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Education, Adult Skills and Social Outcomes

Empirical evidence from the Survey on Adult Skills

(PIAAC 2013)

Patrícia Dinis da Costa, Margarida Rodrigues, Esperanza Vera-Toscano and Anke Weber



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**Education, Adult Skills
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(PIAAC 2013)**

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Executive Summary

It has widely been acknowledged that education is a major source of economic prosperity and social well-being. Education is not only an important factor in the productivity and innovative capacity of an economy, but is also a prerequisite for social and cultural changes in patterns of consumption and leisure behaviour to achieve a sustainable lifestyle. It puts people in a position to take well-informed decisions about the future, to assume responsibility for these decisions and to judge how their personal behaviour will affect future generations. Thus, we are then well aware that education gives access to knowledge that helps individuals and society to be more stable and resilient in times of change. These social returns can take the form of “market outcomes” such as productivity or earnings and “non-market outcomes” such as health, civic participation and more generally social capital. Deeper understanding of the contribution of education to the provision of these social outcomes is a desirable goal.

While the educational system is the primary agent for the acquisition of such knowledge, learning may also take place in the family, the workplace and among our social acquaintances all throughout our lives. Nowadays, constant changes taking place in society encourage individuals that besides grasping occupation-specific skills they must also stock some other various information processing skills to help them cope with this rapid changing environment, especially in the labor market.

The Survey of Adult Skills (PIAAC) was designed to gather information on some of these key skills in society. It directly measures proficiency in several information-processing skills –namely literacy, numeracy and problem solving in technology-rich environments. Simultaneously, it provides insights on key social outcomes such as the level of trust in others, participation in associative, religious, political or charity activities (volunteering), political efficacy or the sense of influence on the political process, and self-assessed health status. The main findings on the relationship between education in its different forms (i.e. years of attainment, skills and adult lifelong learning) and the different social outcomes considered are reported below. Gathering information on the impact of knowledge acquired beyond formal education becomes crucial since individuals’ abilities to successfully meet complex demands in the current context of globalization (measured as their proficiency in numeracy, literacy and problem solving tests or positive attendance to any type of adult lifelong learning in the past 12 months) play a key role in the effective and fruitful participation of citizens in the social and economic life of advanced economies.

How social outcomes are linked to skills proficiency?

- A considerable difference in the distribution of **social trust** exists across the different EU countries with IT, CY and FR reporting the lowest levels of trust and SE followed by FI and DK scoring at the highest. Further, in general low levels of proficiency on literacy, numeracy and problem solving scales are associated with lower level of trust.

- In all EU countries, more than 50% of adults do not **volunteer**. The highest percentage of adults who volunteer every day is registered in BE (FI) (about 3%). FI, DK and NL report the larger proportion of individuals who volunteer even if less than once a month. As with levels of trust, adults with higher levels of proficiency on the different skills measured are more likely to report that engagement in volunteering activities.
- The lowest levels of political efficacy are reported in IT (43%) followed by FR (37%) and ES (36%). These lower levels are associated with lower levels of proficiency on the different skills considered.
- For self-reported health status, the mode of answers is “good”. The maximum percentage of adults reporting “excellent” health is 26% in IE and the minimum is 8% in ST and PL. In general, skills proficiency has a positive relationship with the health status reported by adults.

The relationship between education, skills proficiency and social outcomes.

- For EU average estimations proficiency in literacy, numeracy and problem solving in technology-rich environments and participation in adult lifelong learning programs are positively and significantly associated with the probability of reporting high social trust, believing to have some impact on the political process, participating in volunteer activities and reporting good health. These effects are independent from that of education attainment indicating that not only formal education per se is important; other individuals’ competences understood as the ability to successfully meet complex demands in the current global economy are key for an effective and fruitful participation in the social and economic life of advanced economies. Education systems (through formal or informal education) must ensure the provision of the necessary skills for integration in society.

Country-specific analysis on the relationship between education, skills and social outcomes.

- For all countries, individuals with low skills proficiency and low levels of education show the lowest probability of reporting positive outcomes for all the social outcomes considered. On the contrary, individuals with higher skills proficiency and high levels of education have the highest probability of reporting positive social outcomes.
- Being highly proficient in literacy or numeracy (above Level 3) seems to be more important than having a higher level of education. For example, in the Netherlands, proficiency in literacy seems to be more important than educational attainment. Adults with low levels of education but higher

proficiency are more likely to report positive social outcomes than adults with high levels of education but lower proficiency.

In summary, the role play by the educational system regarding the provision of adequate skills is crucial in creating such different patterns (importance of formal education vs. information-processing skills) in a given society. Once again, it is up to the education system to foster positive outcomes (social outcomes in our case).

1. Introduction

In the past few decades, it has largely been discussed that the benefits from education to society go beyond the economic domain. This is nothing new since in the ancient Greece, Plato and Aristotle already claimed the key role of education for personal fulfilment and social well-being and, nowadays, both economist of neoclassical tradition and their opponents agree on the role of human capital in the creation of growth. Accordingly, research strongly supports this understanding, revealing that education not only provides individuals' knowledge and skills to perform better in the labour market and promote growth, but education also contributes the socialisation in modern societies. Knowledge puts people in a position to take well-informed decisions about the future, to assume responsibility for these decisions and to judge how their personal behaviour will affect future generations, helping individuals and society to be more stable and resilient in times of change.

While the schooling system is the primary agent for the acquisition of knowledge and skills, learning does not solely take place in school. The family, the workplace and our social acquaintances may also be important sources of knowledge (i.e. lifewide learning) which is learned all throughout our life (i.e. lifelong learning). Human beings are curious creatures that tend to enjoy learning and, there is no doubt that the knowledge acquired and its use is likely to have a major impact on their success in life. Gathering information on knowledge acquired beyond formal education becomes crucial.

The new *Survey of Adult Skills 2012* (PIAAC) part of Programme for the International Assessment of Adult Competencies from the OECD was intended to gather quantitative information on skills that are considered to be the basis for effective and fruitful participation in the social and economic life of advanced economies. Beyond measuring education in terms of years of schooling as a simple linear effect, PIAAC survey measures individuals' competences understood as the ability to successfully meet complex demands in the current context of globalization of the economy. Thus, it directly measures proficiency in literacy, numeracy and problem solving in technology-rich environments of the working-age population for 17 participating EU Member States. In addition, information was also gathered from survey participants on key domains for social well-being and cohesion such as: the level of trust in others; participation in associative, religious, political or charity activities (volunteering); political efficacy or the sense of influence on the political process; and self-assessed health status.

The purpose of this technical report is to provide empirical evidence on the association between formal education, directly observed skills among the working age population and different aspects of social well-being, including interpersonal trust, volunteering, individuals' sense of having influence on the political process and health. Results suggest that policy interventions should definitely be geared towards the enhancement in skills both in schools and throughout adulthood so as to accomplish the statement made at the Lisbon European Council:

“...to become the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion”.

The report is organised as follows. The next section provides brief overviews of the existing empirical evidence on the linkages between human capital formation and social outcomes. This section provides useful background for the main part of this technical report (that of the empirical approach). Section 3 deals with new *Survey of Adult Skills 2012* (PIAAC) part of Programme for the International Assessment of Adult Competencies from the OECD. It further presents some descriptive statistics on the distribution of the different social outcomes domains and on the proficiency scores in the different skills measured in the Survey, both by socio-economic characteristics and across countries. Section 4 presents the methodological approach that tries to provide further empirical evidence on the relationship between human capital related variables and social outcomes such as trust, volunteering and political efficacy. Empirical results are also provided for self-reported health status which, as justified later on in this report, can certainly provide important social benefits. The availability of directly observed skills in PIAAC dataset together with educational attainment and lifelong learning related information allows researchers to “unpack” these three effects to some extent. Country-specific analysis on the relationship between education, skills and social outcomes is also discussed here. The final section concludes.

2. Discussion on the Social Returns to Education

When discussing about the social returns to education, researchers imply the positive (or negative) outcomes for individuals other than those making the decision about how much schooling to get. They are benefits (or costs) not taken into account by the education decision-maker himself. If the social returns are significantly important and there is no government intervention, it could result in significant under-investment in education. In addition, policies other than educational policies are far more likely to succeed if they take into account the educational dimension and link properly to educational delivery. Accordingly there is a strong consensus that the links between social well-being and education need to be clearly understood and transferred to policy makers and the broader community (OECD, 2001).

Social returns can take the form of “market outcomes” such as productivity or earnings and “non-market outcomes” such as health, civic participation and more generally social capital. Regarding the former, the factors that determine long term growth in living standards have received substantial attention in the past two decades. The “*new growth theory*” emphasizes the contribution of knowledge and innovation in improving living standards over time. These new perspective has been reinforced by empirical evidence that supports the key role played by education in economic growth (Barro, 2001). We will devote the remaining of this section to discuss on the “non-market” or “social outcomes” of education.

2.1. Social Outcomes: Non-market effects of Education

Considering that “non-market” benefits of education are those other than the ones established in the form of higher wages or non-wage benefits from working, large efforts have been made by researchers and institutions to extend the range of educational outcomes so as to include the social dimension. The Social Outcomes of Learning (SOL) from the OECD project represented a major institutional effort designed to inform thinking across several sectors on the nature of the linkages between learning and well-being, broadly understood (see OECD, 2007 and 2010). Research wise authors such as Berhman and Stacey (1997), McMahon (1997), or Wolfe and Haveman (2001) have also provided a thorough revision of the literature on the social and non-market effects of education. This technical report extends this line of work and focuses on a number of domains related to social outcomes, namely: *Health, trust, volunteering and political efficacy*.

While *health* may be considered private in nature, or at least private to the family, and thus may be taken into account by individuals in choosing the amount of education to acquire, nonetheless, they are benefits that accrue to the individual or family, and thus should be added to the private benefits associated with higher lifetime earnings. In addition, even effects such as improved health outcomes may be of some public value if they reduce reliance on publicly funded programs. Likewise, as mentioned earlier on, *civic participation* through people’s involvement in society and political life has

been seen as one of ways to pursue equity and social cohesion with education being identified as a major lever in this respect. The contribution of education in its different kinds to the accomplishment of these goals, and desirably, the ways in which it does it are the key questions that need to be tackled.

2.2. Education, Adult Skills and Social Outcomes

Education and labour market experience are both *inputs* into the production of human capital and not direct measures of the *outputs* –a set of skills, competencies and knowledge needed by individuals to have a successful life in society. While the relationship between education and job experience, and labour market outcomes such as earnings has largely been investigated, little is known about the relationship between direct measures of skills and labour market outcomes, even less if social outcomes are the target. Recent advances in the collection of data on the skills of the working age population have enlarged our understanding of the acquisition of human capital and its economic consequences.¹ Thus, estimates of the return to schooling and to labour market experience distinguish two effects. First, it is the impact of education and experience on skill production –the relationship between human capital *inputs* and *outputs*. Second, it is the relationship between skills and labour market outcomes such as earnings. Although skills may be acquired in various contexts over the lifetime, education is thought to be particularly important in forming skills.

Insofar that the relation between education and economic outcomes operates through skills, it is clearer the key role of education systems in providing such skills and contributing to the sorting effect among individuals in society (Campbell, 2006; Desjardin, 2008). The same reasoning will apply to the relationship between education and social outcomes. Accordingly, how do education and key adult skills interrelate in their relationship to social outcomes? The availability within the Survey of Adult Skills of directly observed skills, education and social outcomes should allow researchers to "unpack" these two effects to some extent.

2.3. Trust

Trust is a necessary asset for economic activity, due to its ability to promote cooperation and to improve the efficiency of markets (Arrow, 1974). The empirical research often refers to trust as a form of social capital fostering economic growth (Knack and Keefer, 1997; Zak and Knack, 2001) and political stability (Easton, 1965; Hetherington, 2005). However, despite the huge amount of research on the topic, we still have a poor knowledge on the origins of trust. Following Putnam, Leonardi and Nanetti's (1993) seminal work, social capital is commonly defined as the features of social life – networks, norms, and trust – that enable participants to act together more effectively to pursue shared objectives.

¹ Green and Riddell (2003) use the Canadian component of the International Adult Literacy Survey (IALS) to investigate the relationship between education, skills and labour market earnings. Hanushek et al. (2013) have provided recent evidence using PIAAC data on returns to skills (earnings) around the world.

However, networks do not necessarily contribute to the creation of trust. The nature of the linkage connecting these two phenomena is highly context-dependent and needs to be carefully assessed every time. As everyday-life experience and the literature on the so-called “anti-social capital” suggest, some kinds of networks can obstruct the flow of trust and cooperative attitudes, thereby exerting a negative influence on well-being and development (Portes and Landolt, 1996, Molyneux, 2002, Sabatini, 2009). By contrast, if we define (and measure) social capital as trust, any empirical testing will repetitively find that social capital plays a positive role for the economic and political activity.

Trust may be defined as the belief in others’ good intentions. According to Schul et al., “*A state of trust is associated with a feeling of safety. The environment is as it normally is and things really are as they appear to be. Thus, individuals see no reason to refrain from doing what they routinely do*” (2008, p. 1293). Thus people who trust their peers (interpersonal trust) are more engaged in a whole host of activities than their less-trusting counterpart. Likewise, for political stability, attention should also be paid to trust in government institutions (institutional trust) as theorized by Hetherington (2005), but this is out of the scope of this research.

2.3.1. Rationale of the relationship between of education, skills and trust

The impact of education on different domains of civic participation has long been studied by political scientists. The correlation between education and voting is strong. Higher education is also associated with more volunteerism and more charitable activities.

Helliwell and Putnam (1999) among others also find that education is correlated with typical measures of social capital: trust and social participation (club memberships, community work, hosting dinner parties). As wisely summarized in OECD (2007), the relationship between education and trust can have either social or psychological origins. The former is driven by socioeconomic status and consequently the nearer you are to the top of the social hierarchy, the more reason you have to be trusting; the latter implies a psychological predisposition immune to one’s position on the social ladder. There is solid evidence to suggest that *interpersonal trust* combines the psychological and social features. The higher the average levels of education among you and your peers, the higher the individuals’ trust in others. Thus, it is driven both by individual attainment and the peers’ level of education (Temple, 2000; Knack, 2000; Campbell, 2006). Interestingly, this finding is significant because it implies that higher levels of inequality in educational attainment may have a negative impact on the overall social cohesiveness of a society. In contrast, *institutional trust* relies more on oneself (and not so much on your peers) with the more you know about the complex processes of what is happening around them the more likely you are to be trusting.

In spite of – or perhaps because of – the widespread consensus on the universal, strong, and positive relationship between education and the trust domain of civic and social engagement (CSE), the causal mechanism(s) underlying that relationship have been subjected to relatively scant scrutiny (see Huang et al., 2009; OECD, 2009; Putnam, 2000; Schuller and Desjardins, 2007 for the effect of education on civic and social engagement). While policy makers widely recognize the fact that education serves as an engine for economic growth through the accumulation of human capital, education is also strongly associated with boosting levels of social capital including trust. Indeed, an important justification for the large expenditures on education within many democratic nations is its social, and not just economic, impact – the benefits an educated electorate brings to civil society.

The empirical evidence relating skills to trust is scarcer and relies on the two precursors of the PIAAC survey, which also had questions on a number of social outcomes: the International Adult Literacy Survey (IALS) (OECD, 2000) and the Adult Literacy and Life Skills Survey (ALL) (US National Center for Education Statistics, 2003). Notwithstanding, societies consider high levels of skills (mainly literacy) to be desirable for all of their members to sustain widespread participation in economic, social, cultural, and political life. Literacy is important for communication and for making informed decisions. As Coleman (1990) argued, that information is an important dimension of social capital, one that contributes to trust and norm-building by extending the reputation of an individual beyond her immediate contacts. Thus, by extension, skills are a necessary ingredient for citizenship, community participation and a sense of belonging, all of them social outcomes domains intrinsically linked to trust (McCracken and Murray, 2008). Similarly, Freire (1970) highlights skill as central to the process of “conscientisation” in which citizens question the way things are and undertake to change them for the better. As such, skill enables politically active participation in social and economic transformation.

2.4. Volunteering

"Volunteering means any activity in which time is given freely to benefit another person, group or organization" (Wilson, 2000). This broad definition may differ according to the benefits it generates, the degree of freedom it involves, the level of commitment and organizational setting. It has also been defined as a non-marketed output benefiting both private individuals and the general public (Wolfe, 1994) or as a planned and non-obligatory form of helping (Aydinli et al., 2013). This activity can be performed in different types of organisations, namely: charity, political parties, churches, parents associations and other on-profit groups. Unlike supporting family members or friends, volunteering occurs in a formal and organizational context (Penner, 2002). This phenomenon is usually viewed as a contribution to a healthy society, as it fosters a social outcome that may benefit the *volunteer*, but mainly, benefits the society as a whole.

2.4.1. Rationale of the relationship between of education, skills and volunteering

There are several theoretical mechanisms between education, skills and volunteer work. On the one hand, highly educated or skilled individuals have, on average, higher opportunity cost of time, as they are more likely to be employed and to have higher hourly wages. This would translate into less volunteer work. On the other hand, highly educated or skilled individuals may face higher probability of being invited to do this type of work and may do it with less effort with respect to lower educated counterparts (Wilson, 2000), which would translate into more volunteer work. Therefore, there seems to be no clear relation between education, skills and volunteer work, since the decision on which of these two mechanisms wins may depend on the volunteer tasks, individual preferences and other contextualizing factors. In some instances, education may have a curvilinear relation to volunteering (Thompson, 1993).

There is already a vast empirical literature on the relation between education and volunteering, evidencing that education is positively associated with volunteering (Freeman, 1997, Gibson, 2001, Denny 2003, Bekkers, 2005 and Huang et al, 2009). This finding seems to be common to several countries. For instance, using 1991 World Values Survey data for 32 countries, Schofer and Fourcade-Gourinchas (2001) found education and employment status to be a strong predictor of voluntary association membership. However, the literature also acknowledges that education could simply be a proxy for unobserved traits that can also influence volunteering, such as family and community background, taste for altruism, attitudes and beliefs (Dee, 2004, and Huang et al, 2012). If this is the case the positive effect of education on this social outcome should not be interpreted as a causal one. That is, education is associated with, but does not cause, higher volunteer engagement. In fact, when this possibility is taken into account and the causal contribution of education to volunteering is studied, the findings change. For instance, Gibson (2001) presents within-twins estimates suggesting that education actually reduces the probability of volunteering and the number of hours in this activity. Using the instrumental variables approach, Dee (2004) and Denny (2003) conclude that the effect of education turns out to be insignificant.

A study using IALS 1994 data showed that highly skilled individuals in most countries were more likely to participate in voluntary community activities (OECD and HRDC, 1997). Using the same data, Denny (2003) finds that literacy positively and significantly affects volunteering. Moreover, introducing literacy skills significantly reduced the education coefficient: in some countries the education effect was no longer significant, suggesting that all of the positive effect found before was associated with higher literacy skills. Evidence from the ALL shows that higher skills are associated with higher probability of engaging in voluntary activities (OECD, Statistics Canada, 2011). This is found in nearly all countries and even after controlling for important factors. All the three skills analysed (literacy, numeracy and problem solving) are associated with higher volunteering, with different strength across countries.

2.5. Political Efficacy

Political efficacy refers to an individual's sense of having influence on the political process and the extent to which a citizen believes in the government. Efficacy is generally viewed as an indicator for the health of democracies (Craig et al., 1990, p.289). Discussions on the concept of political efficacy date back to the 1950s, when Campbell et al. (1954, p.187) defined efficacy as "the feeling that individual political action does have, or can have, and impact upon the political process, i.e., that it is worthwhile to perform one's civic duties" (Acock et al., 1985, p.1063). As Acock et al. (1985) describes, the scholarly debate² then moved to separating political efficacy into two distinct notions of efficacy, i.e. external political efficacy and internal political efficacy. As Craig et al. (1990, p.290) describe with reference to Converse (1972) and Balch (1974), external efficacy refers to "beliefs about the responsiveness of governmental authorities and institutions to citizen demands". Hence, external efficacy can be seen as a measure of the quality of political institutions, i.e. whether the institutions respond to citizens' needs. The second notion of efficacy is internal efficacy. In contrast to external efficacy, internal efficacy refers to "beliefs about one's own competence to understand and to participate effectively in politics" (Craig et al., 1990, p.290). This means that internal efficacy measures the extent to which citizens feel sovereign to influence the political system. This does not necessarily depend on the quality of those institutions but rather refers to the abilities of the citizen.³

2.5.1. Rationale of the relationship between education, skills and political efficacy

There has been a scholarly debate on *the relationship between education and political efficacy*. (Hayes and Bean, 1993; Niemi et al., 1991; Finkel, 1987; Pollock, 1983; and Baker, 1973). Researchers suggest that highly educated individuals exhibit higher levels of political efficacy than individuals with lower education levels (Hayes and Bean, 1993; and Baker, 1973). Variables used to measure education levels include the number of years of education (Hayes and Bean, 1993) or highest level of education attained (Pollock, 1983). In addition, scholars established that there is an interaction effect between political efficacy and political participation, as well as between education and political participation. In particular, various researchers suggested that higher political efficacy increases political participation and in turn higher political participation enhances the level of political efficacy (Brady et al., 1995; Clarke and Acock, 1989; Finkel, 1987; Powell, 1986; Pollock, 1983; and Baker, 1973). Moreover, educational attainment is strongly related to political participation. For example Brady et al. (1995) suggest that educated individuals are more aware of the importance of becoming politically involved and have also the financial means to participate actively to politics. Similar arguments can be also found in La Due Lake and Huckfeldt (1998), Verba et al. (1993), Powell (1986) and Baker (1973). In sum, the effect of

² Lane (1959), as well as Converse (1972), Balch (1974), and Craig and Maggionto (1981).

