiac attacks increased exponentially, reversing the trend that had been positive until then with respect to neighboring communities.
The story of Roseto represent an excellent example of the tight link between health and social capital as well as of the decline in social capital observed in America (Putnam 2004) .
This latter aspect is the core of the famous paper "Bowling Alone" by Putnam. In it Putnam meticulously analyses several spheres of life in which there has been a tangible decline of social capital lato sensu. He presents evidence ranging from turnout, trust and associationism up to the decline in organized bowling leagues coupled by the increase in Americans playing bowling alone from which the title of the article derives and that serves as the epitome of a wider social phenomenon (Putnam 2000).

Chapter 3

Empirical strategy

3.1 Data sources

The *National Child Development Study* (NCDS) is a continuing longitudinal study that seeks to follow the lives of all those living in Great Britain who were born across England, Scotland and Wales in a single week of 1958 (namely, infants born between 3 and 9 March 1958). The study originates in the *Perinatal Mortality Survey* which investigated social and obstetric factors associated with stillbirth and infant mortality among over 17,000 babies. Concerns for the high number of stillbirths and children dying in the first few weeks of life urged doctors and scientists in the aftermath of World War II to investigate the causes of such a phenomenon in order to develop preventive and corrective policies.
The coverage rate of the original survey among families who had a child in that week of March 1958 was 98%.
Although the study was not originally intended to be an ongoing project, surviving members of the birth cohort have been surveyed on ten [1] further occasions in order to collect information and monitor changings on: physical, cognitive and social development; education; economic circumstances; employment; family life; health behaviour and wellbeing; social participation and attitudes.
The *National Child Development Study* is, as mentioned above, an ongoing study. The next sweep of the survey will be launched in 2020.

My empirical analysis is mainly based on a sample size of approximately 9000 respondents participating in the 7th, 8th and 9th waves of the NCDS.
The first survey took place in 2004 and was conducted via telephone involving 9534 participants. The following took place four years later in 2008 and 9790 people received a paper questionnaire in advance via post and then they were visited at home to complete the survey. This survey coincided with the celebration of the 50th birthday of study members.
The last survey was conducted between 2013 and 2014 and was the first entirely completed via the internet with 9137 participants.
Each survey of NCDS collects data on various aspects of participants' life ranging from family to political participation, from housing to exercise and more[2].
Among those many variables, in this work the focus was on health, socio-economic

[1] Surveys have been conducted in 1965 at age 7, 1969 at age 11, 1974 at age 16, 1981 at age 23, 1991 at age 33, in 2000 at age 42, in 2004 at age 46, in 2008 at age 50, in 2013 at age 55 and, finally, in 2018 at age 60.

[2] Data are available at: https://www.ukdataservice.ac.uk/

conditions and social characteristics of people interviewed.

3.2 Variables description

I will now briefly present the variables used in the work at hand. My dataset consists of variables coming from the last three available waves of NCDS.

3.2.1 Outcome variables

The dependent variables considered are all measures of individual health ranging from self-assessed level of health, a well-established measure of health status in literature, to measure of emotional or psychological health and specific health issues.
With respect to the former measure, which is by the way the baseline for my analysis, in all the three waves taken into account participants were asked about their perceived health level. In 2008 and 2013 the information was collected through the following standard question: "In general, would you say your health is... excellent, very good, good, fair, poor?
In 2004, instead, the question was slightly different. Participants were presented with the following formulation: "Think back over the last 12 months about how your health has been. Compared to people of your own age, would you say that your health has on the whole been...excellent, good, fair, poor or very poor?"
This lack of homogeneity is not a major concern since I use dummy variables reporting whether or not the respondent declares specific levels of health. Nonetheless, it is pretty obvious performing a dichotomisation of a variable is not a neutral process given that entails some loss of information.
It is not a surprise that in data there is an evident general declining trend, both among men and women, in self-reported level of health over time. It might be simply a consequence of aging but it might also be a results of other factors as the slowdown of economy or the general observed decline in self-perception of own state of health. This decline is part of a more general one about our quality of life which I have already very briefly mentioned in introduction but it is quite peculiar given that overall health conditions, at least in developed countries, are significantly better now than in the past: we have witnessed decades of growing life expectancy and improvements in diagnostics and medical care but still we have the perception of a deterioration and this is clearly connected with the loose grade of integration in the social network we belong to (Putnam 2004)
As already mentioned, I take into consideration also other indicators of the personal state of health.
For 2008 I consider dummy variables for sleep quality both in terms of waking up rested and sleeping time and for being a regular smoker.
Goodsleep and enoughsleep are the measures of sleep quality: goodsleep records how often respondents woke up feeling rested in the four weeks before the interview, in particular this variable is equal to 1 when replies were: all of time, most of time, a good bit of the time and 0 otherwise; enoughsleep indicates whether time slept per night is above or below average sleeping hours in my sample.
Smoker8 takes on the value 1 for regular smokers and 0 for non-smokers, ex-smokers and casual smokers.
Finally, I will consider some scores from the Short Form 36 Health Questionnaire. The questionnaire inquires the health of respondents according to 9 macro items: general (5 items), physical (10 items) and emotional (5 items) health, bodily pain (2

items), role functioning both for physical(4 items) and emotional health (3 items), vitality (4 items), social functioning (2 items), and reported health transition (1 item).

Unfortunately, due to dishomogeneity in survey questions, it has not been possible to observe the same indicators of health in both waves considered.
Therefore, for wave 9 the variables taken into account are dummies for reported heart conditions, emotional problems and again being a regular smoker.
Heartp is a dummy equal to 1 when respondents reports to have heart problems like, for example, the Angina pectoris or Coronary Heart diseases and 0 otherwise.
The dummy emoprob takes value 1 when respondents reports emotional disorders.
As for wave 8, the dummy smoker9 is equal to 1 for regular smokers and 0 otherwise.

3.2.2 Treatment variable

As already stressed out, the scope of present work is to assess the influence of social capital on health. But, since it is not easy, if not undoable, to directly measure social capital for empirical reasons it would be necessary to resort to use a proxy.
I follow the well-consolidated example provided by Guiso, Sapienza and Zingales and I choose a measure of trust and confidence as the pivotal aspect to assess the social capital on health (Guiso, Sapienza, and Zingales 2011).
My choice is supported also by the idea that trust might be the basis for other forms of social capital spreading out. Giordano and Linström, for example, hypothesize that trust and reciprocity can help to develop other types of social capital- namely, social participation- besides the direct effect they have on health.
According to their study, it is in fact so: to be confident in others has a positive effect on social participation despite the evidence of weak association between social participation and trust shown in many researches.
Therefore, they warn public intervention should be targeted to assess the causes of the decline in interpersonal trust (i.e., inequalities of wealth and material resources) rather then focus on social participation (Giordano and Lindström 2010).
There are at least two arguments explaining wide use in literature of trust as a proxy of social capital: trusting beliefs are, ultimately, probabilities a priori over the behaviour of other people; the higher are probabilities of expecting a cooperative and fair behaviour from opponents are in a community, the bigger would be the incentive to cooperate (Guiso, Sapienza, and Zingales 2011).
Thus, the choice fell on the level of trust in people belonging to the same local area of respondents. Once again, the variable considered is a categorical variable divided over four levels. People had to reply to the question: "How much do you trust people in your local area? Would you say you generally trust people...a lot, a fair amount, not very much or not at all?"
I create a dummy equal to 1 when the level of trust is at least "a fair amount" and 0 otherwise.

3.2.3 Explanatory variables

A battery of controls are taken into account in order to tidy up as much as possible the effect of trust on health. The criteria of inclusion respond to the necessity of considering variables that are affecting health as well as trust.
My controls are measures of civil and socio-economic status beyond, of course, gen-

der. Material conditions and social class are controlled respectively through household income and the employment status, the level of education is assessed according to the competence-based qualification english system NVQ (National Vocational Qualification) and the civil state is included because many studies show how social isolation and lack of support produce lower level of trust.
I consider as an indicator for household income the variable annual income from all sources before tax benefits included in my dataset but I transform the continuing variable into a categorical one that indicates at which quartile of the income distribution belongs the observation considered.
The rationale for doing so is that when the dependent variable is binary, unless the regressors are also binary, the use of R^2 loses meaningfulness. In fact, R^2 is equal to one when all the data lie exactly on the regression line and it makes sense to assume that this can happen when the dependent variable is continuous while it is quite impossible if we are dealing with a binary outcome variable (Stock and Watson 2012).
For what concern gender, my sample is quite balance among female and male participants.
Employment status is built around seven levels: unemployed, self-employed in small establishment, self-employed with no employees, manager in small establishment, manager in large establishment, foreman or supervisor, employee. The majority of the sample concentrates among the last two levels. Education ranges from no academic qualification at all to the NVQ5 level corresponding to the higher level of academic education.
Regarding the marital status I distinguish between: married, cohabiting as a couple, single (and never married), separated, divorced and widowed. The majority of people in the sample was married at the time of interview (73% and 60,5% respectively among those who report that they can or cannot trust others).
Finally, I include the region of residence. Wales and Scotland are considered in their entirety whereas England is divide in 8 regions: North, Yorkshire and Humberside, East Midlands, East Anglia, South East, South West, West Midlands, North West.