³ Examples on the questions used to measure external and internal efficacy and combined measures of efficacy can be found in Hayes and Bean (1993), Niemi et al. (1991), Craig et al. (1990) and Acock et al. (1985).

education on political efficacy could be direct (as described above) or indirect through the enhancement of political participation, which might in turn increase the level of political efficacy.

Note that the reviewed literature above is limited to measuring education in terms of quantity, and not in terms of quality of education, i.e. competencies in the areas of reading, literacy, numeracy, and problem solving. As already discussed, only in recent years did data become available on the skills' levels of adults, with the most complete survey being PIAAC, preceded by ALL and IALS. However, to the authors' knowledge no information on the political efficacy is directly available from these two adult skills surveys. The only information somewhat related to political efficacy and political participation is available in questions G8 and G9 from the ALL survey and refer to volunteer work that has previously been discussed in **Section 2.4.1** of this report.

2.6. Health

Individual's health, as well as, education, skills and labour market integration are all important characteristics of human capital. Overall, their value lies on the effects they have on individual's productivity and well-being.

The meaning of health has evolved over time from an understanding primarily concerned with curing acute ill-health to a broader definition which includes a state of complete physical and social well-being and not merely the absence of disease or infirmity (WHO, 1946). While the former, more biomedical, approach continues to dominate the study of disease and the administration of health care, the latter introduces a more holistic concept of health, encompassing social as well as physical health. This broader definition of health is at the core of the WHO Health for All Strategy, which aimed to maximising economic and social life as a mean to improving overall health (Blane, White and Morris, 1996; WHO, 1999). This understanding of health concerns individuals' capacity to fulfil their aspirations within their social environment. This raises two issues. First, individual aspirations for health vary, and so to some extent health becomes a relative rather than an absolute concept. Second, the ability to fulfil these (individual) aspirations and so maximize health is constrained by the social environment and one's ability to live in it. The social environment is therefore an important determinant of health.

This conceptualization of health makes less appropriate traditional methods of measuring population health, such as morbidity and mortality rates. It tends to rely on psychological measures based on self-report; for example, self-rated health. As noted by previous studies, there is evidence to suggest that such measures are a powerful predictor of mortality (see, for example, Idler and Angel, 1990; Idler and Kasl, 1995; Idler and Benysmini, 1997) proving the validity of this approach to the conceptualisation of health.

2.6.1. Rationale of the relationship between education, skills and health

The relationship between education and health has received significant attention in the last two decades and it stands out as one of the most important determinants. Grossman and Kaestner (1997) and Wolfe and Haveman (2001) collected a large amount of empirical research on the causal effects of education on health that systematically reinforces the causal impact on health outcomes both in developed and in developing countries. Along with occupation and income, education is a common indicator of socioeconomic status which ultimately affects health outcomes of individuals. However, while each of these three indicators has a distinct relationship with health, they are also highly interrelated. Further, there is also a temporal dimension to their relationship. That is, an education level is achieved (relatively early in the life course) that enables an occupation level to be attained that returns a level of income (later on in life and with greater variability). This life course “stability” to education as opposed to occupation or income level makes it a preferred indicator of socioeconomic status. Another reason for choosing education (proxy for socio-economics status) as a key determinant of health is that it contributes more easily to the interpretation of causal direction in relationships with health measures (cross-sectional studies), since beyond early adulthood, changes in health can have far fewer consequences for educational level than health changes can have for occupation and income level. Statistical robustness of causal estimation in relation to education and some of the health outcomes have been reported in studies such as those undertaken by Arendt, 2005; Adams, 2002; Spasojevic, 2003; or Lleras-Muney, 2005. Having said this, we cannot ignore the large amount of research (including longitudinal one) on the effect of income on health, especially related to the risk of poverty, deprivation and social exclusion (see for example, Deaton, 2003; Frijters, et al., 2005; Jones and Wildman, 2008).

There is less evidence on the ways by which education impacts health. Education may impact the way individuals consider information so as to improve their health choosing different lifestyles. It may also impact the rate of time preference of individuals, with more educated individuals discounting the future less, and thus undertaking actions that improve health (e.g. smoking less). In a widely cited study, Kenkel (1995) found that education is not only associated with better health outcomes but also superior health behaviours such as reduced smoking, more exercise and lower incidence of heavy drinking. Interestingly, however, the influence of schooling does not mainly operate through its impact on health knowledge -- the estimated impact of additional education did not decline substantially when controls were included for health knowledge. This suggests that the effect of education on health occurs mainly through the utilization of health knowledge rather than the acquisition of such knowledge.⁴ Thus, a number of

⁴ An important exception is the case of smoking, where Kenkel (1991) found evidence of an important interaction between health knowledge and education. Those with more schooling reduced their smoking more for a given increase in knowledge of the consequences of smoking. He also points out that prior to the report of the U.S. Surgeon General in the 1960s (which had a major impact on knowledge about the health consequences of smoking) higher education was not related to lower incidence of smoking.

studies conducted over the past decade have focused on the relationships between skills in literacy and health-related outcomes. In a summary of these studies, Weiss (2005) noted that having lower health knowledge is associated with lower health status, higher utilization of health services and not too surprisingly increased costs for health care.

As indicated earlier on in the Report, although better health is principally a private return, it may also be a social benefit if it means less reliance by people on publicly provided health care or welfare payments. In this respect, there is an important difference between morbidity and mortality and the way health outcomes are empirically studied. From the perspective of the public finances, reduced morbidity has a positive effect whereas increased longevity is more likely to negatively affect publicly funded programs such as pensions and medical care.

3. What PIAAC Survey adds to the relationship between education and social outcomes

Since we are interested on empirically testing a conceptual framework for social outcomes which focuses on links between them and education related variables, we should make an additional effort towards providing a deeper understanding of the processes through which education can lead to better social outcomes. A weakness of the evidence to date is that much of the assessment of the relationship and effects of education on the given social outcomes (and also economic outcomes) has measured education in terms of years of schooling as a simple linear effect, without distinguishing the relative benefit of educational participation at different stages. Is there anything else in education that can help maintaining and/or improving social outcomes? The answer was already provided by the OECD project DeSeCo (Definition and Selection of Competencies: Theoretical and Conceptual Foundations, OECD, 2005):

“Beyond reading, writing, and computing, what competencies are needed by individuals to live a successful life and for society to face the challenges of the present and the future in modern, democratic societies?”

By competence we understand “the ability to successfully meet complex demands in a particular context through the mobilisation of psychosocial prerequisites (including both cognitive and noncognitive aspects)” (Rychen and Salganik, 2003, p. 43).

The DeSeCo project further developed a three-fold categorisation of key competencies with one of them being the ability for using tools interactively. This competence responds to the social and professional demands of the global economy and the modern “*information society*”, which require mastery of socio-cultural tools such as language, information, and knowledge, as well as physical tools such as computers. The three key competencies listed in this category are the ability to use - interactively - language, symbols, and text, as defined by tests in reading and mathematical literacy; knowledge and information, as defined in tests for scientific literacy; and technology.

The inclusion in the OECD Programme for International Assessment of Adult Competencies (PIAAC) of specific questions related to this type of competence (i.e. numeracy, literacy and information technology skills) will allow to empirically investigate the relationship between education related variables and social outcomes. This will clearly be a contribution to current research since as discussed later on in Section 4 (methodological approach) we are not able to isolate the causal impact of human capital variables on social outcomes.

3.1. General description of the survey

The Programme for the International Assessment of Adult Competencies is an international survey that measures key cognitive and workplace skills needed for individuals to participate in society and for economies to prosper. The survey assesses the skills of about 5000 adults surveyed in 24 countries. The target population of PIAAC was individuals aged 16-65 years. The survey was interviewed in the respondent's home and it is the outcome of collaboration among the participating countries, the OECD secretariat, the European Commission and an international consortium led by Educational Testing Service (ETS) (OECD, 2013).

PIAAC assessed skills in literacy, numeracy and problem solving in technology-rich environments (solving problems in a computer environment). These skills are “key information-processing competencies” and are relevant to adults in many social contexts and work situations, and necessary for fully integrating and participating in the labour market, education and training, and social and civic life.

The proficiency that respondents showed in the three indicated skills is measured on a scale from 0 to 500 points, which is divided into skills levels (from below 1 to 5 for literacy and numeracy; from below 1 to 3 for problem solving). Contextual questionnaires collected a broad range of information, including educational attainment, family background, linguistic background, outcome variables and how skills are used at work and in other contexts, such as the home and the community.

Table 1 below reports the number of individuals participating in each EU country. The minimum number of adults that participated in the survey was in Sweden (4469) and the maximum was 9366 in Poland. The EU sample is composed of 104909 adults.

Table 1: Number of individuals participating in the survey by country

Country	Frequency	Country	Frequency
Austria (AT)	5130	Ireland (IE)	5983
Belgium (BE FI)	5463	Italy (IT)	4621
Cyprus (CY)	5053	The Netherlands (NL)	5170
Czech Republic (CZ)	6102	Poland (PL)	9366
Denmark (DK)	7328	Slovak Republic (SK)	5723
Estonia (EE)	7632	Spain (ES)	6055
Finland (FI)	5464	Sweden (SE)	4469
France (FR)	6993	England/Northern Ireland (UK)	8892
Germany (DE)	5465	Total (EU 17)	104909

In this report we will present results for the European countries participating in the survey for literacy, numeracy and problem solving in technology-rich environment scales. 17 European countries assessed literacy and numeracy skills (i.e. Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, Germany, Ireland, Italy, Netherlands, Norway, Poland, Slovak Republic, Spain, Sweden and United Kingdom). Cyprus, France, Italy and Spain did not participate in the problem solving in technology-rich environments assessment. The source of all the results presented on this chapter is the Survey of Adult Skills (PIAAC). Missing values were excluded from the analysis.

3.1.1. Proficiency in key information-processing skills among working-age adults

In PIAAC, **Literacy** is defined as the ability to understand and use information from written texts in a variety of contexts to achieve goals and develop knowledge and potential. This is a core requirement for developing higher-order skills and for positive economic and social outcomes. Previous studies have shown reading literacy to be closely linked to positive outcomes at work, to social participation, and to lifelong learning.

Numeracy is the ability to use, apply, interpret, and communicate mathematical information and ideas. It is an essential skill in an age when individuals encounter an increasing amount and wide range of quantitative and mathematical information in their daily lives. Numeracy is a skill parallel to reading literacy, and it is important to assess how these competencies interact, since they are distributed differently across subgroups of the population.

Lastly, **Problem solving in technology-rich environments** involves using digital technology, communication tools and networks to acquire and evaluate information, communicate with others and perform practical tasks. This scale refers to the ability to solve problems for personal, work and civic purposes by setting up appropriate goals and plans, accessing and making use of information through computers and computer networks (OECD, 2013).

Description of proficiency levels in literacy, numeracy and problem solving in technology-rich environments, and the types of tasks completed successfully at each level of proficiency are accurately described in Chapter 2 of the OECD Skills Outlook Report (OECD 2013)⁵.

3.2 Social outcomes and their distribution of by country

The PIAAC Background questionnaire contains a set of specific questions on key social outcomes domains in the section entitled “*About yourself*”. These are:

⁵ Information available at: http://skills.oecd.org/documents/OECD_Skills_Outlook_2013.pdf

Trust

The question (I_Q07a) asks the respondent how much they agree on the statement “*There are only a few people you can trust completely*” with the possible answers being: 1. Strongly agree, 2. Agree, 3. Neither agree nor disagree, 4. Disagree and 5. Strongly disagree. This question resembles the one used in the General Social Survey (GSS) together with a quite similar question in the World Values Survey (WVS)⁶ being probably the most widely used questions. However, several studies have revealed that the GSS question is neither a valid nor a reliable measure of trust (Reeskens & Hooghe 2008). The question is rather imprecise, the possible answers are not mutually exclusive, and only one item is not considered to be a reliable measurement (e.g., Glaeser et al. 1999, Miller & Mitamura 2003, Yamagishi et al. 1999). Furthermore, answers may differ significantly depending on whether individuals understand “few people” in the question as meaning acquaintances or strangers (Reeskens and Hooghe 2008). The advantage is that the same question is used over time and space thus allowing a wide array of different analyses. With these precautions in mind, the distribution of the Trust domain of the participating EU countries in the Survey of Adult Skills is presented in Figure 1.

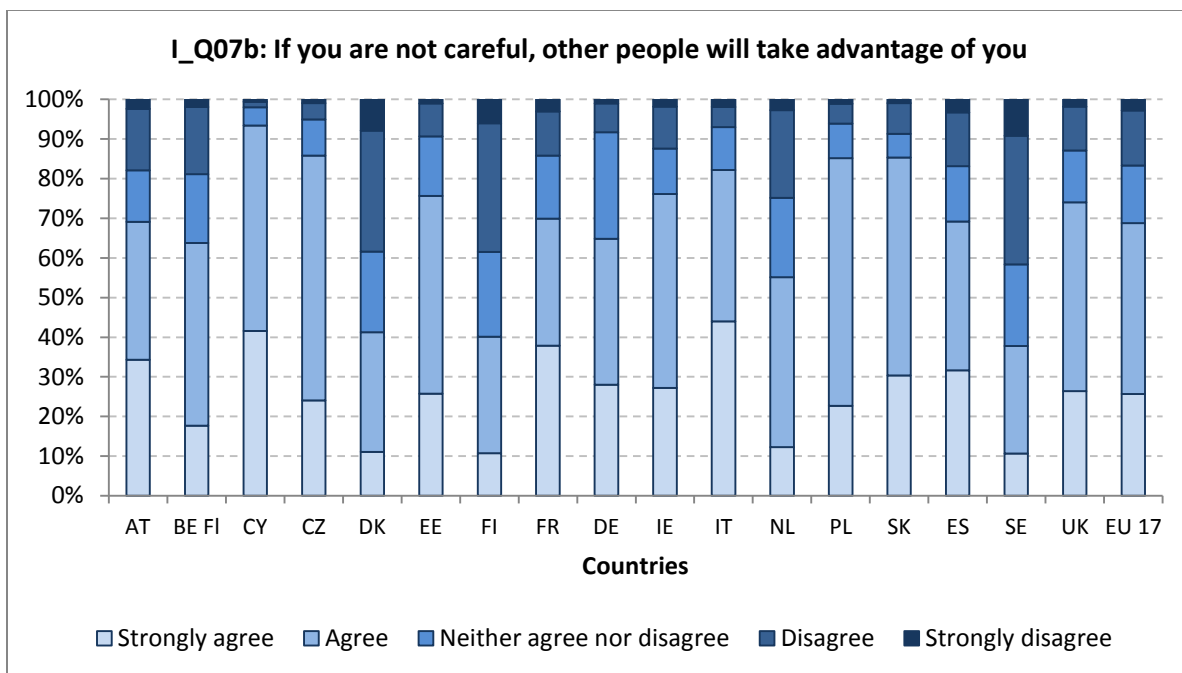


Figure 1: Distribution of the trust variable in each answer category by country

A considerable difference in the distribution of trust exists across the different EU countries. In all of them, the option “agree” is the mode, varying from 30% in Denmark to 62% in Poland. The lowest level of trust (strongly agree) ranges from 10% in Sweden to 44% in Italy (together with Cyprus and France).

⁶ Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people? Most people can be trusted OR Need to be very careful.

On the other hand, the highest level of trust (strongly disagree) is reported by 1% of the adults in Cyprus and by 9% in Sweden (followed by Finland and Denmark in reporting larger levels of trust). At the EU level, the percentage of the respondents answering the variable categories is 17% for the two highest levels of trust, 14% for the option “neither agree nor disagree” and 69% for the two lowest levels of trust.

Volunteering

This question (I_Q05f) asks the responded the frequency he/she did voluntary work in the last 12 months, including unpaid work for a charity, political party, trade union or other non-profit organisation. Possible answers were: i) never; ii) less than once a month; iii) less than once a week but at least once a month; iv) at least once a week but nor every day; v) every day. As for trust, the measurement of voluntary activity is not straightforward; definitional and methodological questions affect the responses, however the underlying stability of volunteering rates throughout different international surveys guarantee some stability in the measurement approach of this key domain (Staetsky and Mohan, 2011).



Figure 2: Distribution of the volunteering variable in each answer category by country

Figure 2 above shows that, in all countries, more than 50% of adults don't volunteer. In addition, the percentage of adults who do not volunteer varies from 56% in Denmark and Finland to 82% in Czech Republic. The percentage of respondents who answered that volunteer less than once a month ranges from 8% in Spain and Czech Republic to 23% in Finland. The highest percentage of adults who volunteer every day is registered in Belgium (about 3%). Considering the EU as a whole, the distribution of the answers across the categories of the options "never", "less than once a month", "less than once a week but at least once a month", "at least once a week but not every day" and "every day" is 69%, 15%, 7%, 7% and 2%, respectively. Given the distribution of answers across the five possible answers, in this report this variable is transformed into a dummy variable that equals one if any volunteer activity was reported, regardless of its intensity (i.e. answers ii, iii, iv) and equals zero if the answer is 'never'.

Political Efficacy

The PIAAC dataset contains a specific question on the internal efficacy of the adult individual. This question asks the responded to what extent he/she agrees or disagrees with the following statement (I_Q06a): "People like me don't have any say about what the government does". Possible answers include strongly agree, agree, neither agree nor disagree, disagree and strongly disagree. As described in the literature review this question relates to the concept of internal efficacy and is designed to measure an individual's perception of whether he/she can influence the political system.

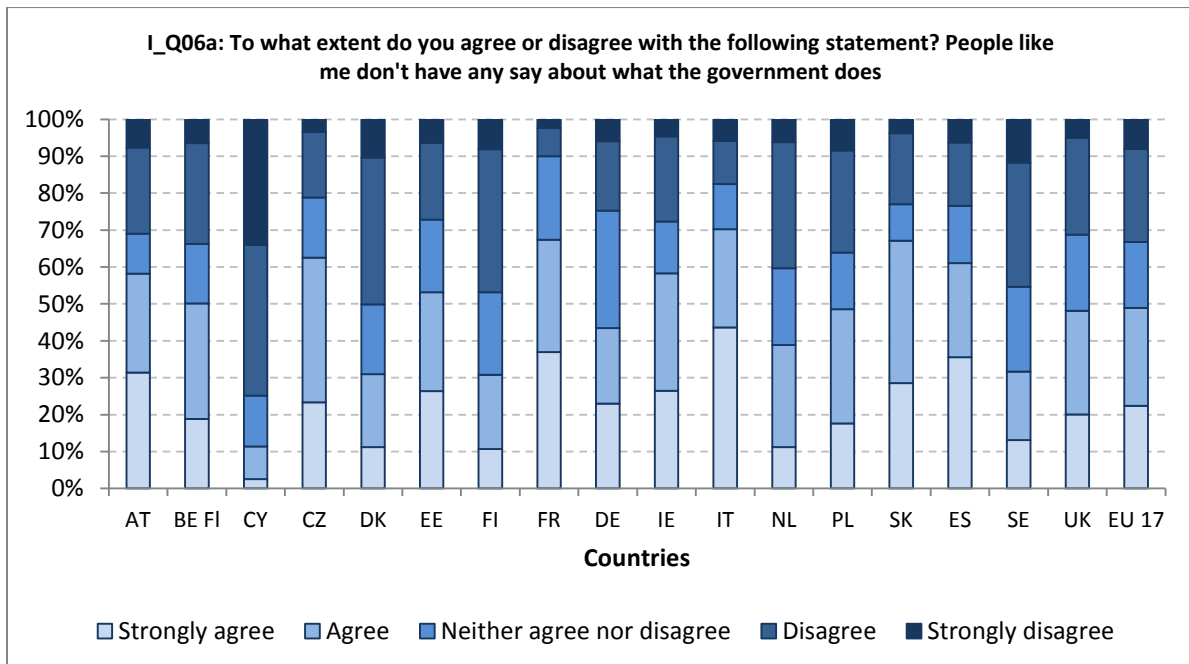


Figure 3: Distribution of the political efficacy variable in each answer category by country

In Figure 3 is presented the distribution of the political efficacy question of the EU participating countries in PIAAC. The graph indicates that there is a wide variation across EU countries in the political efficacy domain. The percentage of adults who reported the lowest level of political efficacy (strongly agree) ranges from 3% in Cyprus to 43% in Italy. At this level, the countries with the largest proportions of adults after Italy are France, (37%) and Spain (36%). The variation interval for the highest level of political efficacy ranges from 2% in France to 34% in Cyprus. The EU results of the political efficacy domain show that 33% of the respondents report the two highest levels of political efficacy and 49% indicate “strongly agree” or “agree” to the question “people like me don’t have any say about what the government does”.