3.3 Models

Before proceeding and introducing models to be estimated, it is essential to take some time to discuss the nature of the relation existing among health and social capital.
Much has been said on this issue. The hypotheses range from entirely rule out causality, meaning associations empirically established would be mere correlations, to acknowledge a causal relation which, nevertheless, could be of three different types: trust independently influences health; conversely, it is health to influence trust (i.e., reverse causality); or finally, there exists a reciprocal influence of one on the other (i.e., circular/reciprocal relation).
On one hand, it is reasonable to argue that social capital can positively impact health, but, on the other hand, it is also reasonable to argue the reverse: personal state of health influences levels of trust, social participation, social norms compliance and so on.
Giordano and Lindström presents evidence of a circular relation existing between trust and health (Giordano and Lindström, 2015). In light of what has been argued hitherto, it seems appropriated to advocate the presence of a bidirectional causality relations existing among those two variables.

Another important point is the necessity to make a clarification about the level at which to observe how social capital affects health. In other words, it is necessary to set whether to analyse social capital as an individual characteristic following the economic perspective or as a community's phenomenon following the sociological political science perspective or even if both levels should be simultaneously taken into consideration.
The reason behind it is that in this way the link between these two variables can be better understood and proper advices for the policy maker on the kind of policies to undertake can be formulated (which is ultimately the aim of assessing the nature of this relation).
It should be already evident that the choice here has been in favour of the first option which is supported by results of previous publications (Poortinga 2006; Rocco and Suhrcke 2012; Rocco, Fumagalli, and Suhrcke 2014).
Rocco et al., among the others, find social capital measured at individual level in a simultaneous equation model has both a stronger and a statistically more significant impact on health than community social capital, although the effects at either level remain positive and significant. Their conclusions are robust also to mis-reporting in self-reported variables of health and trust (Rocco, Fumagalli, and Suhrcke 2014).
In another paper, Rocco and Suhrcke find no evidence of an autonomous effect of community social capital on health but they underlines it is instrumental for individual social capital.
This is, of course, nothing unexpected but the repetition of something I have already said: social capital cannot develop in autarchy but it needs at least the interaction among two people. Therefore, to identify the fundamental influence channel of social capital on health does not weaken in any way its social origin because "trusting others has a positive impact on health only if trust is reciprocal" (Rocco and Suhrcke 2012).

The ideal model chosen to estimate is:

$$Health_{i,t+k} = \alpha + \beta_1 trust_{i,t} + \beta X_{i,t} + \gamma Z_{i,t} + u_{i,t}\psi_{i,t}$$

a dynamic model in which social capital affects the dynamic of health accumulation/ depletion so to investigate the effects of social capital on the health investment more than on the stock of it.
$X_{i,t}$ is the vector of observable predetermined characteristics of individuals whereas $u_{i,t}$ comprehends all those individual characteristics that matter both for health and social capital which are, nevertheless, unobservable .
Even in the case one could convincingly argue to have included in the vector $X_{i,t}$ all the relevant observable variables, still it cannot be eliminated the fact that the error term would include those unobservable characteristics.

My baseline will be represented by models in which the outcome variables are dummy measures of self-reported health both in the short-run (i.e., wave 8) and in the medium-run (i.e., wave 9).

$$self - reportedhealth_{i,t+k} = \alpha + \beta_1 trust_{i,t} + \beta X_{i,t} + \psi_{i,t}$$

Where $X_{i,t}$ includes a dummy for gender, *n-1* dummies for SES variables (household income before tax deductions and employment status), academic educational level, marital status and region of residence all considered at time t=2004.

The inclusion of dummies for $self - reportedhealth_{i,2004}$ among regressors is, so to say, controversial. It is justified from the fact that literature has convincingly argued about the positive association between simultaneous level of trust and health (Giordano and Lindström, 2015) and therefore omission of these controls in my equations would knowingly create omitted variable bias but, at the same time, it is discouraged by the fact that the relation between lagged measures of self-reported health possibly introduce a problem of autocorrelation in errors.

It has been already mentioned that I also take into consideration other indicators of health as outcome variables in order to broaden my analysis and see which are the effects on specific indicator of health like: scores for SF-36 Health Questionnaire, quality of sleep[3], cardiovascular and emotional problems[4] and regularly smoking[5].
As for the specifications just presented, I consider outcome variables at time t+k (i.e., in 2008 and in 2013) and use as set of controls the same explicative variables introduced before at time t (i.e., in 2004).
Unfortunately, wave 9 was the last wave published at the time this thesis has been written so it was impossible to further expand the length of time analized.

3.4 Statistical method

Previous paragraphs have already offered sufficient evidence of the fact that in order to identify genuine causal patterns and not just associations between social capital and health, the self-evident endogeneity problem must be fixed. To get rid of endogeneity the most commonly used way is to resort to an Instrumental Variables strategy (IV), in particular the technique used here is the Two-Stage Least Squares (2SLS).
Using 2SLS allows to decompose the endogenous variable (i.e., trust in my case) into two parts in the first stage: one uncorrelated with the error in the structural equation and one which instead is problematic since it could be correlated with the error term in the structural equation.
Then, it is possible to recover reliable estimates for the coefficient of interest by exploiting the first part of the decomposed endogenous variables in the second stage.
However, resorting to an IV strategy implies as big legacy the need to find a good instrument. For this to happen the instrument has to fulfill the following conditions: first, it must be the case that the effect of the instrument on the outcome variables goes entirely through its effect on the endogenous variable or, in other words, it must be the case that the instrument is not an independent regressor in the structural equation (i.e., exclusion restriction); then, the instrument must significantly affect the endogenous variable (i.e., relevance condition) (Angrist and Pischke, 2009).

3.4.1 Instrumental variable

To find a good instrument, then, is not an easy task but luckily literature can be helpful in this regard.
Previous studies, in fact, have argued that being victim of non-violent petty crime (i.e., minor crimes or offenses like theft) can represent an exogenous shock which modifies trusting beliefs without substantially harming health (Rocco and Suhrcke,

[3]For 2008
[4]For 2013
[5]Both for 2008 and 2013

2012; Rocco et al., 2014). The idea is that, even if those crimes have not produced negative consequences on the health and wealth of victims, they have affected their beliefs about how people can in general be trusted.
This claim is quite convincing because, on one hand, seems likely that individual judgement on whether other people should be trusted could be influenced from experiencing, for example, a theft but, on the other hand, the fact that these are non-violent crimes makes plausible that, since they do not have particular consequences on health, the beliefs updated in consequence of these accidents are independent from the state of health.
It may be worthwhile to recall that the notion of social capital proposed by Guiso, Sapienza and Zingales is in terms of trusting beliefs which constitute priors that are updated with experience and transmitted across generations.
The transmission mechanism of beliefs over time works in the following way. The beliefs inherited by previous generations create priors (i.e., probability distributions over events on which people have no previous experience) on the basis of which people decide whether to trust others or not. Then, interaction among individuals come about and, according to what people experiences, they update their beliefs creating posteriors to transmit to next generations. Obviously, each interaction can either be positive or negative. Positive interactions results in optimistic posteriors increasing cooperation in next generations, negative ones risk to push society to an equilibrium of unjustified mistrust if net benefits of cooperation are not sufficiently high. The good news, however, is that a large positive shock can shift, even permanently, a society to a cooperative equilibrium in spite of priors acquired from parents.
This intuition may provide a rationale for the observed long-lasting persistence of some socio-economic phenomena as the disequilibrium in economic conditions between Northern and Southern Italy or the generalized level of mistrust in Africa (Guiso, Sapienza, and Zingales 2008).

In the NCDS dataset there are dummy variables for petty crimes victimization. The idea is to instrument trust actually observed with the predicted probability of trusting other in function of having personally been a victim of non-violent petty crimes in the last twelve months before the 7th wave. Of course a crucial caveat for the validity of my instruments is that the the accident being a victim of petty crimes shall be as good as randomly assigned. That to say, the fact of being a victim must be just a matter of misfortune rather than a consequence of the fact that people with higher level of generalized trust were ipso facto more likely to be victim of these non-violent crimes. However, that can be excluded using the level of generalized trust in 1991 and looking at correlation patterns among this variable and petty crime variables. The correlations are very small and not significant at 10% level or better providing a reassurance on instrument validity.

Till this moment I have argued that the selected instrument respects requirements in order to be considered a good instrument.
And so now it is time to put my instrument to the test showing the results for first-stage and for the F-statistics testing the hypothesis that the coefficient of the instrument equals zero in first-stage. This is a crucial point as "the IV estimand is predicted on the notion that the first stage is non zero, [...] if the first stage is only marginally significantly different from zero, the resulting IV estimates are unlikely to be informative" (Angrist and Pischke 2009).
That is to say the relevance condition already mentioned: it must be the case that

the instrument has a clear effect on the endogenous variable in order to get causal evidences.