To align this variable with the other social outcomes treated in this report, we coded the variable as having the following values, i.e. 1 for strongly agree, 2 agree, 3 neither agree nor disagree, 4 disagree and 5 strongly disagree. Thereby, higher values of this variable denote more desirable outcomes.

Health

As for the above described social outcomes domains, there is no single "standard" measurement of health status for individuals or population groups. "Health" is a multi-dimensional concept that is usually measured in terms of: 1) absence of physical pain, physical disability, or a condition that is likely to cause death, 2) emotional well-being, and 3) satisfactory social functioning. Some have advocated including the quality of an individual's physical environment in the definition of health, but this dimension is not at present included in the most widely used measures of health. In PIAAC survey Health is measured with a single measure of self-rated health status (I_Q08) as follows *“In general, would you say your health is excellent, very good, good, fair, or poor?”*

While it may not always be equivalent to health status as measured by a medical professional, it does reveal something about a person's perception of his or her own health at a given point in time. Analysis of self-assessed health status may provide insights into how people perceive their own health in relation to being overweight or obese, high risk drinkers, smokers or having a sedentary lifestyle. Research has also shown that self-assessed health is a predictor of mortality and morbidity (Gerdtham et al., 1999; McCallum et al., 1994).

Figure 4 shows the distribution of the adults’ health classification in the five levels.

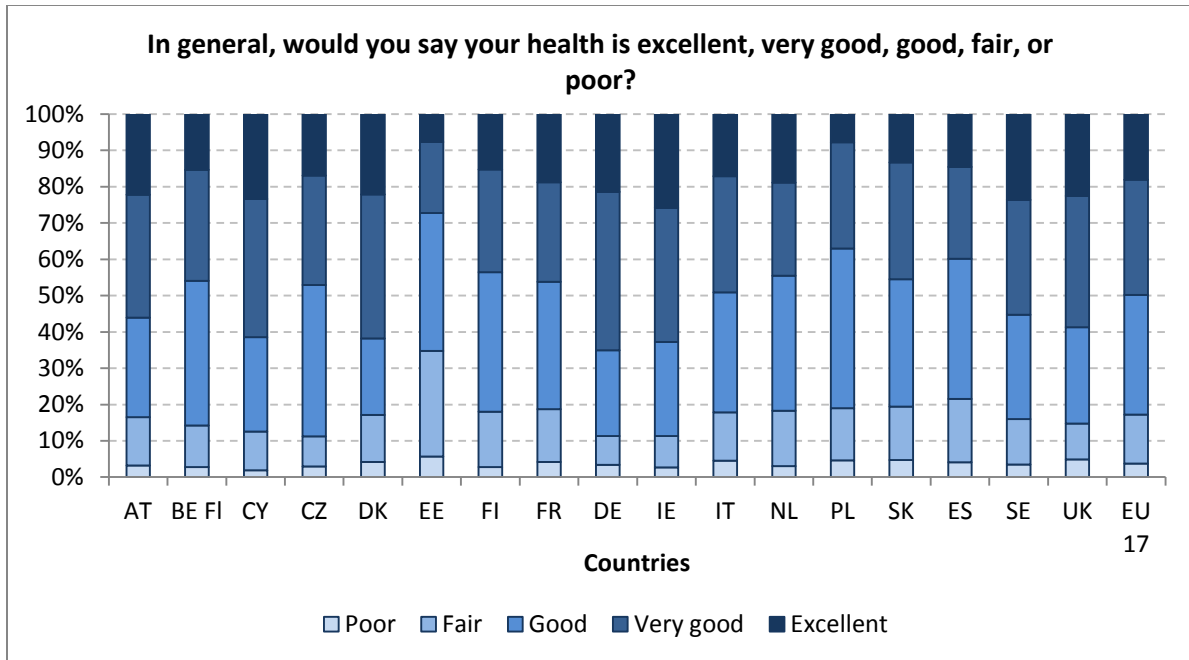


Figure 4: Distribution of the health variable in each answer category by country

The chart reveals differences across countries in the health status of adults. In most of the countries the mode of the answers is “good” (the range of values being from 33% in Italy and 44% in Poland). The second self-rated answer was the “very good” option which varies from 20% in Estonia and 44% in Germany. The maximum percentage of adults self-rating their health as “excellent” is 26% in Ireland and the minimum is 8% in Estonia and in Poland. The lowest percentage of adults reporting poor health status is registered in Cyprus (2%) and the highest in Estonia (6%). The EU 17 results indicate that 65% of the adults self-report their health as good or very good. 18% of the adults classify their health status as excellent and only 4% of the respondents consider their health as poor.

3.3 How distributions of proficiency scores compare across countries by social outcome

In this section we present how the mean proficiency scores compare across countries by social outcome. We first present the results of the proficiency scores for the trust domain. After that, we explain the differences in terms of scores of the adults who volunteer and the ones who do not volunteer. In Section 3.3.3 we focus on the comparison of adults’ scores in the political efficacy domain and finally we show how the proficiency of adults relates to their self-reported health status. Furthermore, it is important to highlight that given the similarity of the results and for the sake of simplicity, this section discusses only those based on respondents’ scores in literacy and their relationship with the variables measuring the social outcomes. In the following figures statistically significant differences, on the 5% level of significance, are denoted in a darker tone.

3.3.1. Trust

To better understand the proficiency scores compare across countries for the trust domain, we grouped options of the trust variable as follows: “strongly agree” with “agree” and “strongly disagree” with “disagree” in response to the statement “Other people take advantage of you” (Item I_Q07b). The first group corresponds to the individuals with “low level” of trust and the second one refers to a “high level” of trust. Figure 5 shows the mean literacy, numeracy and problem solving scores for adults reporting a high level of trust and the ones reporting a low level of trust. In the following Figures (Figure 5 to Figure 8), **not** statistically significant differences, on the 5% level of significance, are denoted in a **lighter blue tone**.

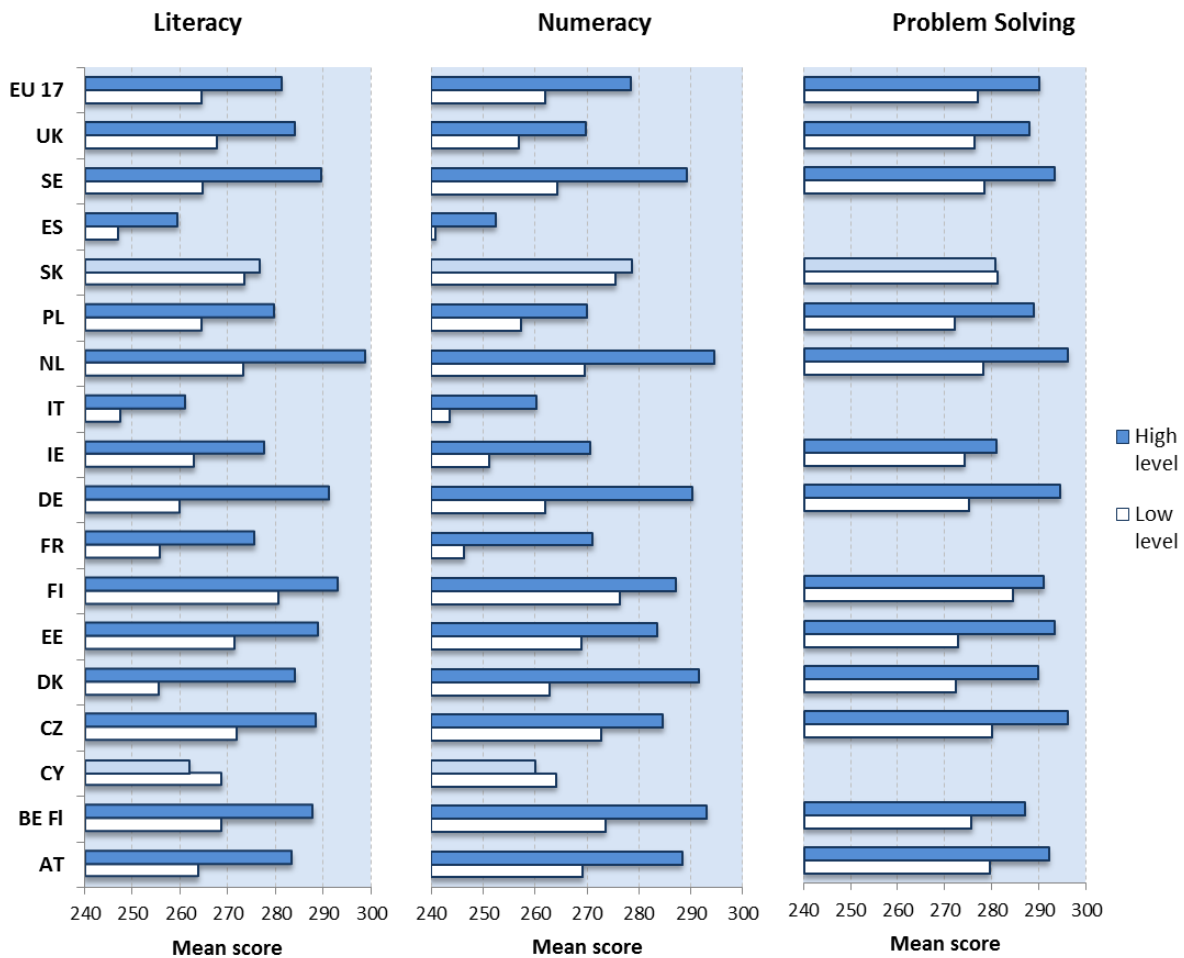


Figure 5: Mean proficiency scores by level of trust and country (literacy, numeracy and problem solving)

Results show that, in almost all the countries, adults reporting higher levels of trust achieve higher proficiency scores in literacy, numeracy and problem solving. The range of difference, favouring the adults with higher level of trust, is from 3 points in Slovak Republic and 31 points in Germany. The

exception is Cyprus, which happens to be the country with the largest proportion of interviewed individuals reporting lowest levels of trust, there adults with lower level of trust perform better (a difference of 7 points). These results are according with the findings of OECD (2013) on the trust dimension indicating that, in general, low proficiency skills are associated with lower levels of trust.

3.3.2 Volunteering

In all EU countries adults who volunteer have a higher proficiency average in literacy, numeracy and problem solving than the ones who do not volunteer (Figure 6). Regarding this social outcome, a dummy variable is recoded and we identify those who volunteer as those that have declared any volunteer activity (answers of the item I_Q05f: less than once a month, less than once a week but at least once a month, at least once a week but not every day or every day). When calculating the difference in the literacy score between adults who volunteer and the adults who do not volunteer, we verify that, on average, the highest variation is registered in England (23 points) and the lowest difference is registered in Cyprus (2 points). For numeracy skills the largest differences between those who volunteer and those who do not is found in Sweden and Germany. The same findings were reported in OECD (2013) with the results revealing that adults with higher levels of skills are more likely to report that they engage in volunteer activities.

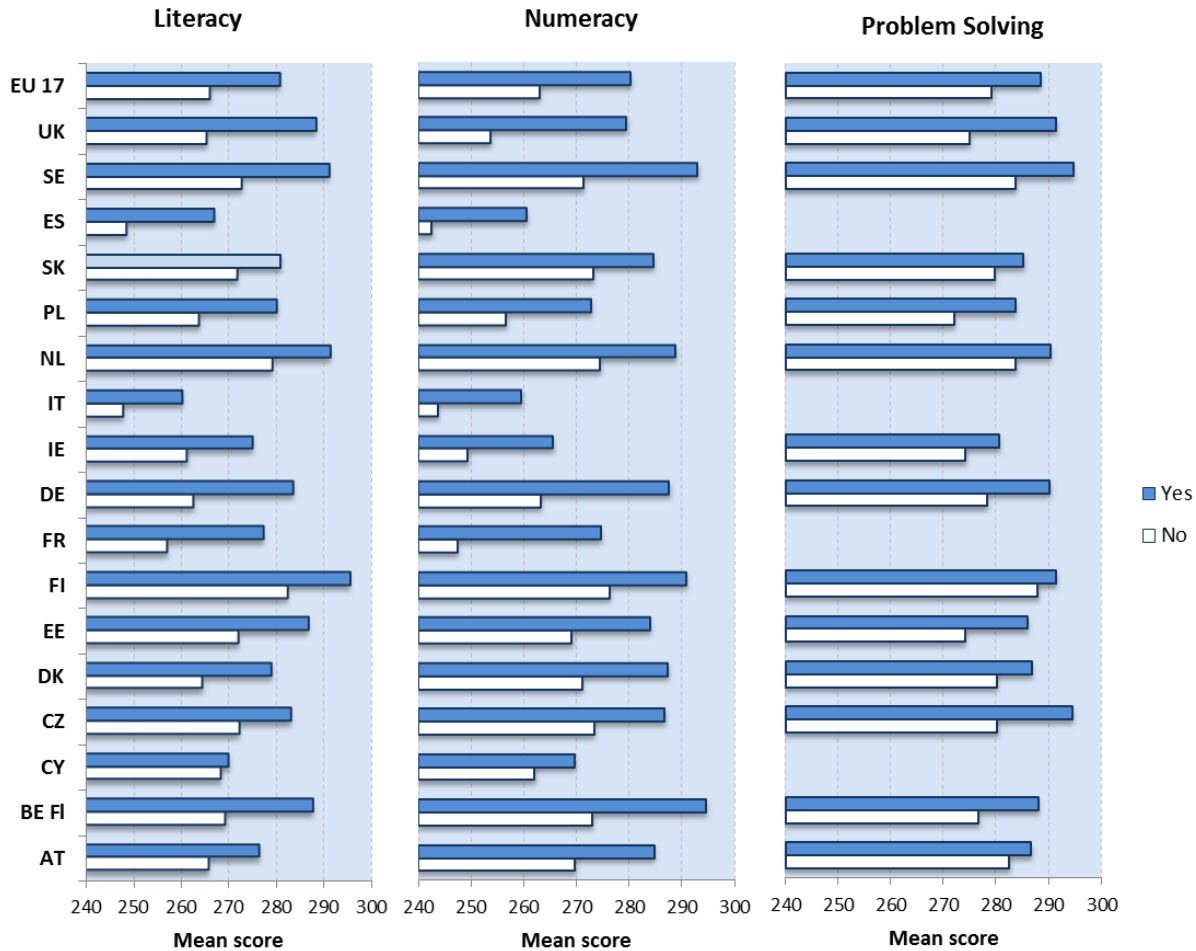


Figure 6: Mean proficiency scores by volunteering and country (literacy, numeracy and problem solving)

3.3.3 Political efficacy

For the political efficacy domain we grouped the answers categories as follows: “strongly agree” with “agree” and “strongly disagree with “disagree”. The first group corresponds to the individuals with “low” political efficacy and the second one refers to a “high” political efficacy.

In all the EU participating countries in PIAAC, a high political efficacy is associated with higher scores in literacy. In France one can find the lowest difference in literacy scores (9 points), whereas the highest is observed in Germany (28 points). Once again, these findings are in line with the OECD Skills Outlook 2013 report indicating that adults with lower levels of skills are more likely to report feeling a low level of political efficacy. In general, we can say by looking at Figures 5 to 7 that literacy scoring does not vary much by country from one social outcome to the other and the outline is very much similar across countries. Besides, those countries reporting larger literacy scores for most of the social outcomes (ie.

The Netherland, UK, Sweden, Denmark, Finland, Estonia, Czech Republic) also report a larger distribution of individuals more trustworthy, volunteers and with greater political efficacy. Thus, there seems to be a positive relationship between literacy levels and larger social outcomes. Proficiency in numeracy basically resembles the same picture as proficiency in literacy whereas smaller differences in proficiency are observed between them and the proficiency in problem solving across countries.

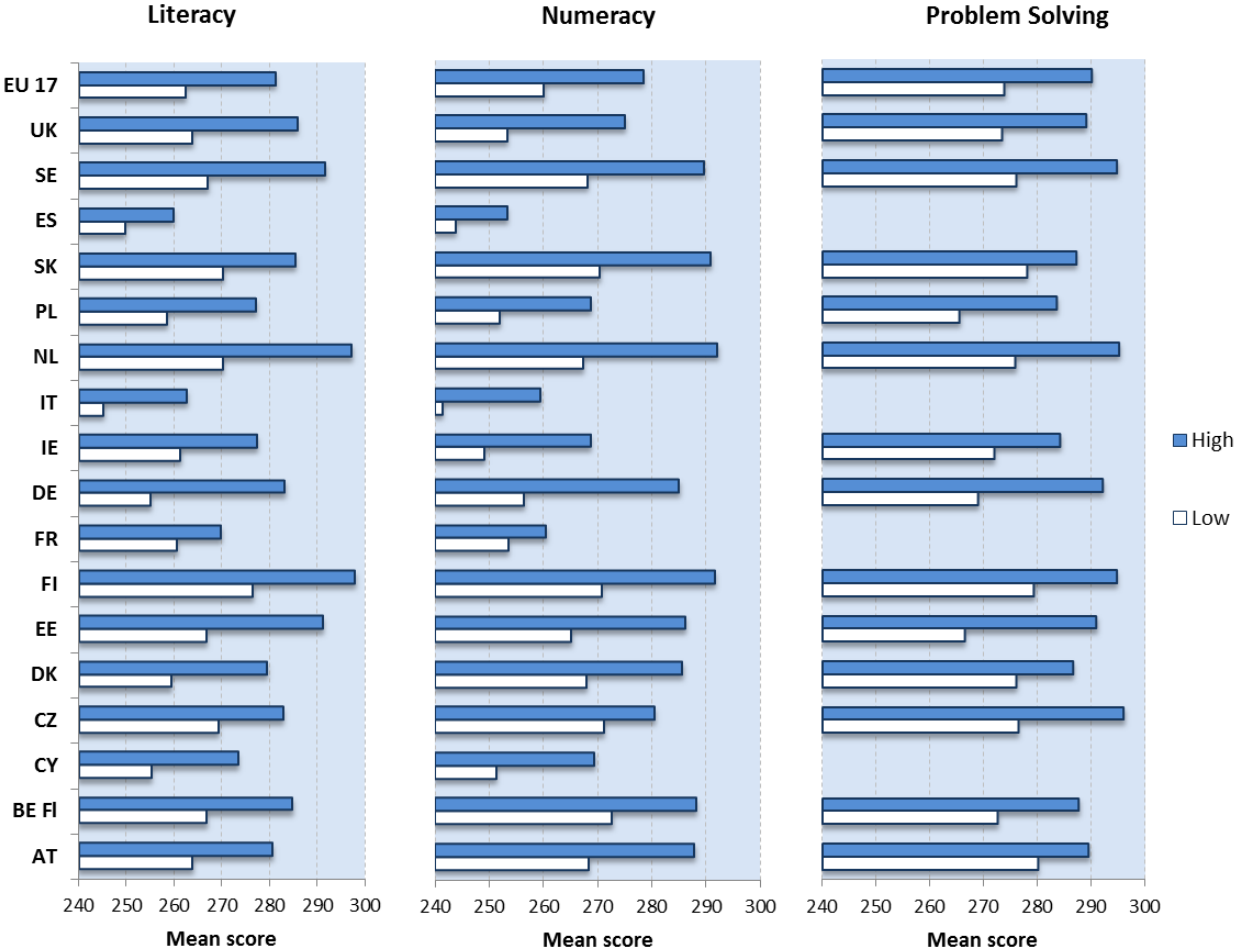


Figure 7: Mean proficiency scores by political efficacy and country (literacy, numeracy and problem solving)

3.3.4 Health

Regarding self-reported health status, the graph shows that in all EU participating countries, adults with a high level of health on average achieve better results in literacy. The differences in mean literacy scores vary between 17 points in Italy and 38 points in Poland. Interesting differences are also observed in The Netherlands and Finland whose citizens report significant larger literacy scores among those

reporting good health than among those with poorer health. As in OECD (2013) and showed that, in general, literacy proficiency has a positive relationship with the health status reported by the adults.