Table 3.1: First-stage

	(OLS) trust	(OLS) trust	(OLS) trust
predicted trust	0.931***	0.939***	0.950***
	(0.140)	(0.141)	(0.141)
$goodhealth_{2004}$	YES		
$poorhealth_{2004}$		YES	
controls	YES	YES	YES
F	43.94	44.63	45.41
Observations	6736	6736	6737
R^2	0.046	0.044	0.043

Robust standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

In all considered cases the instrument is strongly significant (*p-values* are all smaller than 0.001) and the magnitude of coefficients is very high. As I will comment in more detail in the next chapter, the exclusion from regressors of measures of contemporaneous state of health determines a small drop in the R^2 and a slight increase in the coefficient.
However, F-statistics deserve particular attention. They are all heavily larger than the threshold of 10 usually used as a cut-off point to determine whether or not instruments are weak. This is a remarkable results that provides further support for reliability of results presented in next chapters.

The other fundamental component of IV estimates is the reduced form equation which is the regression of the outcome variable on all the available exogenous variables including the instrument.

Table 3.2: Reduced form in short-run

	(OLS) good health	(OLS) poor health	(OLS) good health	(OLS) poor health
predicted trust	0.345**	-0.306**	0.446**	-0.343**
	(0.173)	(0.135)	(0.180)	(0.142)
$goodhealth_{2004}$	YES			
$poorhealth_{2004}$		YES		
controls	YES	YES	YES	YES
Observations	5993	5993	5994	5994
R^2	0.157	0.108	0.037	0.037

Robust standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

In the short-run, the coefficients have coherent signs with what it can be expected a priori and are all significant at 5% level or better, the exclusion of $goodhealth_{2004}$ and $poorhealth_{2004}$ increases the estimates of the impact of the instrument on the outcome variables.

Table 3.3: Reduce form in medium-run

	(OLS) good health	(OLS) poor health	(OLS) good health	(OLS) poor health
predicted trust	0.214	-0.291*	0.287	-0.319**
	(0.182)	(0.151)	(0.193)	(0.155)
$goodhealth_{2004}$	YES			
$poorhealth_{2004}$		YES		
controls	YES	YES	YES	YES
Observations	5620	5620	5621	5621
R^2	0.135	0.085	0.044	0.033

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Turning to medium-run, the coefficients for poor health remain significant at least at 10% or better whereas the coefficients for good health are no longer significant. In the next chapter, I will show the implications of this results.

The importance of results for the reduced form and the first stage lies in the fact that the causal effect of interest (i.e. in this case β_1) is the ratio between the population regression of the outcome variable on the instrument (i.e. the reduced form) to the population regression of the endogenous variable on the instrument (i.e., the first-stage) (Angrist and Pischke 2009).
In light of that it should be clear why I have checked both before to go on presenting my results.

3.4.2 Linear vs. non-linear probability models

Finally, I believe essential to briefly discuss the choice of a linear probability model with respect to a non-linear model.
Generally speaking, the use of linear probability models arouses skepticism and some concern in particular on the interpretation of regression coefficients. Probabilities, by their very definition, shall be less than or equal to 1 and it is reasonable to expect that the marginal variation from an increase in the explanatory variable is not constant as it does happen in linear regression (Stock and Watson 2012).
However, the peculiarity of my model can protect against such a concern. In fact, the use of dummy variables implies that there are no marginal variations but the only variation that can occur is between when the dummy is equal to 1 and when is equal to 0.
Therefore resorting to non-linear probability models will not be necessary to have robust and meaningful estimates. Actually the use of those kind of models could even lead to incorrect estimates of parameters as the use 2SLS strategy with non-linear probability models is not straightforward as it is dealing with linear probability

models.
The point is that the two stages should be performed separately but, by computing "manually" them, it should be taken into account that in the second stage we are regressing the outcome variable on the fitted values of the treatment variable estimated at the first stage, so the errors of the second stage should take this aspect into consideration.

Chapter 4

Results

This chapter will be devoted to explore results obtained using dummies for self-assessed health both with OLS and 2SLS. I will look at those for 2008 first and then I will move to those for 2013.
Not surprisingly, I will devote my attention mostly on results for my variable of interest: trust.

4.1 Short-run results

As it has been mentioned already, the baseline is to assess the impact of trust on self-reported health status expressed in terms of dummies for good and poor health. The use of this kind of health indicator in the baseline models is obviously not an accident: the self-reported level of health, in addition to being a good predictor of morbidity and mortality, is the variable most frequently used in literature discussing the link between social capital and health. That makes it the obvious starting point for my analysis as, otherwise, results would be less comparable to those already recorded in literature (Giordano and Lindström 2012; Rocco, Fumagalli, and Suhrcke 2014; Giordano and Lindström 2016).
Nevertheless, the use of self-reported health is not free from criticism. In fact, self-reported measures hold an intrinsic heterogeneity.
The heterogeneity can be about what and how relevant we value single components of the measure for which we have to express a self-evaluation or it can induce a bias in our evaluation due to the psychological tendency of giving a good impression of ourselves or simply from the fact of having in mind different representations for the scale.
O'Doherty and co-authors estimate the impact of self-reporting on health evaluation using English data. From their analysis emerges that the differences in self-assessment are mainly due to reporting heterogeneity. Nevertheless, the overall picture is that an index of cognitive social capital and an index of structural social capital are positively correlated with self-reported health still after adjusting for reporting heterogeneity.
People living in area characterized by low levels of trust and poor social network have a weaker state of health even after reporting heterogeneity is taken into account; therefore accounting for heterogeneity allows to reinforce correlation patterns already established (O'Doherty et al. 2017).
As said, the use of self-reported health is quite common because of its generality which allows to collapse in one unique variable many aspects. However, this introduces a further element of heterogeneity because different people may attach more

importance to one aspect than to another. Au and Johnston find that self-reported health is mainly a reflex of the sense of vitality as well as of the fact that illness may provoke limited mobility and bodily pain. Physical health and mental health have in general same relevance even though the former matters the most for people who are overall unhealthy and the latter for those who are in better health (Au and Johnston 2015).

The following equations are those that would be estimated in this section:

$$goodhealth_{i,2008} = \alpha + \beta_1 trust_{i,2004} + \beta X_{i,2004} + \epsilon_{i,2004}$$

$$poorhealth_{i,2008} = \alpha + \beta_1 trust_{i,2004} + \beta X_{i,2004} + \eta_{i,2004}$$

Where $X_{i,2004}$, besides the control variables already introduced in the last chapter, could also includes the outcome variable lagged at time t=2004.
From Giordano and Lindström, we know that social capital at time t is significantly associated to health at time t and t-1(Giordano and Lindström 2016). On the flip side, health at time t+1 is likely to be influenced from previous state of health, too. The choice of including/omitting these dummies among control variables is an important point and it deserves the proper consideration.
Therefore, I will compare results across models in order to show the implications of the choice.

4.1.1 OLS

Table 4.1: OLS results for short-run

	(1) good health	(2) good health	(3) poor health	(4) poor health
trust	0.0664***	0.0963***	-0.0782***	-0.0913***
	(0.0198)	(0.0211)	(0.0169)	(0.0175)
$goodhealth_{2004}$	0.443***			
	(0.0138)			
$poorhealth_{2004}$			0.445***	
			(0.0311)	
controls	YES	YES	YES	YES
Observations	5995	5996	5995	5996
R^2	0.158	0.039	0.112	0.042

Robust standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

In the table above the coefficients estimated, in line with what is expected and attested in literature, result positive for $goodhealth_{i,2008}$ and negative for $poorhealth_{i,2008}$. Furthermore, all the coefficients appear to be highly significant (i.e., their *p-values* $<$ 0.01).
In both cases however the inclusion of the dummy for the level of health at time t decreases the effect of trust on health signaling that part of the influence of social capital on later health goes through an increase in contemporaneous health but drop

size is smaller in the case of $poorhealth_{i,2008}$ than the one in good health specification.

As it has been said at the beginning of this chapter, I do not show the effects that control variables have on my outcome.
However, it cannot be forgotten that those variables play a fundamental role for the reliability of my results. In fact, using the correct set of control variables is crucial to obtain good estimates of the treatment effect avoiding the risk of omitted variables bias. To observe how estimates vary when new control variables are added is a way to evaluate this risk.
In the tables below variations in OLS estimates have been reported by changing in the set of controls.

The inclusion of any new group of dummies to control for possible omitted characteristics causes a decrease in the estimated effect of trust and in the number of observations but, at the same time, it increases the R^2. However, the inclusion of controls does not undermine the significance level of estimates which remains always statistically significant at 1% level or better.
Not surprisingly, the most relevant change is observed introducing the variable for good health in 2004 (it is particularly evident looking at the R^2) but also the inclusion of income generates a tangible change. Education, marital status and employment also refine estimates slightly increasing the R^2 and slightly decreasing the estimated value. Gender and region, instead, appear to have basically no effect.
Generally, the stability of coefficients after the inclusion of new variables can be seen as a sign of no OVB.

Same reasoning as before applies also to the inclusion of controls in the specifications for poor health. Introducing new dummies decreases the estimated effects of trust and the number of observations but, at the same time, increases the R^2 leaving, however, the significance level of estimates always at 1% level or better.
The introduction of poor health in 2004 produces also in this case the most remarkable change even if a relevant change is also the one observed after introducing the controls for income. Education, marital status and employment as before refine estimates. Gender and region have again basically no effect although their impact is slightly higher in this case.