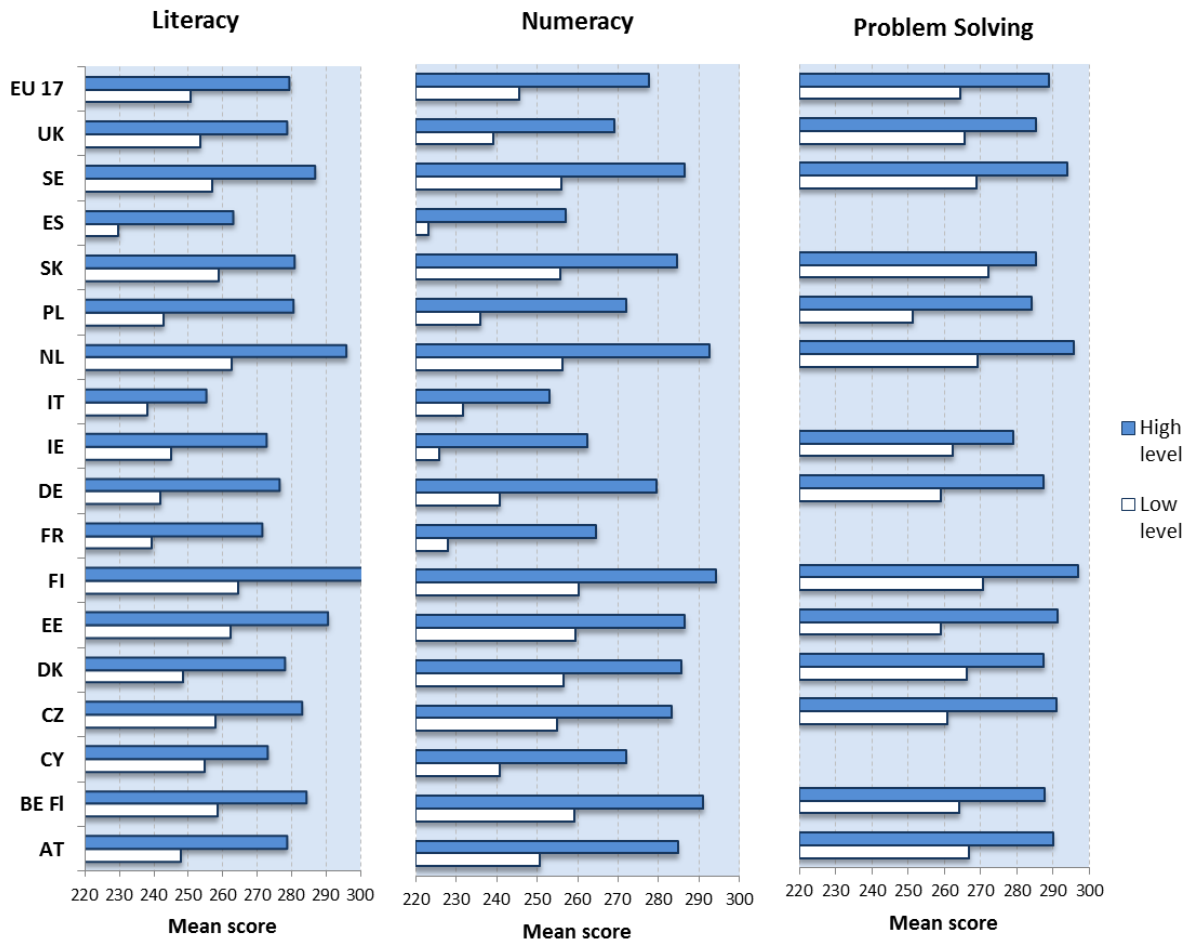


Figure 8: Mean proficiency scores by self-reported health status and country (literacy, numeracy and problem solving)

4. Methodological Framework

The methodological approach used to further analyse the relationship between human capital related variables and social outcomes involves standard multivariate methods, in particular probit and ordered probit estimations. As discussed below, this approach suffers from the limitation that it estimates the association between social outcomes and human capital related variables, after controlling for other observed influences on the given social outcomes, rather than isolating the causal impact of human capital on social outcomes.

The standard positive relationship between education and skills and social outcome is well established in social science as discussed in Section 2. Many social scientists have, however, been reluctant to interpret this correlation as evidence that education exerts a causal effect on social outcomes. According to human capital theory, schooling raises social outcomes because it enhances workers' skills, thus making employees more productive and more valuable to employers. However, as discussed previously, the positive relationship between social outcomes and schooling could arise because both education and social outcomes are correlated with unobserved factors such as ability, perseverance, and ambition (hereafter simply referred to as “ability”). If there are systematic differences between the less educated and the well-educated that affect both schooling decisions and social outcomes, then the correlation between education and social outcomes may reflect these other factors as well.

This “omitted ability bias” issue is of fundamental importance not only for the question of how we should interpret the positive relationship between social outcomes and schooling, but also for the emphasis that should be placed on education in public policies. Unbiased estimates of the causal effect of education on outcomes (labour market related or social related) are thus important for individual decisions as well as for the design of public policies. How can such estimates be obtained? The most reliable methods to isolate the influence of education from the possible effects of unobserved ability would be:

1) *Natural experiments* where individuals randomly assigned to the treatment group would receive a larger “dose” of education or skills than those assigned to the control group. By following the two groups through time we could observe their subsequent social outcome and obtain an unbiased estimate of the impact of schooling on the considered outcomes. Random assignment ensures that, on average, treatment and control groups would not be significantly different from each other in terms of their observed and unobserved characteristics. Nevertheless, it is of course not possible to rely on such method when studying the causal effect of education, since it is basically impossible to assign to individuals a given level of education and even more a given level of skill.

2) Quasi natural experiment, where it is possible to rely on exogenous change in the level of education of individuals due for example to reform in the school systems that increase compulsory age of schooling. This method has been widely used in the literature to study the causal effect of education on several outcomes (labour market, fertility, etc...). Nevertheless the caveat of this method is that it lacks of external validity, since it estimates the effect just for those individuals that due to the reform increase their level of education up to the new compulsory level (compliers), i.e. it identifies the local average treatment effect (LATE). This method is of course not applicable when strictly talking about skills.

3) Instrumental variables methods, similarly to the natural experiment approach, employ variables that affect the educational level or the skills, but that do not directly affect the outcome. For example, variations in educational attainment brought about by policy changes or unique events, variations that are arguably unrelated to the unobserved factors that influence both schooling and social outcomes. Again, it is very hard to think about something that can possibly affect the level of skilled owned but not directly the social outcome of interest.

Finally if it would be possible to follow individuals over time we could, thanks to fixed effect model, get rid of all the unobservable variables that we consider to be omitted, such as ability, perseverance, motivation, etc. and it could be possible to estimate the effect of skills on social outcomes (if skills change over time). Nevertheless PIAAC data are cross sectional, and thus individuals appear only once.

The lack of longitudinal information and valid instruments prevent us from yielding consistent estimates on the causal impact of education related variables on social outcomes. With this caveat in mind, but considering the uniqueness of the dataset in providing data on directly observed skills jointly with education variables, we think it is important to pursue this analysis further and to investigate the association that exist between both education and skills and the different social outcomes studies.

4.1. Description of additional demographic and socioeconomic covariates related to social outcomes.

To more accurately disentangle the relationship between education and social outcomes, estimations will further account for a number of socio-economic and demographic variables which are briefly described in this Section. Traditionally, when controlling for education in multivariate analysis, researchers commonly focus on primary, secondary, and post-secondary education – the three levels of education commonly meant by schooling. However, education needs not end upon the conclusion of a secondary or post-secondary degree. Many people continue their education by joining adult education courses and the motivations for doing so vary. Some people receive training relevant to their job engage sponsored by their employers. Others pursue academic coursework on their own, perhaps to acquire skills and knowledge to improve their employment options. Still others informally take classes purely out

of interest in the subject matter. Unfortunately, little is known about the consequences of adult lifelong learning for social outcomes. Surveys undertaken to measure social outcomes domains always include a measure of formal educational attainment, but rarely ask about lifelong learning. Yet there are good reasons to think that adult education would have effects or at least are somehow related to social outcomes. A study conducted by Feinstein, Hammond, et al. (2003) found that adult learning leads to increases in voter turnout, membership in voluntary associations, and racial tolerance, while participation in such courses leads to decreases in authoritarianism and political cynicism. This research is an important contribution to our understanding of adult learning since it indicates that change can be found in civic-related measures during this period of the life course. PIAAC survey includes a variable on **adult lifelong learning (ALL)**⁷ offering the opportunity of learning much more about the relationship of adult learning on different social outcomes for a wide number of countries.

Other socio-economic and demographic variables have also included in the multivariate analysis. Empirical evidence on the relationship between the variables used and the social outcomes investigated is not always provided, nonetheless we will use the same set of covariates for all social outcomes. Thus, we include some individual and family characteristics such as **age**, **gender**, **marital status** and **children in the household**. In the literature it is observed that there exists an inverted U-shaped relationship linking some domains of social outcomes (i.e. trust or participation in associations) to **age**. We suppose to retrieve the same result, since it is very likely that not only for trust but also for volunteering and political efficacy, it will increase up to a certain age and then begins decreasing (see Durlauf and Fafchamps, 2005). As for health status, it is expected that it decreases with age. Further, given that some empirical evidence shows also how gender and trust are related and more specifically women tend to trust less than men, we further include the **gender dummy** (1=female) in the analysis. In general, women tend to invest less in social capital, since not only they trust less but join voluntary associations less than men (Migheli, 2007). Women also tend to report lower health status. Existing studies largely find family characteristics, such as being **married** and having **children**, to be the facilitators of volunteer work. Marriage has been associated with the higher rate of joining voluntary associations (Rotolo, 2000) and more volunteering (Rossi, 2001). Married people may volunteer more because the institution of marriage accompanies the social expectation, among others, that married couples be active in the community and its local organizations (Rossi & Rossi, 1990). The presence of children is also found to promote parental volunteering (Park and Smith, 2000; Rossi, 2001). It is reasoned that the school socialization of children into civic activities such as volunteering can also encourage their parents to volunteer, although researchers often ignore the age of children in assessing how parental status affects volunteering efforts.

⁷ The variable ALL is a dummy variable equal to 1 if the respondent participated in formal or non-formal AET in 12 months preceding the survey (0 otherwise). For the age group 15-25 years, this variable is only equal to 1 for those that participate in formal education. This means that we are not able to capture young individuals which participated in non-formal education. In comparison to the target of adult lifelong learning, the variable ALL is based on a 12 month period and does not include non-formal educational activities for the age group 15-25 years.

Socio-economic characteristics also matter. We posit that **household income** affects the growth of individual's trust in others since living in less wealthy households is more likely to have negative consequences for an individual's development of trust in others (Alesina and La Ferrara, 2000) and contribute negatively to the creation of social networks (Putnam, 2000; Glaeser et al., 2002), or confidence in institutions (Hibbing and Theiss-Morse, 1996). For this research, we use **parents' level of education** as a proxy of socio-economic status. A dummy variable equals one if at least one of the parents have high level of education and zero otherwise. **Occupation** is also a strong determinant of social outcomes and health status. As argued by Glaeser et al. (2002), social capital rises in occupations with greater returns to social skills and having an occupation positively affect self-reported health with the higher the occupation, the better the mental health (Llena-Nozal, et al. 2004). We further include a dummy variable for **migrant status** (whether born in the country of residency) following Alesina and La Ferrara (2002). They found that participation in associational activities is significantly lower in more unequal and in more racially or ethnically heterogeneous states of the US, concluding that community characteristics affect individual social outcomes (i.e. participation in associations). Finally, culture seems to be a good candidate as turnout determinant of social outcomes (Tabellini, 2005). The culture indicators included refers to the frequency **reading newspapers**. Newspapers readers are interested in social life, since newspapers are costly and they don't bring any direct benefit to the reader. However, much people like to be informed about what happen around them. The number of newspapers sold per person has been also used by Putnam (1993). Country dummy variables are used for the EU-average regression to control for country wise heterogeneity.

Table 2 details the definitions of all the explanatory variables used in the regressions and report their percentages and standard errors at EU-average level.

Table 2. Descriptive statistics of socio-economic variables used in the analysis

EU 17	Percentage	SE
Age		
24 or less	16.72	0.05
25-34	20.35	0.07
35-44	21.28	0.07
45-54	21.09	0.07
55 plus	20.55	0.05
Gender		
Male	49.81	0.02

EU 17	Percentage	SE
Marital status		
Married	70.81	0.14
Family status (children in household)		
Yes	63.28	0.13
Parents education (if at least one of the parents have high education)		
High level	61.47	0.16
Migrants		
Not born in country	11.13	0.10
Employment status		
Employed	67.33	0.12
Unemployed	6.19	0.08
Out of the labour force	26.42	0.12
Skill level of the job		
If employed in Professional occupation	42.23	0.20
If employed in Semi-professional, white collar occupation	27.20	0.19
If employed in Semi-professional, blue collar occupation	22.47	0.17
If employed in Unskilled occupation	8.09	0.12
Civic participation (Reading newspapers)		
Read newspaper at least once a week or every day	79.13	0.16
Adult lifelong learning		
Did not participate in formal or non-formal AET	50.87	0.19
Participated in formal and/or non-formal AET	49.13	0.19

4.2. EU average Results

In this section, results from the different probit and ordered probit estimations are provided so as to disentangle the relationship between education, skills and different social outcomes after accounting for a number of demographic and socio-economic variables. Different specifications are reported. The first three specifications consecutively include education attainment (1), proficiency in literacy skills (2) and adult lifelong learning (3). Specification (4) controls for proficiency in numeracy skills while specification (5) does the same but for problem solving skills in technology-rich environment. Odds ratios are reported indicating the relative probability of an event occurring for a particular group relative to a reference group. Thus, odds ratios greater than 1 represent greater chances for an event occurring for a

particular group as compared to the reference group, while a value below 1 indicates lower chance. Complex survey design has been considered in the estimations. Results for country specific regression are reported in Appendix A1.

4.2.1. Trust

Our baseline estimates of specification (1) indicate that, for EU-average level of education is significantly related to higher interpersonal trust, as seen in Table 3. The coefficient on level of education shows that the odds that adults with medium and higher education report greater interpersonal trust is 13% and 70% higher than the odds of those with lower attained education levels, with a significantly large big jump between medium and higher education. When adding skills level in literacy and ALL to our baseline model, as shown in Table 3 columns 2 and 3, both literacy skills and ALL enter significantly in the interpersonal trust equation. The odds ratios on levels of education go down by 33.5 and 26.02 percent (from 13.4 percent to 8.9 percent for medium level of education and from 70.7 percent to 52.3 percent for high level of education in the pooled EU sample), indicating that a large part of the education-social outcome relation is related to the fact that people with higher education level are more likely to increase further their level of skills and lifelong learning training. However, no significant differences have been found between the first and second lowest skill levels suggesting that adults are more likely to have greater interpersonal trust when they score higher in literacy levels.

But perhaps the clearest finding from our baseline estimation across countries, shown also in Table A1.1, in appendix is that the relationship between interpersonal trust and skills varies significantly across our sample of countries. Five of the countries report odds ratio that are well above the ones reported for the EU average's specification (i.e. DK, DE, AT, SE, UK) indicating a far greater probability that individuals scoring higher in literacy will also report high levels of interpersonal trust. These results differ noticeably from those in another set of countries where either literacy scores do not have any relationship with interpersonal trust (i.e. EE) or it is significant only for the highest score in literacy (i.e. CY, IE, BE, PL, ES) with odds ratios always falling below EU-average results. Finally, ALL does not seem to have any relationship with interpersonal trust for CY, CZ, IT, BE, SK or UK.

Table 3 further allows seeing which socio-economic characteristics increase the probability of interpersonal trust. In general, older individuals and married ones are more likely to report higher interpersonal trust. The odds of higher interpersonal trust are lower for individuals with young children while not significant results were found by gender. Further, higher interpersonal trust is reported for individuals that have educated parents and that read newspapers on a regular basis. Unexpectedly, no significant results have been found for the relationship between trust and migrant vs. native status. The variables related with labour market attachment seem also important in explaining individuals' trust. In fact, compared with adults out of the labour force, skilled occupations increase the odds of trusting while those working in elementary occupations or unemployed have significant lower odds.

Table 3: Ordered probit for Interpersonal Trust (EU-average)

*Odds ratios showing the likelihood of adults reporting higher level of interpersonal trust, by socio-economic and demographic characteristics (t-test values in brackets)**

DEPENDENT VARIABLE		Literacy skills			Numeracy	Problem solving
		(1)	(2)	(3)	(4)	(5)
Interpersonal Trust		Education	Education + Skills	Education + Skills + ALL	Education + Skills +ALL	Education + Skills +ALL
Education level	Educmedium	1.134 (6.3)	1.093 (4.45)	1.089 (4.25)	1.087 (4.15)	1.083 (3.478)
	Educhigh	1.707 (21.4)	1.557 (17.04)	1.523 (16.19)	1.525 (16.23)	1.581 (15.79)
Skills level (literacy, numeracy or problem solving)	Skills level 2		1.036 (1.522)	1.026 (1.13)	1.06 (2.636)	1.093 (3.87)
	Skills level 3		1.239 (8.917)	1.217 (8.167)	1.242 (9.042)	1.354 (11.65)
	Skills level 4-5		1.516 (12.61)	1.48 (11.88)	1.438 (11.34)	1.537 (9.773)
ALL	ALL			1.195 (10.47)	1.195 (10.47)	1.2 (9.579)
Basic characteristics	Age1624	1.119 (3.613)	1.094 (2.903)	1.024 (0.75)	1.03 (0.938)	1.007 (0.194)
	Age2534	0.927 (-3.17)	0.921 (-3.42)	0.916 (-3.67)	0.919 (-3.5)	0.885 (-4.52)
	Age4554	1.058 (2.545)	1.079 (3.455)	1.081 (3.545)	1.073 (3.182)	1.059 (2.192)
	Age5564	1.048 (1.958)	1.095 (3.792)	1.121 (4.75)	1.106 (4.208)	1.124 (4.179)
	Female	0.973 (-1.8)	0.985 (-1)	0.984 (-1.07)	1.002 (0.133)	1.026 (1.529)
	Married	1.075 (4)	1.067 (3.611)	1.07 (3.778)	1.067 (3.611)	1.11 (5.2)
	Children	0.901 (-4.95)	0.911 (-4.43)	0.918 (-4.1)	0.915 (-4.24)	0.905 (-4.35)
	Parentseducated	1.138 (6.842)	1.107 (5.1)	1.097 (4.65)	1.097 (4.65)	1.081 (3.391)
	Migrant	0.975 (-0.56)	1.022 (0.478)	1.023 (0.5)	1.027 (0.587)	0.991 (0.16)
SES	Readnewspaper	1.137 (6.737)	1.104 (5.211)	1.093 (4.684)	1.095 (4.789)	1.139 (5.652)
	Skilled job	1.334 (13.09)	1.285 (10.91)	1.225 (8.826)	1.224 (8.783)	1.262 (8.962)
	Semi-skilled white	0.993 (-0.29)	0.986 (-0.58)	0.96 (-1.71)	0.959 (-1.75)	0.983 (-0.63)
	Semi-skilled blue	0.951 (-2.08)	0.967 (-1.42)	0.951 (-2)	0.943 (-2.36)	0.966 (-1.3)
	Unskilled	0.917 (-2.49)	0.934 (-1.94)	0.929 (-2.11)	0.929 (-2.11)	0.919 (-2.05)
	Unemployed	0.81 (-6.39)	0.819 (-6.09)	0.81 (-6.39)	0.811 (-6.36)	0.821 (-5.05)
	NUTS-FE	Yes	Yes	Yes	Yes	Yes

Omitted categories: Low education, Skill level 1, age3544, Out of the labor force

* Bold values report statistically significant differences

4.2.2. Volunteering

Table 4 provides the results from the multivariate approach for volunteering. A comparison of the first three columns of the Table reveals that, as expected, the introduction of the skills' variables, and then the further inclusion of ALL, decreases the odds ratio of the education variables and the skills variables. Still, analysing the complete specification in column (3), it is clear that the odds ratio of the variables associated with education, skills proficiency and ALL are all higher than one and statistically significant, evidencing that each has its own, distinct and positive contribution to the probability of volunteering.

In particular, the odds that adults with medium and higher education report engagement in volunteer activities is 21% and 44% higher than the odds of the those with lower attained education levels. The estimated odds ratio for the literacy skills levels are monotonically increasing with the proficiency level, meaning that adults scoring higher in literacy are more likely to do volunteering. In particular, compared to adults scoring at level 1, those scoring high levels (4-5) have more than one and half times the odds of participating in volunteer activities. Finally, adults in ALL also have higher odds (69%) of volunteering. For the numeracy and problem solving skills, the patterns are very similar to the literacy one. The only relevant difference is the fact that the odds ratio associated with numeracy skills are higher than for the other skills, meaning that scoring higher in this domain increases more the odds of volunteering.

These findings are somehow heterogeneous across the 17 EU countries, both regarding the significance and magnitude of odds ratios (see Table A1.2 for country specific results of the education related variables). In some countries neither the attained education variables nor the skill levels seem to play a role in explaining volunteer: Cyprus, Czech Republic, Italy and Poland. In Sweden, instead, education variables are not significant but the odds associated with the skills levels are very high. Higher skills levels are particularly associated with higher odds of volunteering in Sweden, Belgium, Germany, and the United Kingdom. Still in other countries, and depending on the skill domain, the odds ratio presents an inverted u-shape pattern, suggesting that the higher odds of doing volunteer activities are present in middle proficiency scores. This is the case for instance in Italy and Spain.

Table 4 also allows seeing which socio-economic characteristics increase the probability of volunteer activities. In general, older individuals, males, individuals with children are more likely to volunteer than their counterparts (younger, females and childless). The odds of volunteering are also higher for individuals that have educated parents and that read newspapers on a regular basis. In contrast, the odds that migrants volunteer are lower than that of natives. The variables related with labour market attachment don't seem to be particularly important in explaining volunteer decisions. In fact, compared with adults out of the labour force, only those working in skilled occupations have higher odds and those working in elementary occupations have lower odds. However, the difference in the odds is not high in magnitude.

Table 4: Probit regression for Volunteering (EU-average)

*Odds ratios showing the likelihood of adults reporting higher level of volunteering, by socio-economic and demographic characteristics (t-test values in brackets)**

DEPENDENT VARIABLE Volunteering		Literacy			Numeracy	Problem Solving
		(1)	(2)	(3)	(4)	(5)
		Education	Education + Skills	Education + Skills + ALL	Education + Skills + ALL	Education + Skills + ALL
Education level	Educmedium	1.305 (10.136)	1.228 (7.698)	1.212 (7.107)	1.201 (6.702)	1.183 (5.804)
	Eduhigh	1.745 (18.097)	1.549 (13.894)	1.444 (11.557)	1.438 (11.344)	1.442 (10.423)
Skills level (literacy, numeracy or problem solving)	Skills level 2		1.187 (5.580)	1.166 (4.992)	1.195 (5.917)	1.261 (7.897)
	Skills level 3		1.443 (11.409)	1.385 (10.030)	1.421 (11.197)	1.479 (12.721)
	Skills level 4-5		1.683 (12.752)	1.591 (11.310)	1.623 (12.482)	1.756 (11.995)
ALL	ALL			1.698 (25.872)	1.703 (26.034)	1.658 (22.177)
Basic characteristics	Age1624	1.136 (3.613)	1.100 (2.691)	0.904 (2.767)	0.906 (2.703)	0.939 (1.547)
	Age2534	0.750 (10.141)	0.743 (10.411)	0.734 (10.793)	0.738 (10.575)	0.708 (10.487)
	Age4554	1.078 (2.787)	1.102 (3.597)	1.112 (3.915)	1.105 (3.685)	1.153 (4.526)
	Age5564	1.014 (0.470)	1.066 (2.191)	1.142 (4.576)	1.128 (4.175)	1.162 (4.516)
	Female	0.905 (5.268)	0.913 (4.731)	0.909 (4.951)	0.930 (3.749)	0.913 (4.208)
	Married	1.031 (1.426)	1.023 (1.062)	1.032 (1.418)	1.028 (1.240)	1.041 (1.631)
	Children	1.059 (2.280)	1.070 (2.699)	1.094 (3.544)	1.091 (3.425)	1.112 (3.697)
	Parentseducated	1.200 (7.626)	1.157 (6.082)	1.122 (4.806)	1.120 (4.693)	1.099 (3.389)
	Migrant	0.727 (6.619)	0.776 (5.271)	0.780 (5.264)	0.782 (5.181)	0.788 (4.149)
SES	Readnewspaper	1.474 (15.614)	1.421 (14.103)	1.381 (12.785)	1.382 (12.837)	1.381 (10.840)
	Skilled job	1.417 (12.940)	1.362 (11.447)	1.179 (5.882)	1.170 (5.568)	1.169 (4.940)
	Semi-skilled white	1.063 (2.189)	1.050 (1.740)	0.970 (1.076)	0.967 (1.167)	0.996 (0.138)
	Semi-skilled blue	1.003 (0.095)	1.017 (0.521)	0.971 (0.883)	0.961 (1.210)	0.986 (0.391)
	Unskilled	0.830 (3.846)	0.851 (3.321)	0.831 (3.769)	0.834 (3.697)	0.884 (2.236)
	Unemployed	0.956 (1.031)	0.968 (0.745)	0.953 (1.086)	0.958 (0.987)	0.939 (1.212)
	NUTS-FE	Yes	Yes	Yes	Yes	Yes

Omitted categories: Low education, Skill level 1, age3544, Out of the labor force

* Bold values report statistically significant differences

4.2.3. Political efficacy

As already found for the trust and volunteering outcomes, also for political efficacy we find that the introduction of the skills' variables, and then the further inclusion of adult lifelong learning, decreases the odds ratio of the education variables and the skills variables (see columns (1) to (3) in Table 5). When looking at the full specification in column (3), we see that the odds ratio of the variables associated with education, skills proficiency and adult lifelong learning are all higher than one and statistically significant, evidencing that each has its own, distinct and positive contribution to the probability of political efficacy.

In particular, the odds that adults with medium and higher education report a higher level of political efficacy is 24% and 65% higher than the odds of the those with lower attained education levels. The estimated odds ratio for the literacy skills levels are monotonically increasing with the proficiency level, meaning that adults scoring higher in literacy are more likely to believe that they have an influence on the government. In particular, compared to adults scoring at level 1, those scoring high levels (4-5) have 1.7 higher odds of higher political efficacy. Finally, adults in adult lifelong learning also have higher odds (24%) of political efficacy. For the numeracy and problem solving skills, the patterns are very similar to the literacy one.

The findings on the relationship between skills and political efficacy somehow heterogeneous across the 17 EU countries, both regarding the significance and magnitude of odds ratios.⁸ Looking at the results obtained for literacy skills, we see that for all countries individuals with highest skills levels and high education levels, exhibit the highest levels of political efficacy. However, the magnitude of the odds ratios varies substantially, i.e. for highest skills levels from 1.26 for France to 2.67 for Germany and for highest education level from 1.17 for Estonia to 2.3 for Finland. In addition, there are a number of countries for which the adult lifelong learning variable does not turn significant, i.e. Cyprus, Ireland, Netherland, Spain and the UK. Results for medium education and lower skills levels, i.e. 2 and 3, are somewhat mixed over the countries. In particular, the positive result for the EU average for the skills level 2 seems to be driven by Cyprus and Germany as the remaining countries have either insignificant odds ratios or odds ratios below 1.

Besides the explanatory variables pertaining to education and skills, Table 5 displays results on a wide of range of other covariates. In particular, we see that compared to individuals aged 35 to 44, young individuals, i.e. aged 16 to 24 years seem more likely to believe that they have an influence on the government. In addition, individuals with children have lower odds of exhibiting political efficacy. Next, the odds of political efficacy are higher for individuals that have educated parents, and that read newspapers on a regular basis. In contrast, the odds that migrants believe to have an impact on the government are lower than that of natives. Moreover, the variables related with labour market

⁸ As suggested by Country experts, results for Poland are not reported given the ambiguity of the questions and the lack of reliability on the results

attachment seem important explanatory factors for the political efficacy of individuals. In fact, compared with adults out of the labour force, those working in skilled occupations have higher odds and those working in white-collar and elementary occupations as well as those unemployed have lower odds.

Table 5: Ordered probit for Political efficacy (EU-average)

*Odds ratios showing the likelihood of adults reporting higher level of political efficacy, by socio-economic and demographic characteristics (t-test values in brackets)**

DEPENDENT VARIABLE		Literacy skills			Numeracy	Problem solving
		(1)	(2)	(3)	(4)	(5)
Political efficacy		Education	Education + Skills	Education + Skills + ALL	Education + Skills + ALL	Education + Skills + ALL
Education level	Educmedium	1.309 (13.543)	1.238 (10.577)	1.238 (10.542)	1.234 (10.345)	1.273 (10.676)
	Educhigh	1.926 (26.500)	1.693 (20.643)	1.653 (19.651)	1.664 (19.826)	1.742 19.256
Skills level (literacy, numeracy or problem solving)	Skills level 2		1.092 (3.683)	1.082 (3.268)	1.139 (5.809)	1.231 (9.104)
	Skills level 3		1.423 (13.684)	1.392 (12.813)	1.389 (13.420)	1.546 (17.087)
	Skills level 4-5		1.811 (18.504)	1.757 (17.569)	1.619 (15.892)	1.871 (16.469)
ALL	ALL			1.235 (12.628)	1.242 (12.919)	1.245 (11.648)
Basic characteristics	Age1624	1.320 (9.937)	1.276 (8.766)	1.178 (5.819)	1.189 (6.180)	1.103 (3.095)
	Age2534	1.011 (0.505)	1.002 (0.077)	0.997 (-0.119)	1.005 (0.215)	0.962 (-1.509)
	Age4554	0.995 (0.021)	1.018 (0.852)	1.020 (0.938)	1.011 (0.503)	1.035 (1.376)
	Age5564	0.930 (-0.226)	0.981 (-0.866)	1.009 (0.386)	0.992 (-0.369)	1.024 (0.907)
	Female	0.992 (-0.516)	1.005 (0.339)	1.004 (0.265)	1.027 (1.772)	1.025 (1.441)
	Married	1.013 (0.704)	1.003 (0.170)	1.007 (0.409)	1.006 (0.310)	1.019 (0.931)
	Children	0.924 (-3.973)	0.939 (-3.162)	0.947 (-2.712)	0.942 (-2.999)	0.933 (-3.075)
	Parentseducated	1.153 (7.720)	1.106 (5.445)	1.094 (4.829)	1.095 (4.824)	1.111 (4.865)
	Migrant	0.871 (-3.623)	0.934 (-1.789)	0.935 (-1.743)	0.922 (-2.090)	0.941 (-1.259)
SES	Readnewspaper	1.343 (16.116)	1.290 (13.751)	1.274 (13.027)	1.279 (13.347)	1.323 (13.047)
	Skilled job	1.234 (9.334)	1.174 (7.097)	1.108 (4.478)	1.110 (4.517)	1.120 (4.349)
	Semi-skilled white	0.959 (-1.808)	0.949 (-2.277)	0.920 (-3.595)	0.920 (-3.586)	0.916 (-3.331)
	Semi-skilled blue	0.811 (-8.167)	0.827 (-7.374)	0.814 (-7.986)	0.804 (-8.467)	0.775 (-8.675)
	Unskilled	0.781 (-6.990)	0.800 (-6.236)	0.797 (-6.325)	0.796 (-6.383)	0.791 (-5.768)
	Unemployed	0.887 (-3.388)	0.898 (-3.021)	0.894 (-3.143)	0.898 (-3.004)	0.895 (-2.618)
	NUTS-FE	Yes	Yes	Yes	Yes	Yes

Omitted categories: Low education, Skill level 1, age3544, Out of the labor force

* Bold values report statistically significant differences

4.2.4. Health

As for the other social outcomes investigated, for EU-average level of education is significantly related to larger health status reported, as seen in Table 6. The coefficient on level of education shows that the odds that adults with medium and higher education report greater health status is 30.3% and 73% higher than the odds of those with lower attained education levels. When adding skills level in literacy and ALL to our baseline model, as shown in Table 6 columns 2 and 3, both literacy skills and ALL enter significantly in the equation slightly decreasing the odds ratios on levels of education. No significant differences regarding this trend are worth noting at country level. If any, once more, highest skills levels and high education levels, exhibit the largest self-reported health status.

Table 6 also allows seeing which characteristics increase the probability of reporting larger health status. In general, self-reported health status decreases with age, males and married individuals more likely to report better health status than their counterparts (female, non-married). The odds of reporting good health are also higher for individuals that have educated parents and that read newspapers on a regular basis. In contrast, the odds that migrants report better health are lower than that of natives. Finally, occupational status significantly affect your health since the most skilled workers have larger odds of reporting good health compared to adults out of the labor force (reference category). Unexpectedly, unemployed individuals have also significantly larger odds of reporting good health than inactive citizens.

Table 6: Ordered probit for self-reported health status (EU-average)

*Odds ratios showing the likelihood of adults reporting higher level of health, by socio-economic and demographic characteristics (t-test values in brackets)**

DEPENDENT VARIABLE		Literacy skills			Numeracy	Problem solving
		(1)	(2)	(3)	(4)	(5)
Self-reported health status		Education	Education + Skills	Education + Skills + ALL	Education + Skills + ALL	Education + Skills + ALL
Education level	Educmedium	1.303 (12.62)	1.229 (9.81)	1.223 (9.571)	1.213 (8.773)	1.245 (8.76)
	Educhigh	1.73 (21.08)	1.56 (17.12)	1.52 (16.12)	1.507 (15.19)	1.568 (15)
Skills level (literacy, numeracy or problem solving)	Skills level 2		1.303 (11.04)	1.29 (10.63)	1.33 (11.88)	1.313 (11.83)
	Skills level 3		1.489 (15.92)	1.456 (15.04)	1.459 (15.12)	1.409 (13.72)
	Skills level 4-5		1.613 (14.48)	1.567 (13.61)	1.584 (14.38)	1.413 (9.351)
ALL	ALL			1.25 (13.94)	1.251 (14)	1.273 (12.68)
Basic characteristics	Age1624	3.699 (43.6)	3.586 (42.57)	3.313 (39.93)	3.33 (40.13)	3.102 (32.34)
	Age2534	1.664 (22.13)	1.657 (21.96)	1.65 (21.78)	1.657 (21.96)	1.584 (17.69)
	Age4554	0.603 (-24.1)	0.61 (-23.5)	0.611 (-22.4)	0.61 (-22.5)	0.629 (-18.6)
	Age5564	0.449 (-34.8)	0.463 (-33.4)	0.476 (-32.3)	0.474 (-32.5)	0.532 (-23.4)
	Female	0.897 (-7.27)	0.9 (-7)	0.899 (-7.07)	0.919 (-5.6)	0.968 (-2.06)
	Married	1.139 (7.222)	1.127 (6.667)	1.131 (6.833)	1.126 (6.611)	1.181 (7.905)
	Children	1.001 (0.048)	1.011 (0.524)	1.001 (1)	1.017 (0.81)	1 (0)
	Parentseducated	1.188 (9.053)	1.148 (7.263)	1.135 (6.684)	1.131 (6.474)	1.123 (5.272)
	Migrant	0.865 (-4.39)	0.918 (-2.53)	0.919 (-2.43)	0.925 (-2.23)	0.892 (-2.78)
SES	Readnewspaper	1.191 (9.211)	1.151 (7.421)	1.135 (6.684)	1.137 (6.4)	1.166 (6.417)
	Skilled job	2.28 (34.33)	2.197 (31.48)	2.063 (28.96)	2.054 (28.8)	2.223 (28.54)
	Semi-skilled white	1.908 (28.09)	1.889 (27.65)	1.822 (26.09)	1.818 (26)	1.904 (24.77)
	Semi-skilled blue	1.815 (22.07)	1.831 (22.41)	1.797 (21.7)	1.779 (21.33)	1.912 (21.6)
	Unskilled	1.508 (12.09)	1.54 (12.34)	1.528 (12.11)	1.54 (12.34)	1.64 (12.69)
	Unemployed	1.285 (6.784)	1.293 (6.946)	1.28 (6.676)	1.283 (6.73)	1.273 (5.605)
	NUTS-FE	Yes	Yes	Yes	Yes	Yes

Omitted categories: Low education, Skill level 1, age3544, Out of the labor force

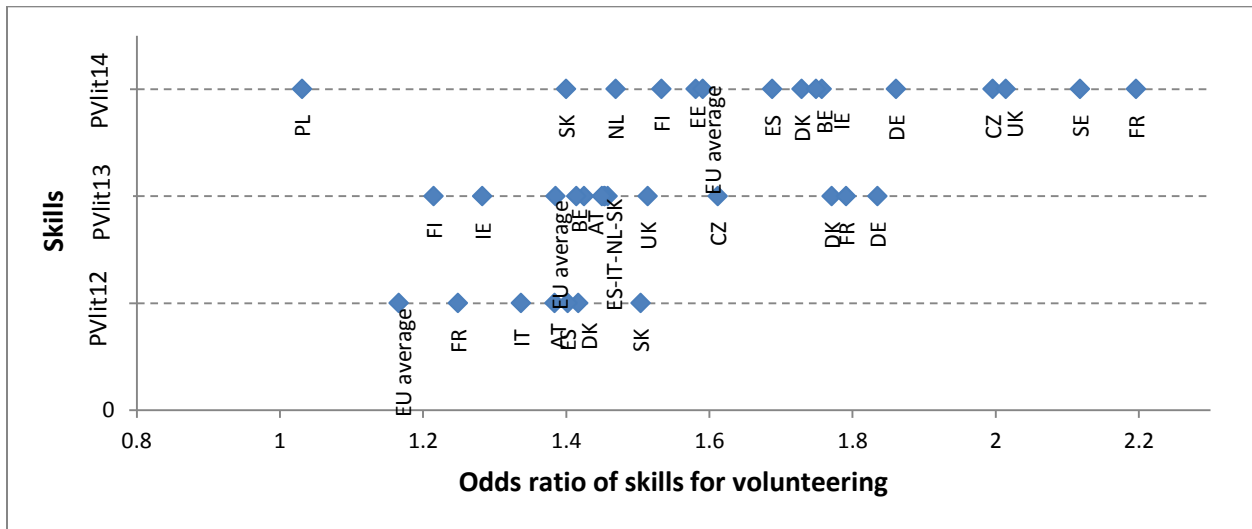
* Bold values report statistically significant differences

4.3. Country-specific analysis on the relationship between education, skills and social outcomes

Average results in Section 4.2. indicate that after controlling for formal level of education there is a significant positive relationship between formal education, individuals' skills and social outcomes. Now, we want to further look into any potential differences across countries. We do this exploratory exercise only for skills in literacy (i.e. pvlit12, pvlit13, pvlit14) and for the volunteering and social trust social outcomes. Political efficacy has proven to be difficult to interpret in some countries and self-reported health status varies slightly from the other two social outcomes. As an exercise we stuck to these two mentioned.

Thus, Figure 9 reports the odds ratios of each country⁹ showing the likelihood of adults reporting higher level of trust and volunteering by levels of skills in literacy.¹⁰ As expected, results show that, on average, individuals with lower level of literacy skills tend to report lower levels in positive social outcomes than their higher skilled counterparts. However interestingly, the differences across countries at lower levels of literacy skills do not seem so large. In fact, it looks as if less skilled individuals were more homogeneous across countries in their likelihood of reporting positive social outcomes with increasing heterogeneity among countries as skills increase.

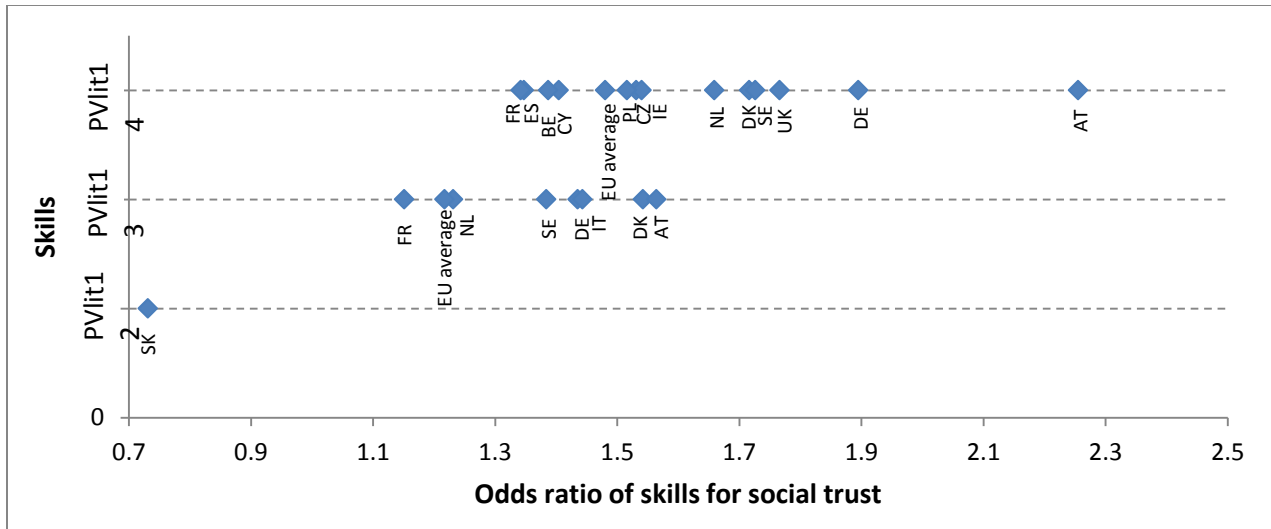
Figure 9. Effect of literacy skills on social outcomes (volunteering and social trust)¹¹



⁹ Only significant results are reported (5% significance level)

¹⁰ For this exercise and trying to simplify slightly, we leave outside self-reported health, given the different characteristics of this social outcome, and political efficiency.