In conclusion, OLS results are quite encouraging but, as it has already stressed out, in order to claim causality among variables it cannot be ignored that trust is likely to be endogenous. For this reason, I will now turn attention to 2SLS estimates.

4.1.2 2SLS

In the first two columns, the coefficients for $goodhealth_{i,2008}$, in line with what is expected and attested in literature, are both positive but they differ with respect to significance levels. The inclusion of the dummy for previous state of health decreases the positive effect of trust by almost 20% (the effects are 39 and 49 percentage points respectively with and without the dummy $goodhealth_{i,2008}$) and the coefficient misses significance at 5% level by a whisker.
However, the most self-evident difference can be found looking at the measure of fit R^2. The equation including $goodhealth_{i,2008}$ has a positive R^2 signaling that regressors explains approximately 12% of variability in the dependent variable but in column 2 the R^2 is not even reported. The reason for it is quite simple: STATA

Table 4.2: Effects on trust including control variables in the short-run

	(1) good health	(2) good health	(3) good health	(4) good health	(5) good health	(6) good health	(7) good health	(8) good health
trust	0.145***	0.101***	0.0790***	0.0696***	0.0681***	0.0664***	0.0666***	0.0664***
	(0.0183)	(0.0172)	(0.0195)	(0.0196)	(0.0197)	(0.0197)	(0.0198)	(0.0198)
control for health status in 2004		YES	YES	YES	YES	YES	YES	YES
controls for income			YES	YES	YES	YES	YES	YES
controls for education				YES	YES	YES	YES	YES
controls for marital status					YES	YES	YES	YES
controls for employment						YES	YES	YES
control for region							YES	YES
control for gender								YES
Observations	7439	7438	5995	5995	5995	5995	5995	5995
R^2	0.008	0.141	0.149	0.155	0.156	0.158	0.158	0.158

Robust standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4.3: Effects on trust including control variables in the short-run

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	poor health	poor health	poor health	poor health	poor health	poor health	poor health	poor health
trust	-0.114***	-0.0990***	-0.0883***	-0.0811***	-0.0807***	-0.0777***	-0.0782***	-0.0782***
	(0.0154)	(0.0148)	(0.0169)	(0.0168)	(0.0169)	(0.0169)	(0.0169)	(0.0169)
control for health status in 2004		YES	YES	YES	YES	YES	YES	YES
controls for income			YES	YES	YES	YES	YES	YES
controls for education				YES	YES	YES	YES	YES
controls for marital status					YES	YES	YES	YES
controls for employment						YES	YES	YES
control for region							YES	YES
control for gender								YES
Observations	7439	7438	5995	5995	5995	5995	5995	5995
R^2	0.011	0.094	0.098	0.105	0.107	0.111	0.112	0.112

Robust standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4.4: 2SLS results for short-run

	(1) good health	(2) good health	(3) poor health	(4) poor health
trust	0.391*	0.495**	-0.345**	-0.381**
	(0.204)	(0.211)	(0.158)	(0.164)
$goodhealth_{2004}$	0.430***			
	(0.0166)			
$poorhealth_{2004}$			0.429***	
			(0.0332)	
controls	YES	YES	YES	YES
Observations	5993	5994	5993	5994
R^2	0.119	.	0.056	.

Robust standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

does not print R^2 on 2SLS whenever the latter is negative which is equivalent to say whenever the Explained Sum of Squares is negative (i.e. Residual Sum of Squares is larger than the Total Sum of Squares) (Sribney, Wiggins, and Drukker n.d.).
Is this a point of no return? Not really, blind faith in R^2 is unjustified. The choice of including (excluding) a variable in a multiple regression model shall be based primarily on whether its inclusion (exclusion) allows to get better estimates of the causal effect of interest provided that R^2 mechanical decreases when we eliminate an explanatory variable.
A lower or even negative R^2 does not necessarily imply the existence of an OVB (i.e., Omitted Variables Bias) or that we are using an improper set of controls. However, in this case it might be the indication of a considerable loss of accuracy in the model.

A similar reasoning applies to regressions about $poorhealth_{i,2008}$in the last two columns.
The coefficients here are both significant at 5% level or better and both have negative sign as it could be expected a priori.
Interestingly, the magnitude of the two is more similar here than it was for the coefficients of $goodhealth_{i,2008}$. The probability of being in poor health in 2008 decreases by 35-38.6 percentage points if people felt they can trust others. This numbers are quite impressive: trusting alone can almost offset drawbacks of previous poor state of health in column 3.
Here as well as before, the same problem with R^2 recurs.

4.2 Medium-run results

Looking at a longer period of time it might seem reasonable to expect a smaller impact of social capital on health if any.
The equations estimated are modelled on those presented for the short-run. And, so they are:

$$goodhealth_{i,2013} = \alpha + \beta_1 trust_{i,2004} + \beta X_{i,2004} + \epsilon_{i,2004}$$

$$poorhealth_{i,2013} = \alpha + \beta_1 trust_{i,2004} + \beta X_{i,2004} + \eta_{i,2004}$$

I will again start from presenting OLS results and then I will move to 2SLS.

4.2.1 OLS

Table 4.5: OLS results for medium-run

	(1) good health	(2) good health	(3) poor health	(4) poor health
trust	0.0843***	0.108***	-0.0774***	-0.0864***
	(0.0213)	(0.0220)	(0.0189)	(0.0192)
$goodhealth_{2004}$	0.392***			
	(0.0142)			
$poorhealth_{2004}$			0.422***	
			(0.0330)	
controls	YES	YES	YES	YES
Observations	5622	5623	5622	5623
R^2	0.137	0.048	0.088	0.037

Robust standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The coefficients in OLS for $goodhealth_{i,2013}$, similarly to results for the short-run, are both positive and significant at 1% level but their magnitude is slightly larger than the one of coefficients for 2008. This result is quite surprising because it would imply that trust reinforces its influence over time, quite a peculiar finding.
Also the coefficients for $poorhealth_{i,2013}$ are significant at 1% level. As for the short-run they have negative signs but, differently from what I have just observed for $goodhealth_{i,2013}$, they are slightly smaller than the ones for the short- run.
The inclusion of the dummy for contemporaneous level of health increases the R^2 as well as marginally decreases the magnitude of estimated effects of trust on health.

I briefly comment the impact of including new controls on the estimates of trust for the medium-run as it was done for the short-run. Again the level of significance of the treatment dummy remains at 1% level or better throughout the entire process while the absolute values of estimates decrease. In the case of good health is the inclusion of the previous level of health to determine the more visible change whereas for poor health is the set of controls for income. The inclusion of the other groups of controls leaves the estimate quite stable and that is a good sign in order to claim that there are not important omitted variables.

4.2.2 2SLS

The peculiar results of an higher impact of trust in the medium-run than in the short-run is strongly contradicted by 2SLS estimates.
The coefficients $goodhealth_{i,2013}$ seem to validate the idea that the social capital influence has a short life. They are smaller that the ones for the short-run but

Table 4.6: Effects on trust including control variables in the medium-run

	(1) good health	(2) good health	(3) good health	(4) good health	(5) good health	(6) good health	(7) good health	(8) good health
trust	0.153***	0.116***	0.0953***	0.0857***	0.0841***	0.0837***	0.0842***	0.0843***
	(0.0191)	(0.0185)	(0.0211)	(0.0212)	(0.0213)	(0.0213)	(0.0213)	(0.0213)
control for health status in 2004		YES	YES	YES	YES	YES	YES	YES
controls for income			YES	YES	YES	YES	YES	YES
controls for education				YES	YES	YES	YES	YES
controls for marital status					YES	YES	YES	YES
controls for employment						YES	YES	YES
control for region							YES	YES
control for gender								YES
Observations	6950	6949	5622	5622	5622	5622	5622	5622
R^2	0.009	0.104	0.127	0.133	0.134	0.136	0.137	0.137

Robust standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4.7: Effects on trust including control variables in the short-run

	(1) poor health	(2) poor health	(3) poor health	(4) poor health	(5) poor health	(6) poor health	(7) poor health	(8) poor health
trust	-0.128***	-0.118***	-0.0829***	-0.0771***	-0.0773***	-0.0761***	-0.0771***	-0.0774***
	(0.0173)	(0.0170)	(0.0187)	(0.0188)	(0.0188)	(0.0188)	(0.0189)	(0.0189)
control for health status in 2004		YES	YES	YES	YES	YES	YES	YES
controls for income			YES	YES	YES	YES	YES	YES
controls for education				YES	YES	YES	YES	YES
controls for marital status					YES	YES	YES	YES
controls for employment						YES	YES	YES
control for region							YES	YES
control for gender								YES
Observations	6950	6949	5622	5622	5622	5622	5622	5622
R^2	0.011	0.068	0.078	0.084	0.086	0.087	0.088	0.088

Robust standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 4.8: 2SLS results for medium-run

	(1) good health	(2) good health	(3) poor health	(4) poor health
trust	0.232	0.306	-0.315*	-0.340**
	(0.197)	(0.206)	(0.166)	(0.169)
$goodhealth_{2004}$	0.387***			
	(0.0160)			
$poorhealth_{2004}$			0.412***	
			(0.0346)	
controls	YES	YES	YES	YES
Observations	5620	5621	5620	5621
R^2	0.129	0.034	0.051	.

Robust standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

more importantly they are not significant even at 10% levels (p-values are 0.213 and 0.129). This should not be a surprise given the results for the reduce form in the previous chapter.
However, turning to estimates for $poorhealth_{i,2013}$ they are both significant at least at 10% level and just slightly smaller than the one for the short- run. At a distance of almost 10 years from when the trusting statement has been formulated, to trust other people still implies a tangible decrease in the probability of reporting poor health.
This finding conveys an interesting lesson: the positive influence of social capital to some extent loses intensity over time so that in the medium - run it is no longer able to significantly increase the probability of being in good health but it is still capable to protect against poor health.
Also in this case, a quick look to the bottom line of the table is enough for becoming aware of the fact that regression equations in which one controls for previous state of health have substantially higher R^2.
I have already discussed the issue and said that, although it does not represent a bad thing per sé, this change cannot be ignored.

4.3 Oster test

In the previous chapter I have argued about the role that both the first stage and the reduced form play to recover IV estimates for the coefficient of interest.
Therefore getting reliable estimates for both of them is fundamental in order to claim to have estimated a causal effect.
However, as always when we deal with linear regression models, a major threat to validity of results comes from the possibility that variables correlated either with the outcome variable and with the explicative variables have not been included in the model creating an omitted variables bias.
Having said that, there might be some concern on the possibility that my estimates are not reliable since they might not be robust to omitted variables bias. Nevertheless, a possibility to check robustness to omitted variable bias of my results is given by performing the Oster test.

This test estimates treatment effects under the assumption that the relationship between treatment and unobservables can be recovered from the relationship between the treatment and observables (i.e., from the assumption of proportional selection on observables and unobservable)(Oster 2016). It is noteworthy that Oster suggests a method to estimate bias-adjusted treatment effect under a specific assumption about the model rather than a method to recover the model itself.
However, to compute the bias-adjusted treatment effect with Oster's procedure requires to explicit two assumptions: first, the relative degree of selection on observables and unobservables (i.e., δ) ; second, the value for the R^2_{max} from the regression of the outcome on treatment and both observed and unobserved controls. In her paper, Oster proposes to consider equal selection on observed and unobserved variables (i.e. $\delta = 1$), and to set the $R^2_{max} = 1,3 * R^2$ where the latter is the R^2 from the original estimated model (Oster 2016).

Table 4.9: Estimates of predicted trust in the first-stage

	(with$goodhealth_{2004}$) trust	(with $poorhealth_{2004}$) trust	(without both) trust
2SLS estimates	0.931	0.939	0.950
Oster estimates	0.931	0.943	0.954

The results for the first stage are quite satisfactory. Performing the Oster test I get estimates for the coefficients of the instrument very close to those estimated using 2SLS in all the specifications presented. This finding is quite relevant as it implies that estimated treatment effects are very close to bias-adjusted treatment effects meaning that my estimates are not undermined by the existence of an OVB.

Table 4.10: Estimates of predicted trust in the reduced form for short-run

	(1) good health	(2) poor health	(3) good health	(4) poor health
2SLS estimates	0.345	-0.306	0.446	-0.343
Oster estimates	0.326	-0.307	0.456	-0.353
$goodhealth_{2004}$	YES			
$poorhealth_{2004}$		YES		

As for the first stage, also in the equations for the reduce form of the short-run the coefficients estimated through the Oster procedure have the same signs and have a similar magnitude to coefficients estimated through 2SLS providing support to robustness to OVB. This is particularly true considering the specification for poor health that includes among controls the dummy for the state of health in time t.

In the medium-run, again the signs of coefficients and their magnitude are quite similar among 2SLS estimates and Oster estimates, particularly in the first two columns. In the last two columns estimates are a little bit more distant instead.

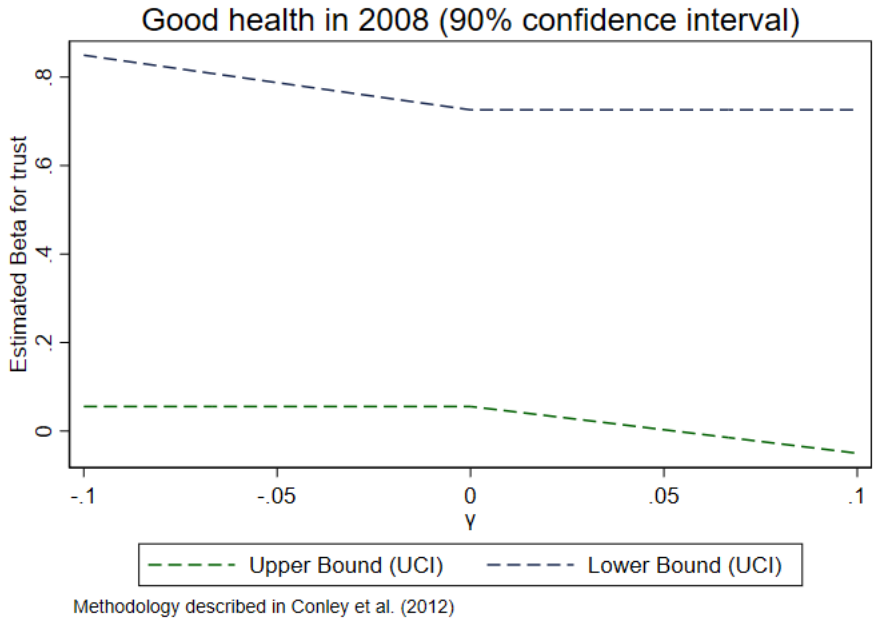
Table 4.11: Estimates of predicted trust in the reduced form for short-run

	(1) good health	(2) poor health	(3) good health	(4) poor health
2SLS estimates	0.214	-0.291	0.287	-0.319
Oster estimates	0.217	-0.296	0.312	-0.329
$goodhealth_{2004}$	YES			
$poorhealth_{2004}$		YES		

4.4 Only plausibly exogenous

It has been already stressed out that the more delicate task to perform when one resorts to an IV strategy is of course to choose a proper instrument.
The chosen instrument must fulfill two requirements: exogeneity (which in the case of homogenous treatment effects is equivalent to the exclusion restriction) and relevance, meaning it must have a proven influence on the endogenous treatment variable and its effect on the outcome variable should be mediated entirely by the instrumented variable.
The exclusion restriction is nonetheless untestable.
In the previous chapter it has been provided some support for the choice of using the predicted probability of trusting others in the local area according to the fact of having been a victim of non-violent petty crimes but still there might be concerns about it.
The point might be that the exclusion restriction $\gamma = 0$ in structural equation does not hold, or, put it in other way, it might be the case that my instrument has an independent, although small, direct effect on outcome variables. If this is case, IV estimates would not be reliable.
Nevertheless, it can be argued that also an instrument which is only plausibly exogenous may be valuable for purpose of estimating a proper relation between health and social capital under some conditions.
Conley and co-authors propose practical tools in order to perform inference in those exact situations in which violations of the exclusion restriction cannot be ruled out beyond any reasonable doubt (Conley, Hansen, and Rossi 2012).
A merit that authors advocate for their work is that their practical methods "provide valid inference statements for any beliefs about the validity of the instrument". Authors stress out this is a crucial feature of their procedures given the sensitivity of the Two-Stage Least Square estimator to violation of the exclusion restriction which is strongly related to the strength of the instruments. That is to say, large deviation from the exclusion restriction can ultimately have minor impacts on precision of estimates when instruments are relevant whereas also smaller deviation can undermine precision with weak instruments.
The procedures proposed by Conley et al. do not always provide researchers with punctual estimations for the parameter of interest but they always predict a range within which the true parameter lies as long as priors over γ have been correctly specified (Conley, Hansen, and Rossi 2012).
Exemplifications of how those practical methods work are provided below applying them to the above discussed cases of the impact of social capital on $goodhealth_{i,t+k}$ and $poorhealth_{i,t+k}$ with (k=1,2).

The approach used in this work among those suggested by authors is the "Union of Confidence Intervals" and requires to make assumptions on minimum and maximum values that γ can take and to set the confidence level. Once the range of values for γ is set, UCI method calculates upper and lower bounds for the estimates of the parameter of interest combining all confidence intervals in the range considered.
Symmetric intervals around 0 have been considered in this work but it has to be said that symmetry is not pivotal. Estimates for the variables would be presented below using plauesexog uci STATA command implemented by Damian Clarke (Clarke and Matta 2017).