¹¹ Only significant odds-ratios are shown.



Thus, for the case of volunteering, for example, we see how in countries like Sweden, UK or France being very proficient in skills (pvlit14) has a much larger impact on the probability of volunteering than in Cyprus or Poland other things equal. Although skills may be the result of learning throughout life (lifewide and lifelong), education itself is thought to be particularly important in providing the necessary skills as discussed earlier on. They are not independent of one another. To the degree that the relationships between education and different social outcomes operate through key skills, it would be beneficial if education systems were more effective providing those skills.

Therefore, it is interesting to know a bit more on how different educational systems across the EU affect the relation between educational attainment and skills in their relationship to social outcomes. To do so, we next deep into the analysis and compare individuals with different education levels and skills profiles and look into the probability that they would realise positive social outcomes.¹² If we estimate the average probability of reporting a positive outcome for each of the 12 resulting groups (combination of skills and education level), we can relate them by country and see what weights more (either education or skills) in reporting positive social outcomes. First, we run probit regressions with 0-1 response for the three social outcomes considered accounting for formal education, individuals' skills, ALL, age, gender and other socio economic and demographic characteristics; then, we estimate the average predicted probabilities.

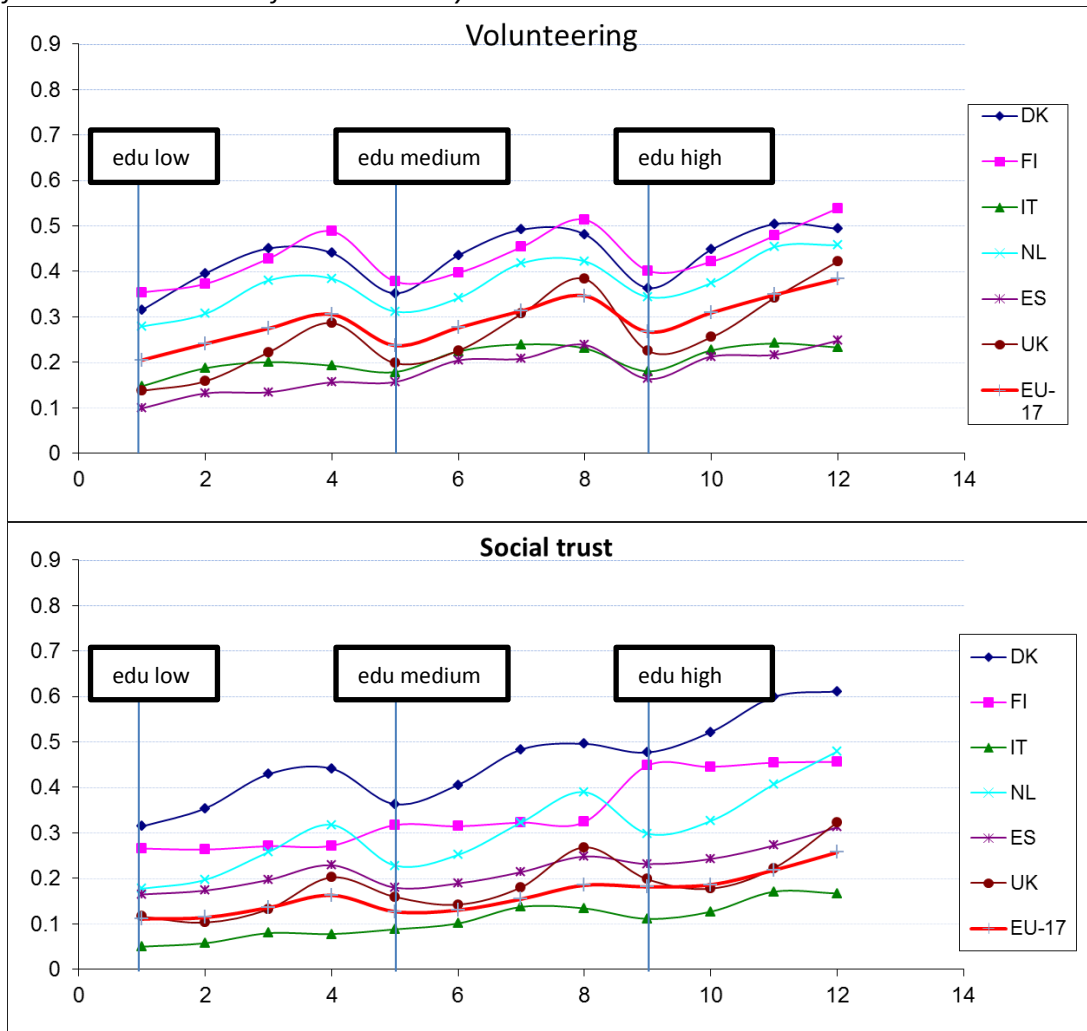
¹² The combination of educational levels and skills resulted were:

- | | | |
|--|---|--|
| 1. Low education + Proficiency level 1 | 5. Medium education + Proficiency level 1 | 9. High education + Proficiency level 1 |
| 2. Low education + Proficiency level 2 | 6. Medium education + Proficiency level 2 | 10. High education + Proficiency level 2 |
| 3. Low education + Proficiency level 3 | 7. Medium education + Proficiency level 3 | 11. High education + Proficiency level 3 |
| 4. Low education + Proficiency level 4+5 | 8. Medium education + Proficiency level 4+5 | 12. High education + Proficiency level 4+5 |

Results are provided in Figure 10 for literacy and Figure 11 for numeracy, only for a number of comparison countries while for all countries results are reported in Appendix A1. The EU-17 average probabilities are also reported in the Figures as a reference.

Figure 10. Education attainment, skill proficiency in literacy and social outcomes (volunteering and trust)

Average predicted probabilities showing the likelihood of adults reporting positive social outcomes, by level of education and level of skills in literacy



Note: Predicted probabilities are adjusted for socio-economic and demographic characteristics. Only a random sample of countries is shown. Full information on all EU-17 countries available in Appendix A1.

Values in horizontal axes refer to the following combination of formal education and skills:

- | | | |
|--|---|--|
| 1. Low education + Proficiency level 1 | 5. Medium education + Proficiency level 1 | 9. High education + Proficiency level 1 |
| 2. Low education + Proficiency level 2 | 6. Medium education + Proficiency level 2 | 10. High education + Proficiency level 2 |
| 3. Low education + Proficiency level 3 | 7. Medium education + Proficiency level 3 | 11. High education + Proficiency level 3 |
| 4. Low education + Proficiency level 4+5 | 8. Medium education + Proficiency level 4+5 | 12. High education + Proficiency level 4+5 |

As expected, the analysis shows that, for all countries, individuals with low proficiency and low levels of education show the lowest probability of reporting positive outcomes for all the social outcomes

considered. On the contrary, individuals with higher proficiency and high levels of education have the highest probability of reporting positive social outcomes.

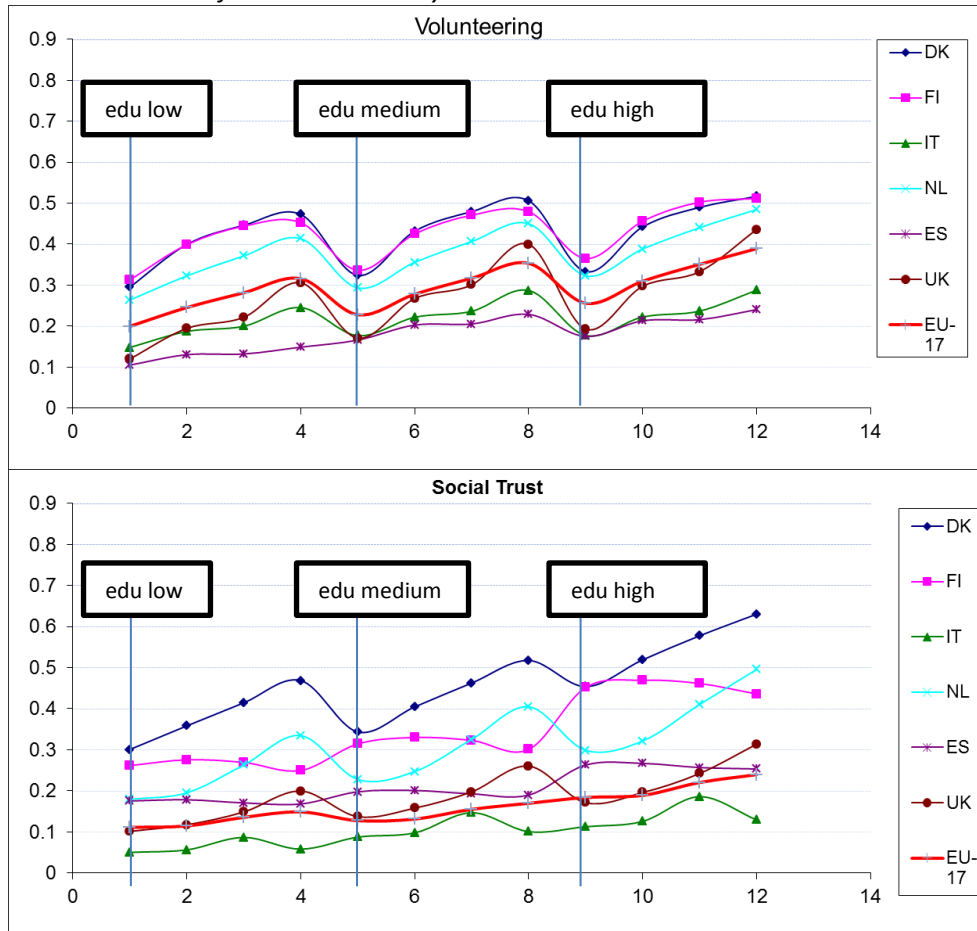
Yet, another important finding is that, in some cases, being proficient in literacy at Level 3 or higher seems to be more important than having a higher level of education. This depends on the specific outcome and country, however. For example, in The Netherlands, (Figure 10) literacy proficiency seems to be more important than education, in that adults with low levels of education but higher proficiency are more likely to report positive social trust and volunteering than adult with high levels of education but lower proficiency (i.e. compare horizontal axes' values 4 and 5 or 8 and 9). This is also the case in Denmark (except for social trust), and the UK. However, this pattern is not so clear in Italy or Spain, where educational attainment rather than literacy skills seems to be more important for the outcomes considered and an increase in skills combined with education level does not have such a great impact on positive social outcomes. For social trust and Finland, we surprisingly observe how formal education seems to gear the likelihood of reporting trust since increases in the proficiency in literacy does not seem to increase trust levels (i.e. the pink chart line for social trust remain flat once a certain formal level of education is achieved).

With slight differences similar results are provided in Figure 11 for proficiency in numeracy.

Results so far advocate the strength of the sorting effect of education in a given society. Educational systems play a key role in creating such different patterns (OECD, 2007). Given that adults with high levels of both skills and educational attainment are the most likely to report positive social outcomes, we can conclude that educational systems which are not successful in providing appropriate skills will not likely to be as valuable in nurturing positive outcomes.

Figure 11. Education attainment, skill proficiency in numeracy and social outcomes (volunteering and trust)

Average predicted probabilities showing the likelihood of adults reporting positive social outcomes, by level of education and level of skills in numeracy



Note: Predicted probabilities are adjusted for socio-economic and demographic characteristics. Only a random sample of countries is shown. Full information on all EU-17 countries available in Appendix A1.

Values in horizontal axes refer to the following combination of formal education and skills:

- | | | |
|--|---|--|
| 1. Low education + Proficiency level 1 | 5. Medium education + Proficiency level 1 | 9. High education + Proficiency level 1 |
| 2. Low education + Proficiency level 2 | 6. Medium education + Proficiency level 2 | 10. High education + Proficiency level 2 |
| 3. Low education + Proficiency level 3 | 7. Medium education + Proficiency level 3 | 11. High education + Proficiency level 3 |
| 4. Low education + Proficiency level 4+5 | 8. Medium education + Proficiency level 4+5 | 12. High education + Proficiency level 4+5 |

5. Conclusions

It has widely been acknowledged that the benefits from education go beyond the economic domain. Education not only provides the necessary knowledge and skills to fully integrate individuals in the labor market, but puts also people in a position to make well-informed decisions contributing to the socialisation and stability of modern societies. When discussing the social returns to education, researchers imply the positive (or negative) outcomes for individuals other than those making the schooling decision. If the social returns are significantly important and there is no government intervention, it could result in significant under-investment in education. Thus, there is a clear consensus that the links between social well-being and education need to be clearly understood, especially in the current context of globalization where not only formal knowledge but current individuals' abilities and skills play a key role in the effective and successful participation of citizens in their social and economic life. The results presented in this technical report aimed at illustrating the relationship between education, and more important, individual skills and a number of social outcomes. As in similar studies, it exists a clear relationship between educational attainment and individuals skills and social outcomes such as social trust, volunteering, political efficacy and self-reported health status. However, despite the substantial evidence that education attainment and skills matters for the given social outcomes, it is also clear that the relationship is complex such that causality is difficult to examine. The reason for this is twofold: (1) the limitations of available data; and (2) the difficulties in adequately measuring these multidimensional social concepts. If research is to provide valid and reliable information for policy makers, it is necessary to find research methods and statistical techniques that can appropriately deal with this social complexity. Having said this, it would be a mistake to conclude that because of the difficult to measure the impact this is not important matter. As discussed earlier on in this report, evidence to date suggests that features of the educational system may be very important in the formation or destruction of individuals' abilities and skills which turn to be important elements in the capability of individuals to achieve better market and non-market outcomes. Further, hopefully this report has also demonstrated that the existing data justify developing cross-national comparison related to those aspects of education which have a connection with social outcomes. The recognition of their value and heterogeneity across countries is an important step forward.

Overall, as expected, results indicate that low levels of proficiency on literacy, numeracy and problem solving in technology rich environments are generally associated with lower levels of trust, volunteering, political efficacy and self-reported health status, however some heterogeneity exists across countries. When it comes to investigating the relationship between formal education, individuals' proficiency in skills and social outcome, for the EU average we observed a positive and significant relationship. Thus, not only formal education per se is important; other individuals' competences and abilities are key for an effective and fruitful participation in the social and economic life of current globalized economies. Specifically, being highly proficient in literacy or numeracy (above Level 3) seems to be more important

than having a higher level of education. That is, individuals with “low level of education” and “above Level 3 in skills” are a greater likelihood of reporting positive social outcome than their counterpart with “medium level of education” and “below Level 3 in skills”. This means that the role played by the educational system regarding the provision of adequate skills (through formal or informal education) to foster positive social outcomes is crucial.

Finally, let us reflect for a moment on the relatively minor role of the social outcomes of education in policy making. The importance of a good education and high levels of skill among individuals seem to be underestimated sometimes. Thus, during the past decade, among all EU countries we have observed a general decline in the efforts governments made towards publicly financing education (Vera-Toscano, 2013). Thus, EU member states have tried to overcome the negative effects and social costs of a relatively low educated population by providing unemployment and other social benefits. As argued by Feinstein et al. (2006) there are large spill-over effects between education and social outcomes. More and better education could yield savings in these fields. This means that education and social policies should not be designed in isolation, but rather in a more comprehensive and integrated way. Strategic coordination of policies is desirable.

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Appendices

A1. Country-specific regressions and predicted probabilities.

A1.1. Country-specific odds ratios of education, skills (literacy, numeracy and problem solving) and ALL on Trust

Proficiency in literacy and Trust

Variable	educmedium		educhigh		pvlit12		pvlit13		pvlit14		ALL	
Country	odds ratio	t-stats	odds ratio	t-stats	odds ratio	t-stats	odds ratio	t-stats	odds ratio	t-stats	odds ratio	t-stats
CY	1.139	1.193	1.292	2.032	1.191	1.667	1.087	0.783	1.404	2.119	1.071	0.945
CZ	0.698	3.03	1.184	1.076	1.138	0.977	1.177	1.393	1.531	2.448	1.114	1.241
DK	1.229	3.169	1.97	8.805	1.065	0.797	1.542	5.035	1.716	4.954	1.237	3.435
EE	0.946	0.71	1.232	2.58	0.919	1.1	1.062	0.789	1.146	1.478	1.22	3.685
FI	1.29	3.592	2.155	8.348	0.987	0.12	1.088	0.857	1.092	0.793	1.328	4.508
FR	1	0	1.448	3.978	1.042	0.621	1.151	1.986	1.347	3.104	1.184	3.25
DE	1.122	1.211	1.59	3.712	1.073	0.814	1.435	4.056	1.895	5.071	1.328	3.838
IE	1.194	2.011	1.581	4.321	0.961	0.42	1.196	1.946	1.54	3.57	1.163	2.435
IT	1.317	3.716	1.594	3.82	1.192	1.743	1.443	3.336	1.429	1.889	1.131	1.519
AT	1.036	0.449	1.338	3.129	1.067	0.67	1.564	4.217	2.255	5.891	1.285	3.691
NL	1.276	3.437	1.917	7.315	1	0	1.231	2.213	1.659	4.252	1.376	4.431
BE	1.138	1.613	2.061	6.952	1.053	0.515	1.22	1.86	1.387	2.702	1.03	0.417
PL	0.967	0.47	1.116	0.932	1.021	0.247	1.129	1.476	1.516	3.25	1.379	4.013
SK	1.025	0.291	1.381	2.91	0.731	3.34	0.843	1.68	0.942	0.41	1.076	1.106
ES	1.087	1.169	1.428	4.45	0.997	0.04	1.101	1.247	1.342	2.146	1.212	3.31
SE	1.046	0.464	1.523	3.898	1.083	0.762	1.384	2.876	1.726	3.985	1.14	2.148
UK	1.189	2.11	1.55	4.66	1.029	0.259	1.274	2.142	1.766	3.845	1.106	1.365
EU average	1.089	4.25	1.523	16.19	1.026	1.13	1.217	8.167	1.48	11.88	1.195	10.47

Proficiency in Numeracy and Trust

Variable	educmedium		educhigh		pvlit12		pvlit13		pvlit14		ALL	
Country	odds ratio	t-stats	odds ratio	t-stats	odds ratio	t-stats	odds ratio	t-stats	odds ratio	t-stats	odds ratio	t-stats
CY	1.169	1.444	1.336	2.358	0.898	-1.13	0.922	-0.83	1.043	0.288	1.071	0.932
CZ	0.685	-3.27	1.146	0.85	1.123	0.859	1.228	1.496	1.458	1.77	1.108	1.198
DK	1.196	2.841	1.91	8.19	1.214	2.587	1.589	5.788	1.986	6.533	1.236	3.475
EE	0.966	-0.45	1.278	3.025	0.934	-0.91	0.992	-0.11	0.919	-0.84	1.231	3.852
FI	1.296	3.597	2.192	8.722	1.125	1.192	1.127	1.379	1.096	0.8	1.33	4.597
FR	1.064	0.861	1.556	4.804	0.845	-2.82	0.995	-0.07	1.116	1.279	1.19	3.346
DE	1.104	1.031	1.533	3.389	1.102	0.99	1.441	3.614	1.876	5.073	1.342	3.973
IE	1.209	2.159	1.623	4.61	1.003	0.037	1.2	2.116	1.355	2.321	1.163	2.397
IT	1.296	3.648	1.573	3.744	1.225	2.388	1.565	4.392	1.554	2.96	1.114	1.333
AT	1.04	0.494	1.362	3.287	1.26	2.457	1.636	4.598	2.012	5.592	1.288	3.776
NL	1.25	3.097	1.866	6.71	0.974	-0.27	1.339	2.729	1.85	5.302	1.374	4.356
BE	1.125	1.494	2.102	7.214	1.154	1.362	1.28	2.352	1.273	2.008	1.033	0.444
PL	0.953	-0.65	1.101	0.8	1.001	0.015	1.189	2.19	1.562	3.568	1.379	4.013
SK	0.996	-0.05	1.297	2.321	0.959	-0.42	1.068	0.635	1.37	2.54	1.055	0.831
ES	1.119	1.514	1.52	5.173	0.991	-0.14	0.939	-0.73	1.017	0.116	1.225	3.441
SE	1.029	0.302	1.51	3.85	1.143	1.229	1.498	3.575	1.697	4.766	1.153	2.328
UK	1.17	2.013	1.505	4.596	1.185	2.099	1.487	4.363	2.054	5.455	1.103	1.342
EU average	1.087	4.15	1.525	16.23	1.06	2.636	1.242	9.042	1.438	11.34	1.195	10.47

Proficiency in Problem solving and Trust

Variable	educmedium		educhigh		pvlit12		pvlit13		pvlit14		ALL	
Country	odds ratio	t-stats	odds ratio	t-stats	odds ratio	t-stats	odds ratio	t-stats	odds ratio	t-stats	odds ratio	t-stats
CZ	0.7	3.02	1.215	1.168	1.013	0.102	1.172	1.161	1.428	1.703	1.101	1.055
DK	1.226	3.138	1.986	8.575	1.266	3.324	1.626	6	2.188	5.476	1.217	3.161
EE	0.941	0.79	1.223	2.513	1.081	1.368	1.262	3.478	1.377	2.162	1.208	3.5
FI	1.285	3.638	2.115	8.416	1.104	1.32	1.276	3.012	1.252	1.758	1.311	4.234
DE	1.151	1.5	1.647	4.057	1.127	1.429	1.514	4.611	1.946	5.084	1.346	4.125
IE	1.234	2.386	1.677	5.222	0.978	-0.31	1.196	2.131	1.21	1.355	1.163	2.435
AT	1.043	0.532	1.395	3.469	1.148	1.568	1.692	4.826	1.857	4.182	1.274	3.507
NL	1.285	3.486	1.96	7.16	1.031	0.431	1.39	3.739	1.745	3.664	1.368	4.347
BE	1.147	1.756	2.16	7.938	1.134	1.482	1.115	1.313	1.324	2.626	1.029	0.408
PL	0.973	0.38	1.106	0.886	1.145	1.688	1.619	5.671	1.917	3.829	1.336	3.537
SK	1.016	0.184	1.381	2.833	0.916	-1.19	1.038	0.407	1.04	0.159	1.074	1.044
SE	1.037	0.371	1.55	4.093	1.162	1.667	1.525	4.22	1.772	4.931	1.119	1.867
UK	1.215	2.5	1.605	5.315	1.155	1.694	1.368	3.295	1.391	2.215	1.108	1.411
EU average	1.083	3.478	1.581	15.79	1.093	3.87	1.354	11.65	1.537	9.773	1.2	9.579

A1.2. Country-specific odds ratios of education, skills (literacy, numeracy and problem solving) and ALL on Volunteering

Proficiency in Literacy and Volunteering

Variable Country	educmedium		educhigh		pvlit12		pvlit13		pvlit14		ALL	
	odds ratio	t-stats	odds ratio	t-stats	odds ratio	t-stats	odds ratio	t-stats	odds ratio	t-stats	odds ratio	t-stats
CY	0.814	(1.741)	0.865	(1.008)	0.962	(0.290)	0.986	(0.106)	0.895	(0.518)	2.287	(7.732)
CZ	1.029	(0.174)	1.048	(0.257)	1.208	(0.964)	1.612	(2.002)	1.996	(2.857)	1.950	(5.857)
DK	1.184	(2.291)	1.278	(2.762)	1.417	(3.456)	1.771	(5.069)	1.729	(3.994)	1.503	(6.425)
EE	1.328	(3.228)	1.582	(4.260)	1.116	(1.031)	1.136	(1.296)	1.581	(4.035)	1.836	(7.647)
FI	1.123	(1.428)	1.275	(2.440)	0.979	(0.223)	1.215	(2.220)	1.533	(4.671)	1.319	(3.721)
FR	1.747	(3.317)	2.385	(4.914)	1.249	(2.602)	1.791	(5.838)	2.196	(5.996)	1.782	(8.845)
DE	1.171	(1.300)	1.402	(2.554)	1.052	(0.416)	1.835	(4.500)	1.861	(4.005)	1.527	(5.919)
IE	1.289	(2.781)	1.511	(3.723)	1.178	(1.430)	1.283	(2.097)	1.757	(3.823)	1.856	(8.809)
IT	1.255	(1.959)	1.269	(1.645)	1.337	(2.148)	1.458	(2.483)	1.426	(1.725)	1.649	(4.547)
AT	1.204	(1.927)	1.492	(2.878)	1.384	(2.371)	1.425	(2.721)	1.313	(1.491)	1.519	(5.814)
NL	1.181	(1.798)	1.404	(3.245)	1.065	(0.549)	1.453	(3.216)	1.469	(2.906)	1.407	(4.820)
BE	1.314	(3.061)	1.678	(5.229)	1.183	(1.498)	1.414	(2.971)	1.749	(3.798)	1.706	(7.462)
PL	0.745	(3.309)	1.294	(2.084)	0.891	(0.867)	0.913	(0.653)	1.031	(0.190)	2.457	(8.960)
SK	1.245	(2.111)	1.942	(4.440)	1.504	(3.072)	1.454	(2.768)	1.400	(1.798)	1.836	(7.576)
ES	1.706	(4.704)	1.740	(4.495)	1.402	(2.953)	1.450	(2.860)	1.688	(2.405)	1.361	(3.627)
SE	1.143	(1.204)	1.180	(1.266)	1.097	(0.648)	1.246	(1.688)	2.118	(4.989)	1.506	(4.750)
UK	1.590	(3.703)	1.901	(4.950)	1.019	(0.131)	1.514	(2.975)	2.014	(3.815)	1.776	(6.494)
EU average	1.212	(7.107)	1.444	(11.557)	1.166	(4.992)	1.385	(10.030)	1.591	(11.310)	1.698	(25.872)

Proficiency in Numeracy and Volunteering

Variable	educmedium		educhigh		pvnum12		pvnum13		pvnum14		ALL	
Country	odds ratio	t-stats	odds ratio	t-stats	odds ratio	t-stats	odds ratio	t-stats	odds ratio	t-stats	odds ratio	t-stats
CY	0.805	(1.778)	0.837	(1.241)	0.949	(0.430)	0.981	(0.169)	1.511	(2.752)	2.292	(7.792)
CZ	0.988	(0.073)	1.083	(0.403)	0.963	(0.149)	1.588	(1.717)	1.113	(0.399)	1.995	(6.163)
DK	1.176	(2.146)	1.288	(2.742)	1.396	(3.159)	1.656	(4.303)	1.775	(4.941)	1.523	(6.718)
EE	1.350	(3.465)	1.637	(4.681)	1.143	(1.483)	1.134	(1.399)	1.194	(1.467)	1.851	(7.674)
FI	1.128	(1.489)	1.320	(2.903)	1.303	(2.343)	1.544	(4.322)	1.581	(4.211)	1.313	(3.665)
FR	1.749	(3.261)	2.292	(4.641)	1.331	(3.685)	1.953	(8.210)	2.374	(8.188)	1.768	(8.790)
DE	1.159	(1.203)	1.420	(2.659)	1.109	(0.932)	1.586	(3.714)	1.715	(4.111)	1.574	(6.259)
IE	1.297	(2.861)	1.519	(3.772)	1.183	(1.916)	1.296	(3.095)	1.689	(3.679)	1.852	(8.884)
IT	1.242	(1.873)	1.249	(1.503)	1.311	(2.215)	1.420	(2.559)	1.815	(2.560)	1.636	(4.465)
AT	1.196	(1.888)	1.449	(2.774)	1.124	(1.129)	1.477	(3.411)	1.348	(2.079)	1.499	(5.531)
NL	1.175	(1.720)	1.400	(3.300)	1.217	(1.849)	1.488	(3.420)	1.778	(4.618)	1.406	(4.809)
BE	1.285	(2.749)	1.666	(5.129)	1.180	(1.376)	1.486	(3.283)	1.702	(4.082)	1.713	(7.492)
PL	0.718	(3.655)	1.216	(1.534)	1.015	(0.115)	1.216	(1.692)	1.230	(1.179)	2.415	(8.895)
SK	1.261	(2.243)	1.959	(4.515)	1.242	(1.716)	1.214	(1.366)	1.228	(1.277)	1.844	(7.606)
ES	1.710	(4.705)	1.764	(4.704)	1.299	(2.796)	1.341	(2.560)	1.517	(2.037)	1.361	(3.634)
SE	1.112	(0.955)	1.163	(1.159)	1.156	(1.178)	1.331	(2.398)	2.140	(5.614)	1.529	(4.858)
UK	1.557	(3.559)	1.857	(4.940)	1.546	(3.350)	1.779	(4.408)	2.662	(6.024)	1.779	(6.490)
EU average	1.201	(6.702)	1.438	(11.344)	1.195	(5.917)	1.421	(11.197)	1.623	(12.482)	1.703	(26.034)

Proficiency in Problem solving and Volunteering

Variable	educmedium		educhigh		pvpsl12		pvpsl13		pvpsl14		ALL	
Country	odds ratio	t-stats	odds ratio	t-stats	odds ratio	t-stats	odds ratio	t-stats	odds ratio	t-stats	odds ratio	t-stats
CZ	1.013	(0.077)	1.024	(0.120)	1.564	(2.235)	2.186	(4.259)	2.350	(3.795)	1.848	(5.315)
DK	1.191	(2.388)	1.288	(2.748)	1.506	(5.439)	1.610	(5.438)	2.016	(5.303)	1.478	(6.183)
EE	1.315	(3.131)	1.577	(4.335)	1.023	(0.299)	1.247	(2.614)	2.044	(4.728)	1.813	(7.416)
FI	1.152	(1.771)	1.342	(3.039)	1.102	(1.168)	1.231	(2.582)	1.275	(2.201)	1.327	(3.779)
DE	1.228	(1.760)	1.537	(3.380)	1.186	(1.888)	1.448	(3.692)	1.725	(3.530)	1.575	(6.208)
IE	1.259	(2.503)	1.444	(3.166)	1.341	(3.853)	1.529	(4.221)	1.706	(2.882)	1.794	(8.112)
AT	1.226	(2.194)	1.521	(3.107)	1.135	(1.528)	1.132	(1.137)	1.038	(0.198)	1.513	(5.626)
NL	1.185	(1.803)	1.395	(3.193)	1.226	(2.249)	1.556	(4.478)	1.685	(3.236)	1.400	(4.666)
BE	1.304	(2.870)	1.649	(4.989)	1.333	(3.417)	1.626	(5.401)	2.166	(5.064)	1.672	(7.021)
PL	0.733	(3.462)	1.227	(1.582)	1.241	(1.895)	1.361	(2.704)	1.596	(2.857)	2.368	(8.845)
SK	1.262	(2.278)	1.897	(4.309)	1.206	(1.905)	1.232	(1.941)	1.327	(1.413)	1.798	(6.941)
SE	1.119	(1.015)	1.197	(1.358)	1.150	(1.169)	1.515	(3.531)	2.120	(4.804)	1.463	(4.438)
UK	1.610	(3.840)	1.930	(5.319)	1.512	(3.451)	1.868	(4.820)	2.438	(4.730)	1.744	(6.265)
EU average	1.183	(5.804)	1.442	(10.423)	1.261	(7.897)	1.479	(12.721)	1.756	(11.995)	1.658	(22.177)

A1.3: Country-specific odds ratios of education, skills (literacy, numeracy and problem solving) and ALL on Political Efficacy

Proficiency in Literacy and Political efficacy

Variable	educmedium		educhigh		pvlit12		pvlit13		pvlit14		ALL	
Country	odds	tstats	odds	tstats	odds	tstats	odds	tstats	odds	tstats	odds	tstats
CY	1.205	2.026	1.663	4.611	1.348	2.757	1.736	4.868	2.109	5.422	1.008	0.103
CZ	1.006	0.058	1.579	3.091	1.140	0.840	1.337	1.692	1.565	2.460	1.479	5.010
DK	1.259	4.056	1.523	5.294	1.110	1.155	1.429	4.377	1.495	3.317	1.149	2.296
EE	1.124	1.853	1.171	1.994	0.909	-1.221	1.284	2.966	2.059	7.011	1.427	6.055
FI	1.521	4.991	2.318	7.600	1.006	0.062	1.228	1.802	1.343	2.483	1.386	4.625
FR	1.014	0.152	1.363	2.985	0.850	-2.602	1.036	0.530	1.268	2.170	1.192	3.378
DE	1.206	2.137	1.594	4.233	1.377	2.796	2.230	7.729	2.675	7.498	1.371	5.032
IE	1.637	5.479	2.198	7.324	0.971	-0.345	1.160	1.513	1.448	2.569	1.082	1.410
IT	1.472	4.494	1.733	4.062	1.057	0.663	1.396	3.048	1.763	3.450	1.394	3.422
AT	1.298	3.144	1.858	6.906	1.241	1.909	1.872	5.324	2.119	5.463	1.400	6.088
NL	1.327	4.025	1.885	7.570	1.103	0.973	1.558	4.477	2.115	6.778	1.084	1.187
BE	1.240	2.926	1.769	5.644	1.126	1.388	1.435	4.075	1.911	6.133	1.210	3.238
SK	1.228	2.790	1.818	5.285	0.963	-0.392	1.119	1.154	1.663	3.753	1.281	3.748
ES	1.059	0.738	1.331	4.039	1.035	0.518	1.042	0.473	1.497	2.985	1.084	1.436
SE	1.192	1.810	1.382	2.641	1.220	1.574	1.628	3.562	2.024	4.936	1.197	2.490
UK	1.193	1.692	1.607	4.748	1.116	1.114	1.502	3.722	2.112	5.996	1.006	0.069
EU Average	1.238	10.542	1.653	19.651	1.082	3.268	1.392	12.813	1.757	17.569	1.235	12.628

Proficiency in Numeracy and Political efficacy

Variable	educmedium		educhigh		pvnum12		pvnum13		pvnum14		ALL	
Country	Odds ratio	t-stats	Odds ratio	t-stats	Odds ratio	t-stats	Odds ratio	t-stats	Odds ratio	t-stats	Odds ratio	t-stats
CY	1.157	1.536	1.622	4.231	1.483	4.327	1.721	5.510	1.849	4.405	0.996	-0.050
CZ	0.998	0.018	1.579	2.847	1.160	1.060	1.269	1.524	1.456	2.254	1.480	5.028
DK	1.251	3.802	1.541	5.412	1.178	1.719	1.406	3.495	1.418	3.030	1.160	2.471
EE	1.134	2.007	1.196	2.243	1.042	0.526	1.354	3.771	1.723	4.920	1.446	6.218
FI	1.532	5.123	2.344	7.760	1.172	1.750	1.273	2.247	1.410	3.138	1.391	4.716
FR	1.008	0.086	1.370	3.165	0.896	-2.024	1.063	0.885	1.143	1.438	1.199	3.530
DE	1.156	1.602	1.511	3.735	1.415	3.798	2.168	7.141	2.514	8.490	1.403	5.422
IE	1.597	5.100	2.115	6.734	1.207	2.551	1.428	3.646	1.642	3.477	1.073	1.244
IT	1.494	4.660	1.781	4.285	1.115	1.144	1.219	1.595	1.796	3.394	1.409	3.496
AT	1.300	3.253	1.815	6.681	1.326	2.673	1.891	6.223	2.362	7.396	1.393	6.002
NL	1.356	4.262	2.014	8.330	1.165	1.581	1.488	4.516	1.728	5.050	1.091	1.257
BE	1.262	3.198	1.929	6.591	1.095	1.017	1.161	1.826	1.349	3.121	1.223	3.456
SK	1.178	2.267	1.668	4.719	1.238	2.319	1.488	4.371	2.306	7.860	1.256	3.406
ES	1.068	0.829	1.357	4.254	0.938	-0.913	1.042	0.458	1.227	1.299	1.087	1.482
SE	1.220	2.102	1.463	3.257	1.059	0.484	1.387	2.818	1.446	2.931	1.230	2.822
UK	1.216	1.927	1.638	5.019	1.096	1.069	1.480	4.201	1.847	5.618	1.012	0.146
EU Average	1.234	10.345	1.664	19.826	1.139	5.809	1.389	13.420	1.619	15.892	1.242	12.919

Proficiency in Problem solving and Political efficacy

Variable	educmedium		educhigh		pvpsl12		pvpsl13		pvpsl14		ALL	
Country	odds	tstats	odds	tstats	odds	tstats	odds	tstats	odds	tstats	odds	tstats
CZ	1.010	0.097	1.596	3.129	1.075	0.621	1.526	3.226	2.123	3.632	1.439	4.592
DK	1.259	4.045	1.538	5.480	1.322	4.883	1.436	4.761	1.729	4.428	1.134	2.090
EE	1.126	1.977	1.181	2.132	1.314	4.668	1.836	9.481	2.798	9.272	1.397	5.614
FI	1.523	5.024	2.290	7.507	1.155	1.823	1.391	3.567	1.701	4.241	1.373	4.524
DE	1.285	2.787	1.740	5.130	1.318	2.890	2.024	7.294	2.385	6.777	1.405	5.465
IE	1.590	5.114	2.069	6.566	1.247	2.844	1.570	5.183	1.682	3.746	1.049	0.833
AT	1.318	3.214	1.940	7.180	1.351	3.590	1.718	6.041	1.775	4.387	1.377	5.735
NL	1.372	4.482	2.043	8.727	1.263	3.192	1.552	4.887	1.754	4.365	1.085	1.194
BE	1.234	2.840	1.843	5.868	1.306	4.043	1.586	6.305	1.704	5.096	1.183	2.934
SK	1.252	3.136	1.842	5.515	0.984	-0.231	1.242	2.453	1.631	3.139	1.270	3.454
SE	1.206	2.039	1.472	3.518	1.281	2.476	1.478	3.815	1.699	4.062	1.189	2.465
UK	1.256	2.212	1.724	5.414	1.096	0.978	1.383	3.203	1.593	3.643	1.014	0.171
EU Average	1.273	10.676	1.742	19.256	1.231	9.104	1.546	17.087	1.871	16.469	1.245	11.648

A1.4: Country-specific odds ratios of education, skills (literacy, numeracy and problem solving) and ALL on Health

Proficiency in Literacy and Health

Variable	educmedium		educhigh		pvlit12		pvlit13		pvlit14		ALL	
	odds ratio	t-stats	odds ratio	t-stats	odds ratio	t-stats	odds ratio	t-stats	odds ratio	t-stats	odds ratio	t-stats
CY	1.346	2.583	1.883	4.832	1.114	1.029	1.51	3.815	1.745	3.841	1.162	1.765
CZ	1.067	0.504	1.492	2.817	1.134	0.906	1.319	2.007	1.446	2.264	1.281	2.818
DK	1.402	4.694	1.562	4.901	1.115	1.298	1.436	3.935	1.415	3.155	1.368	4.968
EE	1.281	3.758	1.694	6.588	1.169	1.814	1.373	3.522	1.559	4.396	1.456	7.094
FI	1.262	2.774	1.835	5.42	0.995	-0.05	1.166	1.439	1.257	2.045	1.525	6.806
FR	1.256	2.505	1.502	3.876	1.116	1.392	1.218	2.494	1.14	1.409	1.234	4.884
DE	1.079	0.792	1.305	2.235	1.338	2.645	1.418	3.009	1.545	3.425	1.328	4.508
IE	1.202	2.329	1.39	3.392	1.368	3.478	1.539	4.954	1.618	3.34	1.156	2.302
IT	1.184	2.253	1.405	2.537	1.174	1.882	1.096	0.754	1.079	0.349	1.013	0.163
AT	1.306	3.926	1.749	5.324	1.543	4.173	1.859	6.2	2.018	5.359	1.221	3.125
NL	1.123	1.634	1.381	3.629	1.627	4.969	1.751	5.657	1.878	5.207	1.366	4.457
BE	1.175	1.872	1.589	4.327	1.166	1.51	1.35	2.97	1.446	2.86	1.15	2.414
PL	1.176	2.16	1.519	3.87	1.57	5.5	1.8	6.391	1.921	5.023	1.275	3.627
SK	1.21	2.076	1.689	5.188	1.43	3.691	1.669	4.971	1.772	4.206	1.157	2.355
ES	1.133	1.689	1.251	2.435	1.533	5.931	1.554	5.513	1.642	4	1.196	2.712
SE	1.269	2.356	1.344	2.792	1.332	2.633	1.383	2.817	1.51	3.296	1.34	4.014
UK	1.376	3.067	1.428	3.043	1.445	3.345	1.567	3.973	2.081	5.35	1.133	2.016
EU average	1.223	9.571	1.52	16.12	1.29	10.63	1.456	15.04	1.567	13.61	1.25	13.94