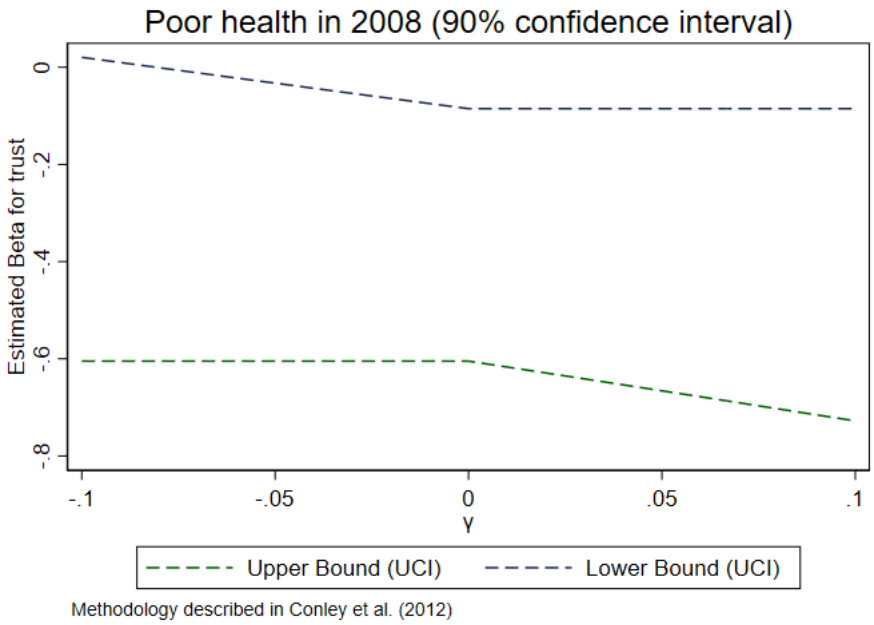


The first graph displays confidence intervals for β_1(i.e., the coefficient of trust) in the specification for $goodhealth_{i,2008}$ considering 90% confidence level.
Considering a deviation from the exclusion such that $\gamma = 0.05$ it is possible to get significant values for the coefficient of trust at least at 10% level. In correspondence of this value of γ the exact confidence interval is [.0030 .6652] and the value estimated at the beginning of this chapter lies inside the interval. This result provides further support for the reliability of the value estimated previously.
It is not surprise, given that 2SLS was statistically significant only at 10% level, that it is not possible to recover a confidence interval for estimates significant at 5% level in which the lower limit does not include 0 from the beginning.

The estimate for the effect of trust on $poorhealth_{i,2008}$ was significant at 5% level so it is not a surprise that it is possible to get bounds in which estimated coefficients are significant at that same level. Clearly, the higher is the significance level required for estimates the smaller would be the deviation allowed.
If fact, I get as maximum γ: $\gamma = -0.07$ for 90% confidence interval and $\gamma = -0.03$ for 95% confidence interval.

Staring from the result in 90% confidence level case, I see that for $\gamma = -0.07$ the estimated confidence interval is [-.6905 -.0116] and also in this case the value estimated with 2SLS lies within the bounds.

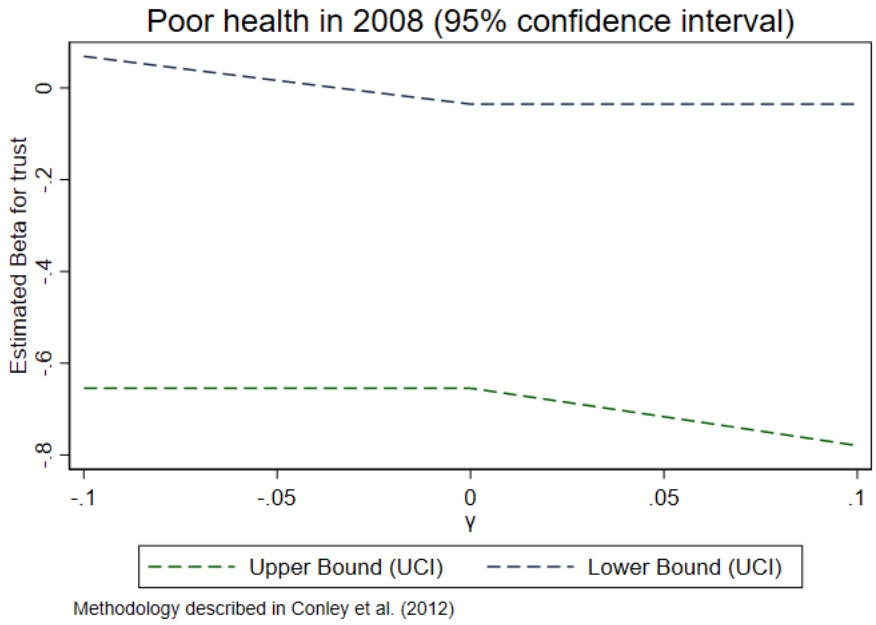
Requiring a more selective confidence interval, the deviation from the exclusion restriction must be smaller. Allowing $\gamma = -0.03$, the confidence interval obtained is

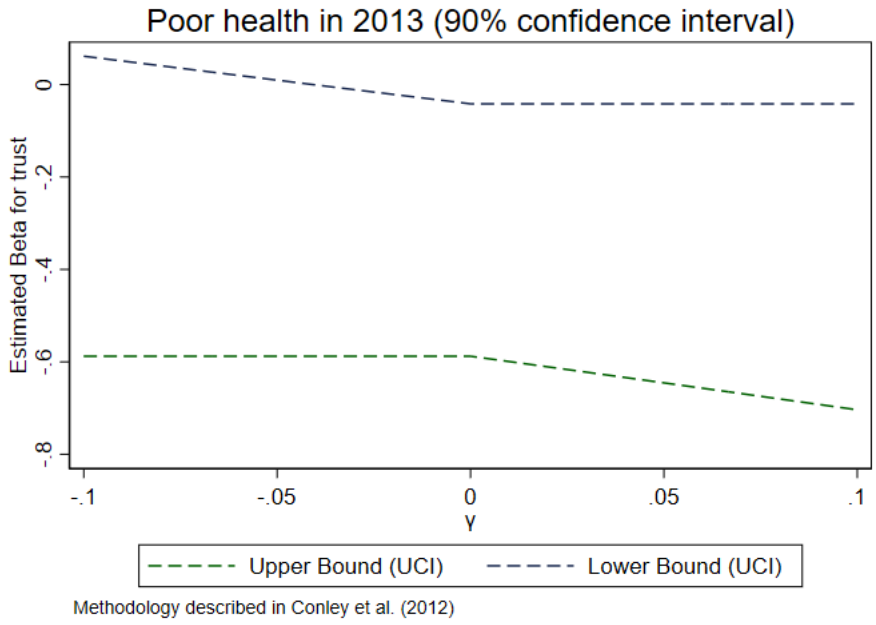


[-.6178 -.0046]. Again estimated interval contains the 2SLS coefficients supporting the reliability of that estimate.

As usual, I analyse also the medium-run albeit it has been unfeasible to consider the same deviation for $goodhealth_{i,2013}$ and $poorhealth_{i,2013}$. In the case of the former variable because no deviation would never give back a significant coefficient since the coefficient was not significant even when it has been estimated through 2SLS; for the latter, instead, is a problem of magnitude.
Considering a smaller deviation, namely $\gamma = -0.03$, it can be shown that it is possible to recover significant estimates at least for 90% confidence level.

The confidence interval in correspondence of this γ is [-.5537 -.0110] and the value estimated at the beginning of this chapter lies inside this interval.
As in the cases above, the use of UCI approach gives a positive feedback on robustness of estimates found.


Poor health in 2008 (95% confidence interval)
Estimated Beta for trust
0
-.2
-.4
-.6
-.8
-.1
-.05
0
.05
.1
Y
Upper Bound (UCI)
Lower Bound (UCI)
Methodology described in Conley et al. (2012)


Poor health in 2013 (90% confidence interval)
Estimated Beta for trust
0
-.2
-.4
-.6
-.8
-.1
-.05
0
.05
.1
Y
Upper Bound (UCI)
Lower Bound (UCI)
Methodology described in Conley et al. (2012)

Chapter 5

Further analysis

This chapter will be devoted to present some further analysis and discussion on the consequences of social capital on health.
I will start by considering other binary measures for the state of health and, as before, I will distinguish in my analysis outcomes for the short and medium-run. Then, I will replicate my analysis for the self-reported health status comparing results in subsamples.
The end of this chapter, instead, I will briefly present a caveat.

5.1 Short-run

Table 5.1: Results for other indicators of health in the short-run

	(2SLS) good sleep	(2SLS) enough sleep	(2SLS) smoker
trust	0.495**	0.485**	-0.165
	(0.225)	(0.218)	(0.162)
$goodhealth_{2004}$	0.165***	0.0648***	-0.0328**
	(0.0213)	(0.0210)	(0.0153)
$poorhealth_{2004}$	-0.0697*	-0.0866**	0.0157
	(0.0365)	(0.0388)	(0.0292)
controls	YES	YES	YES
Observations	5471	5420	5993
R^2	.	.	0.064

Robust standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

I have already introduced my other considered health variables for wave 8 in chapter three.
They all have the sign that can be reasonably expected ex ante.
Trust increases the probability of having a good quality of sleep and an higher amount of sleeping time by almost 50 percentage points and coefficients are both significant at 5%. The coefficient for regular smokers, instead, is negative indicating that trust could be beneficial lowering the probability of smoking but unfortunately it is not significant.

Last but not least, it is noteworthy that all those models have lower or negative R^2 with respect to baseline specifications stated in previous chapter.
This may be the natural consequence of the fact that self-reported health is an holistic measure able to collapse in one unique measure different aspects of the individual health.