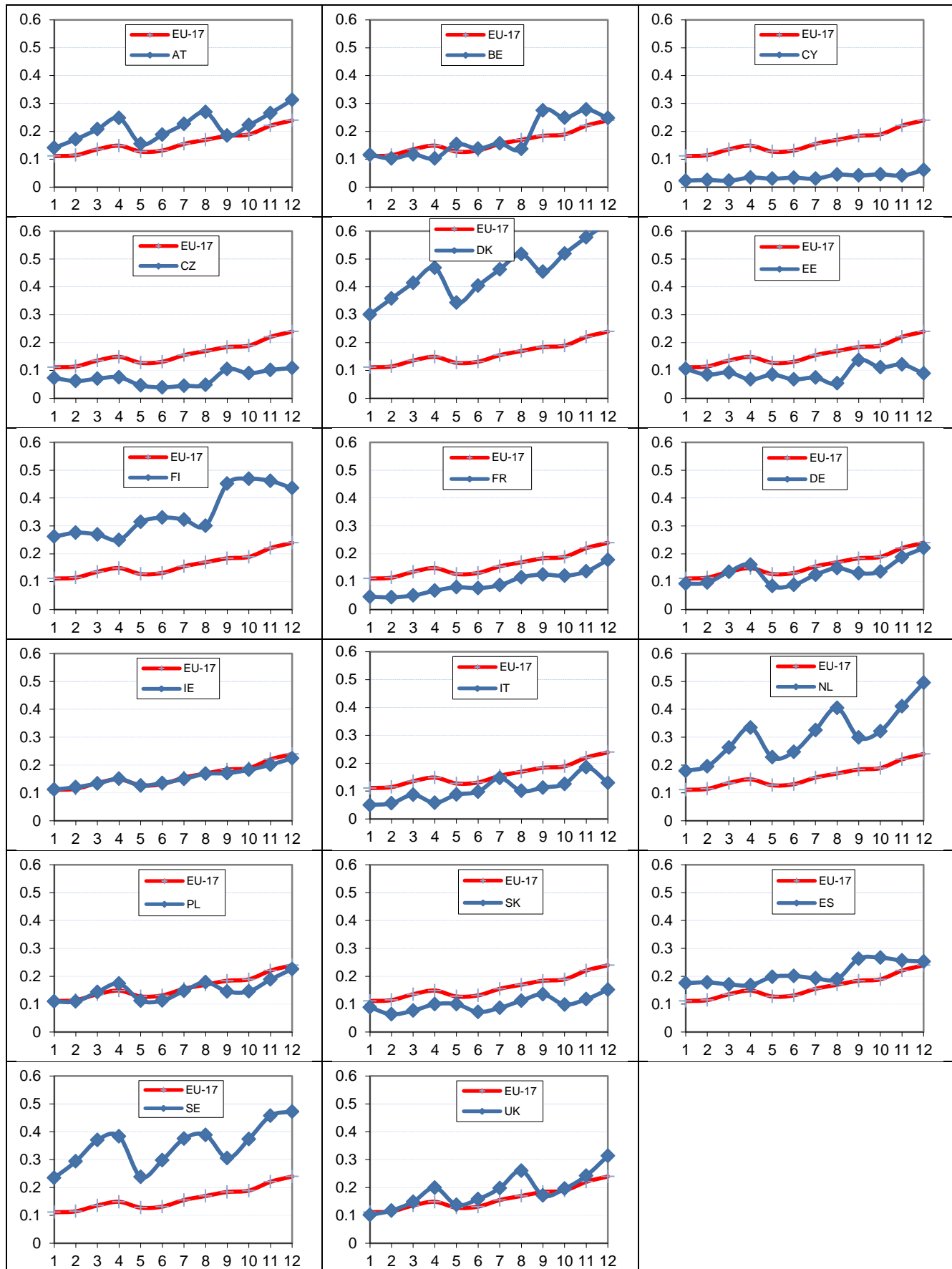
Proficiency in Numeracy and Health

Variable	educmedium		educhigh		pvlit12		pvlit13		pvlit14		ALL	
Country	odds ratio	t-stats	odds ratio	t-stats	odds ratio	t-stats	odds ratio	t-stats	odds ratio	t-stats	odds ratio	t-stats
CY	1.267	2.061	1.774	4.276	1.303	2.819	1.707	4.652	2.188	4.894	1.15	1.667
CZ	1.059	0.445	1.53	2.872	1.339	1.884	1.311	1.882	1.363	1.658	1.297	2.921
DK	1.408	4.75	1.589	5.088	1.188	1.849	1.305	3.023	1.428	3.123	1.38	5.031
EE	1.287	3.761	1.716	6.667	1.213	2.539	1.359	3.655	1.324	2.728	1.47	7.264
FI	1.242	2.553	1.784	5.079	1.297	2.524	1.564	4.257	1.586	3.874	1.501	6.344
FR	1.26	2.538	1.478	3.62	1.134	2.032	1.255	3.439	1.203	2.033	1.228	4.767
DE	1.062	0.645	1.279	2.05	1.271	2.105	1.422	3.143	1.43	3.346	1.338	4.85
IE	1.212	2.462	1.392	3.521	1.48	5.026	1.484	5	1.54	3.823	1.162	2.381
IT	1.171	2.052	1.379	2.396	1.147	1.756	1.108	0.99	1.339	1.604	1.004	0.05
AT	1.271	3.582	1.642	4.724	1.696	5.176	2.234	7.882	2.732	8.59	1.198	2.785
NL	1.121	1.629	1.366	3.586	1.429	3.606	1.675	5.432	1.793	4.949	1.357	4.296
BE	1.116	1.25	1.468	3.491	1.455	4.261	1.709	5.307	1.998	5.492	1.138	2.224
PL	1.183	2.24	1.56	4.12	1.442	4.41	1.542	5.217	1.582	3.762	1.284	3.731
SK	1.204	1.958	1.675	5.059	1.534	4.28	1.619	4.505	1.713	4.107	1.165	2.508
ES	1.153	1.893	1.294	2.774	1.302	3.568	1.306	3	1.257	1.558	1.214	2.985
SE	1.306	2.618	1.416	3.193	1.122	1.018	1.108	0.88	1.137	1.113	1.363	4.189
UK	1.37	3.088	1.412	3.026	1.408	3.455	1.47	3.812	2.059	6.119	1.137	2.065
EU average	1.213	8.773	1.507	15.19	1.33	11.88	1.459	15.12	1.584	14.38	1.251	14

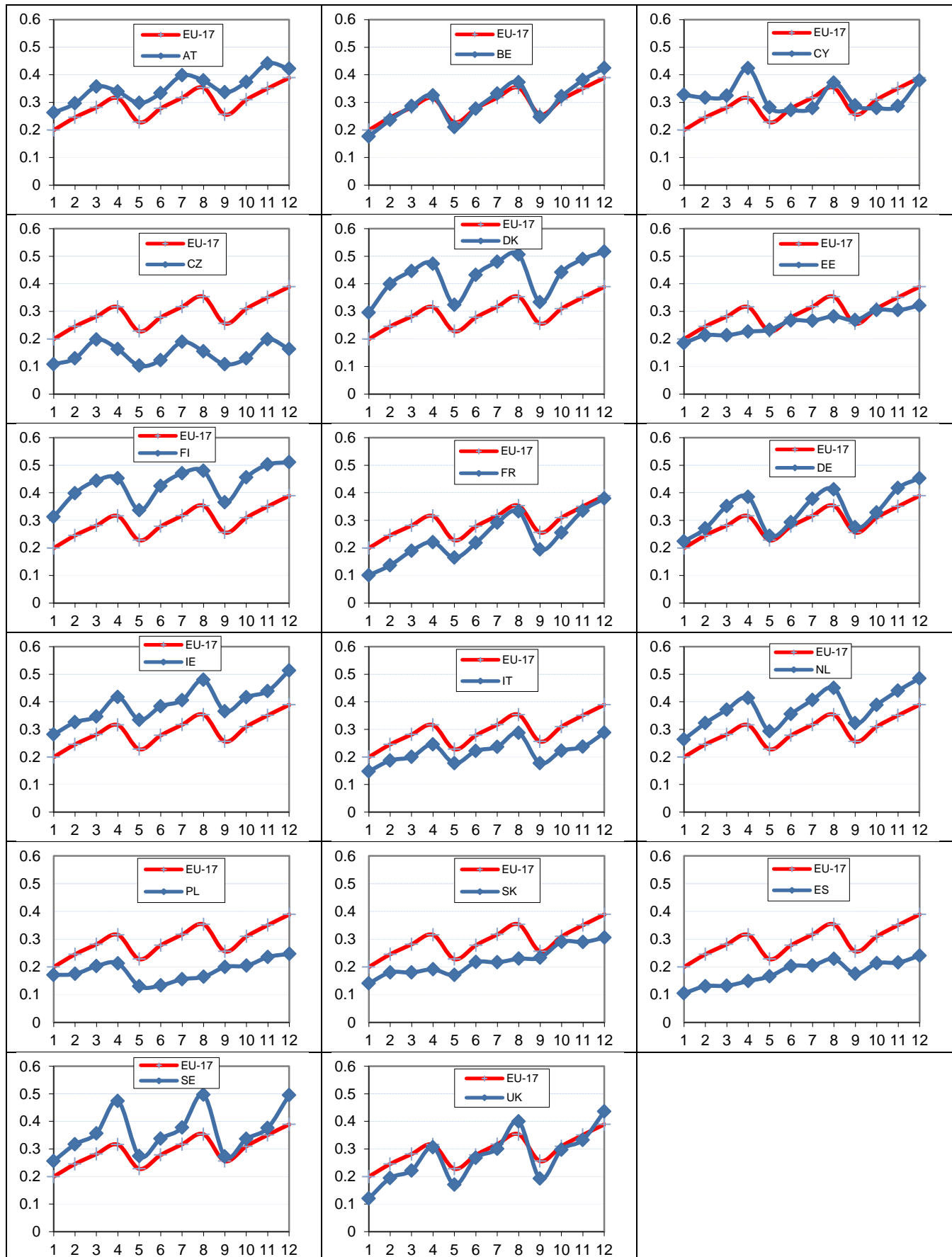
Proficiency in Problem solving and Health

Variable	educmedium		educhigh		pvlit12		pvlit13		pvlit14		ALL	
Country	odds ratio	t-stats	odds ratio	t-stats	odds ratio	t-stats	odds ratio	t-stats	odds ratio	t-stats	odds ratio	t-stats
CZ	1.053	0.391	1.459	2.455	1.436	3.771	1.699	5	1.47	2.484	1.239	2.326
DK	1.43	4.972	1.636	5.407	1.203	2.372	1.285	3.061	1.197	1.463	1.373	4.803
EE	1.284	3.906	1.657	6.474	1.562	6.862	1.874	7.753	1.598	4.078	1.412	6.389
FI	1.255	2.735	1.822	5.455	1.387	4.479	1.468	4.518	1.462	3.762	1.476	6.078
DE	1.114	1.091	1.372	2.548	1.264	2.629	1.231	2.237	1.289	2.117	1.347	4.885
IE	1.232	2.518	1.448	3.7	1.27	2.915	1.182	1.92	1.197	1.295	1.149	2.206
AT	1.342	4.261	1.852	5.923	1.441	4.867	1.451	4.227	1.436	2.681	1.207	2.848
NL	1.143	1.914	1.391	3.75	1.189	2.136	1.454	4.11	1.664	4.105	1.35	4.286
BE	1.195	2.07	1.645	4.654	1.09	1.049	1.271	2.553	1.293	1.76	1.143	2.271
PL	1.254	3.183	1.649	4.902	1.234	2.838	1.387	3.802	1.554	3.675	1.284	3.676
SK	1.249	2.387	1.716	5.243	1.419	4.43	1.342	3.5	1.217	1.195	1.161	2.443
SE	1.275	2.382	1.377	2.963	1.246	2.136	1.273	2.211	1.288	2.41	1.335	3.959
UK	1.406	3.376	1.47	3.438	1.397	3.839	1.56	4.837	1.893	4.09	1.122	1.797
EU average	1.245	8.76	1.568	15	1.313	11.83	1.409	13.72	1.413	9.351	1.273	12.68

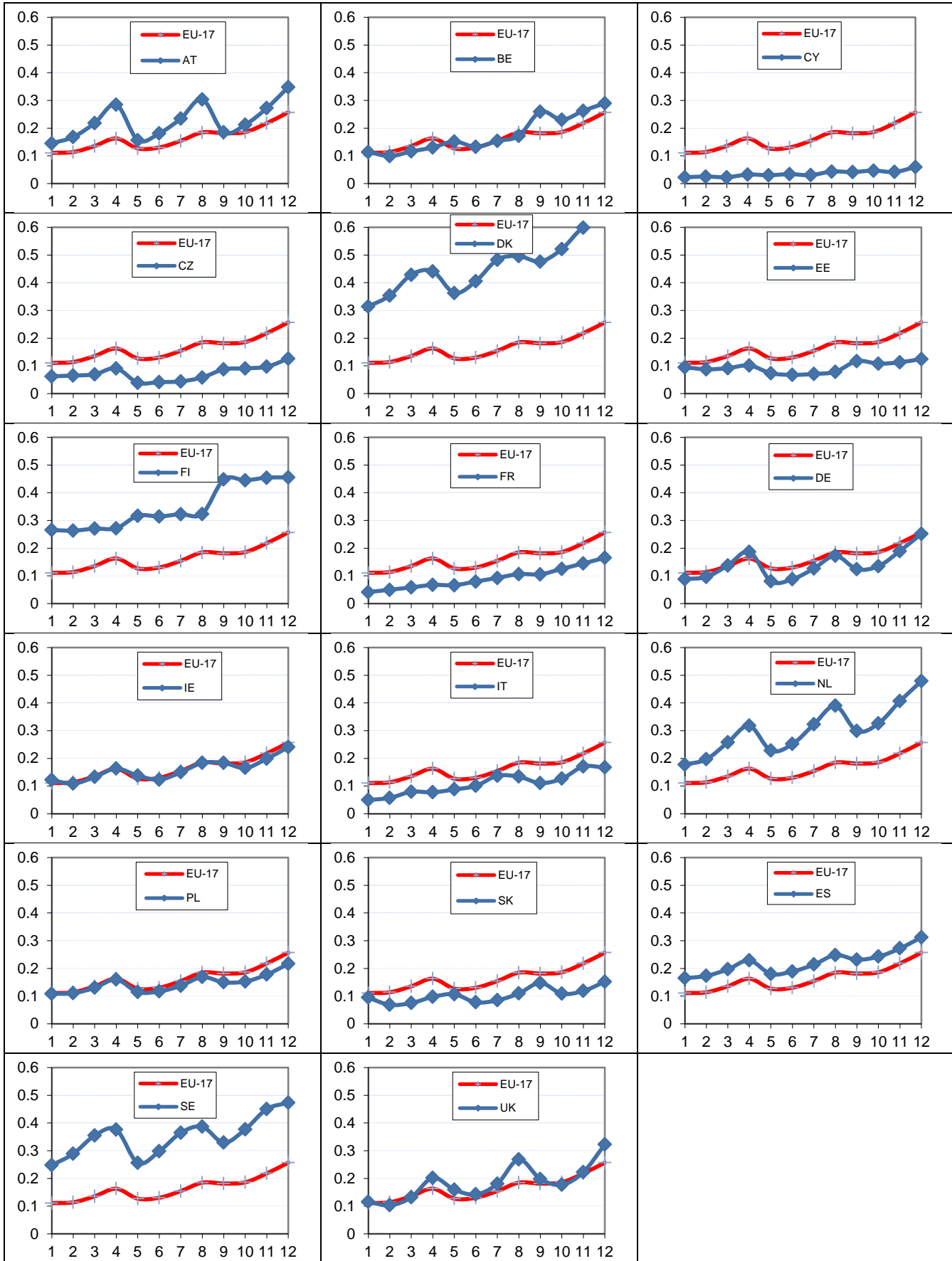
A1.5. Education attainment, skill proficiency in numeracy and trust: Average predicted probabilities



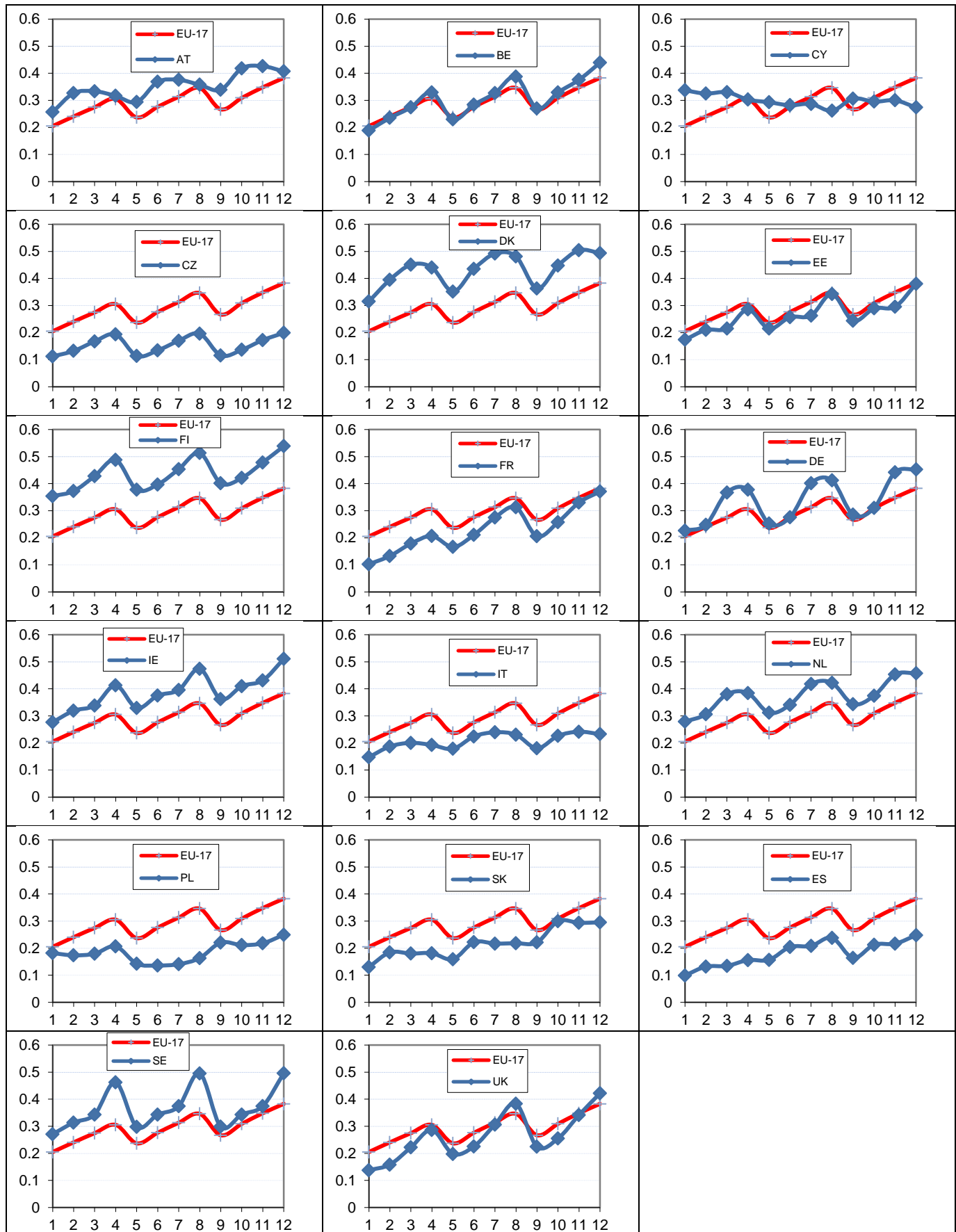
A1.6. Education attainment, skill proficiency in numeracy and volunteering: Average predicted probabilities



A1.7. Education attainment, skill proficiency in literacy and trust: Average predicted probabilities



A1.8. Education attainment, skill proficiency in literacy and volunteering: Average predicted probabilities



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Authors: Patrícia Dinis da Costa, Margarida Rodrigues, Esperanza Vera-Toscano and Anke Weber

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Abstract

It has widely been acknowledged that education is a major source of economic prosperity and social well-being. Education is not only an important factor in the productivity and innovative capacity of an economy, but is also a prerequisite for social and cultural changes in patterns of consumption and leisure behaviour to achieve a sustainable lifestyle. It puts people in a position to take well-informed decisions about the future, to assume responsibility for these decisions and to judge how their personal behaviour will affect future generations. Thus, we are then well aware that education gives access to knowledge that helps individuals and society to be more stable and resilient in times of change. These social returns can take the form of “market outcomes” such as productivity or earnings and “non-market outcomes” such as health, civic participation and more generally social capital. Deeper understanding of the contribution of education to the provision of these social outcomes is a desirable goal.

While the educational system is the primary agent for the acquisition of such knowledge, learning may also take place in the family, the workplace and among our social acquaintances all throughout our lives. Nowadays, constant changes taking place in society encourage individuals that besides grasping occupation-specific skills they must also stock some other various information processing skills to help them cope with this rapid changing environment, especially in the labor market.

The Survey of Adult Skills (PIAAC) was designed to provide information on some of these key skills in society. It directly measures proficiency in several information-processing skills –namely literacy, numeracy and problem solving in a technology-rich environment. Simultaneously, it provides insights on key social outcomes such as the level of trust in others, participation in associative, religious, political or charity activities (volunteering), political efficacy or the sense of influence on the political process, and self-assessed health status. The main findings on the relationship between education in its different forms (years of attainment, skills and adult lifelong learning) and the different social outcomes are presented in this report.

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