A great virtue of wave 8 is that a considerable attention has been paid on collecting information about the health of respondents. In this wave, for example, scores for the Short Form 36 Health Survey Questionnaire have been recorded too. The choice has been to consider scores for general and emotional health and for body pain.
Although taken individually they represents a partial depiction of health status, it is however useful to use these scores obtained using a standard questionnaire.
I differentiate among the impact that trust has on those who reports the top scores for the macro items considered and those who scored worse.

Table 5.2: Results for SF-36 Health Questionnaire

	(2SLS) hgen36	(2SLS) lgen36	(2SLS) hpain36	(2SLS) lpain36	(2SLS) hemo36	(2SLS) lemo36
trust	0.111	-0.277*	0.378*	-0.127	0.460**	-0.191
	(0.165)	(0.168)	(0.193)	(0.108)	(0.186)	(0.176)
$goodhealth_{2004}$	0.205***		0.175***		0.0983***	
	(0.0110)		(0.0154)		(0.0153)	
$poorhealth_{2004}$		0.456***		0.238***		0.192***
		(0.0326)		(0.0303)		(0.0331)
controls	YES	YES	YES	YES	YES	YES
Observations	5482	5482	5470	5470	5482	5482
R^2	0.054	0.069	.	0.043	.	0.030

Robust standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Just three coefficients out of six are statistically significant but it is noteworthy that the signs all support the claim of a positive influence of trust on health.
It is important to remember that scores ranges from 0 (i.e., maximum level of disability) to 100 (i.e., absence of disability). So, for example, the coefficient for trust in column 2 means that trusting others lowers by almost 30 percentage points the likelihood for an individual to report the lowest scores (i.e., highest level of disability) in the section about general health. Furthermore, people equipped with trust are more likely not to report emotional or body pain disability (respectively, by 46 and 38 percentage points).
Even if they are partial indicators of health, these represents further evidence of the beneficial impact that social capital can have on health broadly speaking.

5.2 Medium-run

As already pointed out, the breadth of health variables collected in wave 8 represents quite an unicum. The health section in wave 9 is more contained so I will consider

a smaller number of variables.

Table 5.3: Results for other indicators of health in medium-run

	(2SLS) emotional problems	(2SLS) heart problem	(2SLS) smoker
trust	-0.322**	-0.223*	-0.0145
	(0.131)	(0.118)	(0.142)
$goodhealth_{2004}$	-0.0413***	-0.0382***	-0.0340**
	(0.0116)	(0.0113)	(0.0146)
$poorhealth_{2004}$	0.0711**	0.0648***	-0.0410
	(0.0276)	(0.0248)	(0.0258)
controls	YES	YES	YES
Observations	5619	5616	5618
R^2	.	.	0.046

Robust standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The significant coefficients are suffering from cardiovascular conditions and emotional problems and are both significant almost at 5% (the *p-value* for cardiovascular conditions is 0.058 and the *p-value* for emotional problems is 0.014) whereas again the dummy variables for regular smoking is not significant even at 10% level.
All the coefficients, however, are as expected negative. Trust decreases the probability of having cardiovascular conditions by 22.3 percentage points and the probability of reporting emotional problems by 32.2 percentage points.
Again emerges some evidence in favour of the thesis that the positive influx of trust is somehow long-lasting. To have a better understanding of how long social capital can positively influence health would be beneficial to consider longer periods but, as previously mentioned, data are not available already.

5.3 Analysis in sub-samples

Till now, I have always consider the total sample. However, it might be interesting to investigate the effects of trust considering specific sub-samples.
I analyse the different effects of trust in the sub-samples of female and males and then between sub-samples of people living alone and those living with other people.

What emerges looking at first three columns of the table of results for short-run is that for males trusting other makes more likely to report good health, the coefficient is 10 percentage points higher for men than it was for the original sample and it is more significant. The coefficient for women instead is smaller and not significant.
The opposite result applies for poor health. The coefficients for women is larger and significant (although less significant than the one for the overall sample) whereas the coefficient for men it is smaller and not significant.

In the medium-run, instead, there are no significant effects in both sub-samples for genders.
However, it is noteworthy that, although not significant, the coefficients for good health have similar magnitudes whereas those for poor health have not: the impact on female is larger.

Table 5.4: Short-run results among gender

	(totall) good	(female) good	(male) good	(total) poor	(female) poor	(male) poor
trust	0.391*	0.207	0.497**	-0.345**	-0.502*	-0.238
	(0.204)	(0.353)	(0.250)	(0.158)	(0.297)	(0.186)
controls	YES	YES	YES	YES	YES	YES
Observations	5993	2767	3226	5993	2767	3226
R^2	0.119	0.159	0.093	0.056	.	0.107

Robust standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 5.5: Medium-run results among gender

	(total) good	(female) good	(male) good	(total) poor	(female) poor	(male) poor
trust	0.232	0.241	0.238	-0.315*	-0.468	-0.224
	(0.197)	(0.348)	(0.238)	(0.166)	(0.304)	(0.193)
controls	YES	YES	YES	YES	YES	YES
Observations	5620	2626	2994	5620	2629	2994
R^2	0.129	0.130	0.133	0.051	0	0.077

Robust standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Previously in this work, it has been said that the interest for social capital initially spread from the work of Emile Durkheim who noticed that lonely people were more likely to commit suicide. Given that, it might be interesting to look whether there are different effects on health for people living alone with respect to those living with others.

Table 5.6: Short-run results among people living with others or alone

	(total) good	(alone) good	(with others) good	(total) poor	(alone) poor	(with others) poor
trust	0.391*	-0.339	0.547**	-0.345**	0.112	-0.434**
	(0.204)	(0.414)	(0.231)	(0.158)	(0.268)	(0.180)
controls	YES	YES	YES	YES	YES	YES
Observations	5993	523	5470	5993	523	5470
R^2	0.119	0.169	0.076	0.056	0.149	0.022

Robust standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Actually, at least in the short-run, considering the sub-sample of respondents living with other people the effects of trust are larger and more significant than the ones found for the whole sample. The effects of trust in the sub-sample for alone people, instead, are not significant in any case and have reversed signs with respect to other estimates.

This finding shows that the positive influx of trust oh health can be massively weakened from the low levels or absence of interplay with others.

Table 5.7: Medium-run results among people living with others or alone

	(overall) good	(alone) good	(with others) good	(overall) poor	(alone) poor	(with others) poor
trust	0.232	-0.201	0.316	-0.315*	-0.0738	-0.357**
	(0.197)	(0.527)	(.211)	(0.166)	(0.420)	(0.178)
controls	YES	YES	YES	YES	YES	YES
Observations	5620	497	5123	5620	497	5123
R^2	0.129	0.127	0.118	0.051	0.134	0.034

Robust Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

In the medium-run, the effects of trust are again stronger in the sub-sample of people living with others. However, even in this subsample the coefficient for good health it is not significant even at 10%.
For what concern poor health, instead, the magnitude of the coefficient is larger than the one of the overall sample and the level of significance is even increased.
Nonetheless, in all the specifications presented above I cannot fail to notice that significance is achieved at expense of R^2.

5.4 The "big elephant" in the room

Till now, I have not discussed the period of time covered in used data, however, it must be noticed that it partially overlaps the Great Recession.
Although it has not been possible to identify the effects of this exogenous shock since it affected all participants in the survey, it is clear that important repercussions on the welfare of individuals are generated in times of economic slowdown by depletion of personal material conditions as well as government cost-cuttings in welfare state.
Data in hand, during the recession the British National Health System was able to respond to the challenges of the recession such as, for example, the risk of a decline in access to care (as it has dramatically happened in the USA).
The history of the NHS had began in the immediate post-war period when Great Britain had found itself having to rebuild all the national infrastructure that had collapsed during the war. Already during the conflict, a national emergency health care system had been set up to deal with the inability of private insurance companies to provide the services necessary to absorb the needs of the British Army. This service had met with considerable success, therefore on July 5, 1948, the Labour government had extended it to the whole country.
Since its inception there have been critical voices that predicted an explosive growth in spending but, contrary to expectations, the health system was one of the factors that stimulated economic recovery.
Despite the good results recorded by the systems and certified among others also by the OECD and despite the proven efficacy and receptivity in countering the negative effects of the crisis which have actually saved the lives of many people, the government of Great Britain undertook in the years of the Great Recession progressive measures to dismantle the national welfare state system. In the healthcare

sector, this coincided with a transition towards the introduction of competition and market models along the lines of the American private healthcare system (Stuckler and Baku, 2012).
Such an argument becomes even further relevant in light of the idea that "health systems are part of the social fabric of every country. They are not only producers of health or health care but they are also the purveyors of a wider set of societal values and norms" (Gilson,2003).
So, if it actually was the case that during the Great Recession people perceived the welfare state to fail and gave up care, to not consider this aspect could represent a problem.
Therefore, even if it is impossible with the data available to identify if and to what extent the crisis has affected the health level of the interviewed people, it will still be necessary to consider that these aspects may have had effects in particular in wave 9.
In conclusion, assessing the impact of the Great Recession and of the policies applied might open an interesting perspective for a further step on the analysis of the interplay between health perception, social capital and national economy.

Chapter 6

Final remarks

"Always go to other people's funerals, otherwise they won't come to yours"
Yogi Berra

It might seem tacky to start the last chapter of my thesis talking about funerals.
Funerals are a touchy subject for everyone and, although it is uncomfortable to think about it, it is true that anyone would be disappointed to know no one wishes to attend his or her funeral when our time is up[1]. However, beyond the fact that provides us with a witty answer to the perfect rational homo oeconomicus inquiring about why you should accept to suffer the disutility that funerals generate, this sentence teaches us something very important. Social capital is not an ideal or a buzzword without meaning, it is instead something very concrete that is, in some way, tangible in our life.
It is evident that if we struggle also to be dead in loneliness it is because we even more so struggle to live far from others. We are not "islands entire of themselves" but rather, so to say, trees inside a forest communicating and exchanging nutrients to live.
Interpersonal relationships are not only important in themselves but also because of the bonds and beliefs they create. Without a sense of belonging to a group (e.g., family, group of friends or colleagues, neighborhood committees ...), without the idea that trust and reciprocity in people-to-people exchanges give us well-being and protection probably no one would attend funerals.
So with these few words Berra, who was neither a sociologist nor an economist but rather a baseball player, tells us a lot about the real value that social capital has in our lives as well as showing us social capital is really everywhere!
As often repeated in this thesis the effects of social capital, considered in its various connotations, can be of different nature and can involve multiple and sometimes very distant aspects of human action and life.
However, the purpose of this work, in the awareness of the vastness and complexity of the theme, was to contribute to existing literature by providing further empirical evidence of the causal link between social capital and health.
In my analysis based on english data from the last three published waves of the National Child Development Survey, I took into account several health dummy variables ranging from self-reported level of health (namely, the most used indicator in literature despite its criticalities) up to physical and emotional health measures.
To assess the causal impact of social capital (proxied by a dummy for general trust in other people) on individual health I have used a 2SLS estimator and I have provided

[1] Even Ebenizer Scrooge, arguably one of the most misanthropic characters in Western literature, suffers from the sight of his abandoned tomb

evidence in support of robustness of selected instrument: the predicted probability of trusting other people as a consequence of having been a victim of non-violent petty crimes in the last twelve months before the 7th wave.
My results support the empirical evidence, already present in literature, that social capital has a positive influence on health and that it is not a matter of mere associations but causal relationships in all respects.
Considering a time-frame of four years from the moment in which the trusting statement has been formulated, to trust others increases by almost 40 percentage points the probability of being in good health and decreases the probability of being in poor health by 35 percentage points. These effects are partly durable, albeit weaker, over time proving that investing in social capital has positive effects in the short-term but also generates positive returns over time. In fact, stretching the time horizon considered to nine years, the impact of trust is still significant in lowering the probability of being in poor health (the estimated effect is 31,5 percentage points and it is significant at least at 10% level).
Furthermore, I find that trust has a larger positive influx on people living with others whereas it is not of any particular help for people living alone.
The evidence for gender, in the short-run, is mixed: trust seems to have a significant positive impact of probability of being in good health for men whereas it helps women to diminish the probability of being in poor health.
However, the fact of having found favourable results should not lead, as Portes warns, to forget that social capital can sometimes generate negative spillovers like, for example, social marginalization of out-group members or excessive intra-group controls that can limit individual liberties (Portes 1998).
The lesson, if we want to draw one, is that we must take into account the effects of non-medical variables such as trust, reciprocity, social support because their effects on our health is as strong as, if not more, the one of other factors.
In this regard, the case of Roseto that I have presented in chapter 2 is exemplary of the "thaumaturgical power" that social capital possesses. For a long time the tight bonds that existed in the community had positively countered factors of cardiovascular risk protecting the people of Roseto.
In any case, the articulated nature of the relationship between health and social capital makes any further analysis of the issue more than welcome as it could help to increase external validity. In this regard, interesting research ideas to expand my study comes from the possibility of investigating the effects of social capital on health (and vice versa) using samples of people of different ages and who live in socio-economically different countries. This study, in fact, has been conducted on a population of respondents all of the same age and all born and resident in the UK. The latter aspect is even more relevant given the already mentioned decline in social capital in the Western culture.
However, beyond the possibility of finding specific effects for different samples, the general pattern of causality and positive relations between social capital and health has been clearly demonstrated in previous literature (Giordano and Lindström 2012;Giordano and Lindström 2016; Rocco and Suhrcke 2012; Rocco, Fumagalli, and Suhrcke 2014) as well as in this work.
Ultimately, whether you call it social capital or not and whether or not you see it as a form of capital, what matters is the evidence that people through social interaction can play a significant role on their own health and on health of those around them.

Appendix A

Changes in health

Discussing results for baseline models I have stressed that the inclusion of dummies accounting for $self - reportedhealth_{i,2004}$ is to some extent not straightforard.
However, a possibility to overcome the dilemma on whether or not to include a dummy for health status at time t is to consider not the level of health status itself but whether there has been a change over time. Clearly it is necessary to distinguish between those who have seen a decline in health status and those who have improved their health.
Thus, two dummies have been created: $deterioration_{i,t+k}$ and $improvement_{i,t+k}$. The first dummy is 1 when people report worse health status at time t+k and 0 otherwise; the latter has been constructed in specular manner (i.e., 1 when the level of health is higher at time t+k than in 2004). The obvious drawback of so-constructed dummies is that any change in self-reported health is treated in the same way irrespectively of whether it has just been moderate or substantial.

The models for short-run are the following:

$$deterioration_{i,t+k} = \alpha + \beta_1 trust_{i,2004} + \beta X_{i,2004} + \nu_{i,t}$$

$$improvement_{i,t+k} = \alpha + \beta_1 trust_{i,2004} + \beta X_{i,2004} + \zeta_{i,t}$$

a dynamic model in which social capital affects the dynamic of health accumulation/ depletion so to investigate the effects of social capital on the health investment more than on the stock of it.
Where $X_{i,t}$, includes all the control variables used for estimating $goodhealth_{i,t+k}$ and $poorhealth_{i,t+k}$ a part from the lagged health state at time t=2004.

Table A.1: Changes in the level of health in short-run

	(2SLS) $deterioration_{2008}$	(2SLS) $improvement_{2008}$
trust	-0.0696	-0.0367
	(0.183)	(0.160)
Constant	YES	YES
Observations	5993	5993
R^2	0.005	0.007

Robust standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

In the short-run there are no surprise about the signs of coefficients but estimates are not significant even at 10% level and are smaller than the ones in the baseline specification. Looking at the bottom line, both R^2 are positive but very small.

Table A.2: Changes in the level of health in medium-run

	(2SLS) $deterioration_{2013}$	(2SLS) $improvement_{2013}$
trust	-0.0282	-0.117
	(0.201)	(0.160)
controls	YES	YES
Observations	5620	5620
R^2	0.006	.

Robust standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

It is not a surprise, given the results for the short-run, to observe that trust has no significant effect on the probability of suffering from a worsening of health status nor on the probability of enjoying enhancements of it observing a longer period of time.
With regards to the R^2, it is negative in the case of improvement and therefore not printed whereas it is very small for deterioration.

Appendix B

Weak instrument

It has been extensively argued how much important is to use strong instruments for recovery the coefficient of interest with IV estimators.
I now replicate my analysis for short-run considering 2008 as time t whereas my instrument will be the same as before.

Table B.1: Results for short-run

	(OLS) $goodhealth_{2013}$	(OLS) $poorhealth_{2013}$	(2SLS) $goodhealth_{2013}$	(2SLS) $poorhealth_{2013}$
trust	0.0453***	-0.0362***	0.347	-0.676
	(0.0172)	(0.0128)	(0.551)	(0.558)
$goodhealth_{2008}$	0.487***		0.458***	
	(0.0169)		(0.0420)	
$poorhealth_{2008}$		0.463***		0.413***
		(0.0293)		(0.0476)
controls	YES	YES	YES	YES
Observations	2903	2903	2571	2571
R^2	0.252	0.191	0.163	.

Robust standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Generally speaking, the number of observation has dramatically gone down as a consequence of the fact that the section about income in wave 8 is more limited than the one in wave 7. At the same time, however, the R^2 in the first three columns is higher than what has been found in chapter 4.
The results for OLS are strongly significant and have coherent signs but their magnitude is approximately halved with respect of estimates for short-run found in chapter 4.
However, what is more relevant is that the estimates for 2SLS are not significant. This is of course disappointing but, before questioning all previous results, it might be the case to look at first-stage.

As it has been said in chapter 3, IV estimates are based on the assumption that the first-stage is not zero.
Here, instead, both coefficients for the instrument in the first-stage are not statistically significant and F-statistics are very small (namely, quite far from the threshold

Table B.2: Results for the first-stage

	($goodhealth_{2013}$) trust	($poorhealth_{2013}$) trust
predicted trust	0.369	0.393
	(0.271)	(0.271)
$goodhealth_{2008}$	0.0635***	
	(0.0192)	
$poorhealth_{2008}$		-0.0667**
		(0.0311)
controls	YES	YES
F	1.85	2.10
Observations	2801	2801
R^2	0.043	0.041

Robust standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

value of 10).
Therefore, the bad results obtained are the natural consequence of using bad instrument and they do not signal that previous findings were not reliable.

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