

WORKING PAPER SERIES

No. 3/2020

**Adult skills and labor market conditions
during teenage years:
Cross-country evidence from ALL and PIAAC**

Marianne Haraldsvik
Senter for økonomisk forskning AS

Bjarne Strøm
*Department of Economics
Norwegian University of Science and Technology*

Department of Economics

 Norwegian University of Science and Technology
N-7491 Trondheim, Norway
<http://www.ntnu.edu/econ/working-papers>

Adult skills and labor market conditions during teenage years: Cross-country evidence from ALL and PIAAC¹

Marianne Haraldsvik

Bjarne Strøm

Department of Economics
Norwegian University of Science and Technology

This version, March 2020

JEL No: E24, I2, J2

Keywords: Human capital accumulation, business cycles, adult skills

Abstract:

Do individuals finishing compulsory school in economic downturns end up with higher skills in adulthood than comparable individuals that finish compulsory school in economic upturns? This paper answers this question by exploring data on country unemployment rates combined with individual data on educational attainment and adult skills in numeracy and literacy from the Program for the International Assessment of Adult Competencies (PIAAC) and the Adult Literacy and Life Skills Survey (ALL). We find that completed education is countercyclical, and the same pattern is found for adult skills in numeracy and literacy. The results are fairly robust across different model specifications including fixed country and cohort effects and country specific cohort trends. The results indicates that the labor market conditions at the time when young people make crucial educational decisions have long lasting effect on skills and potential earnings in adulthood.

¹ The project was funded by the Norwegian Research Council under the Program for Educational Research (UTDANNING 2020/FINNUT), grant number 228285. Comments from seminar participants at Department of Economics, NTNU and participants at the IIPF 2015 Congress in Dublin are gratefully acknowledged.

1. Introduction

It is well known that recessions have direct short run costs in terms of output lost and potential long run cost because workers who are unemployed for a long period loose skills and hence decrease the production capacity in the future. However, there is also some mechanisms that may work in the other direction. According to Barr and Turner (2013), college enrollment in the US increased by more than 2.5 million students during the great recession from 2007-2010 and indicates counteracting effects in terms of increased propensity to enroll in post-secondary schooling during recessions. This and similar experiences from other countries and time periods combined with the fact that human capital is a crucial determinant of economic growth suggest the need for more knowledge of the relationship between human capital accumulation and the business cycle conditions when young people make critical educational choices. This paper contributes to the literature by providing evidence on the potential long run effects on cognitive skills measured in adulthood of high unemployment during teenage years.

The human capital model as formulated by Becker (1964) suggests that educational investments decrease (increase) in business cycle upturns (downturns) due to higher (lower) opportunity costs of education. This opportunity cost effect may be counteracted by an income effect if the existence of credit constraints makes the number of families affording post-compulsory education to vary pro-cyclically. However, a majority of empirical studies suggest that educational attainment is countercyclical. Studies mostly from UK and US find that high school and college enrolment increases when regional unemployment as measured when students are 16-18 year old increases, see Betts and McFarland (1995), Dellas and Sakellaris (2003) and Clark (2011). Similarly, using regional panel data on upper secondary school completion and regional unemployment from 1981-2004, Reiling and Strøm (2015) find that completion of upper secondary education in Norway is countercyclical. An important question is to what extent this countercyclical pattern in educational attainment translates into a similar pattern in adult cognitive skills. Almost all previous research on the relationship between educational investments and business cycles have used formal education levels as outcome variables. However, research in the last decade suggest that direct skill measures accounting for quality such as test scores and traditional skill measures in quantitative terms (years of schooling) contributes equally to economic growth differences across countries as well as across US states, see Hanushek and Woessmann (2012) and Hanushek et al. (2017). Thus, an important question is to what extent the countercyclical pattern found in acquisition of formal education translates into a similar pattern in adult skills. This paper extends the literature by providing cross-country

empirical evidence on the effect of unemployment rates during a person's teenage years on adult cognitive skills.

Traditional human capital theory deals with demand side effects of business cycles through changed individual opportunity cost of education and changes in the bite of credit constraints. Supply side effects may also be important. A possible fiscal effect of a business cycle downturn (upturn) is reduced (increased) funds available for post-compulsory education institutions and hence reduced (increased) access to education and this may moderate the cyclical opportunity cost effect. This may be counteracted if governments discretely allocate resources to education in a countercyclical fashion, by increasing (decreasing) educational spending in downturns (upturns). While first order demand effects due to opportunity costs (possibly modified by income effects and supply side effects) can plausibly predict countercyclical patterns in enrollment in post-compulsory education it is an open question whether this quantity effect is mirrored by a similar pattern in cognitive skill quality as measured in adulthood. Asked differently: Will individuals that happen to finish compulsory school in an economic downturn, end up with more years of completed education and higher cognitive skills in adulthood than comparable individuals that finish compulsory school in an economic upturn?

First, it is possible that temporal change in opportunity cost only affect the timing of educational investments, and not the final level as measured in adulthood. Individuals leaving education at a young age due to high opportunity costs induced by a business cycle upturn may compensate by taking more formal and informal education as adults. Second, business cycles can affect the quality composition of students enrolling in post-compulsory education. If a business cycle downturn generates enrollment of many weak students in terms of motivation and initial skills into post-compulsory education, the effect of business cycle conditions on completed education and in particular on skills measured in adulthood may be small or non-existing.

Data on adult competencies from the OECD by the Program for the International Assessment of Adult Competencies (PIAAC) and earlier data from the study of Adult literacy study (ALL) makes it possible to provide cross-country evidence on this issue. We explore individual data on completed education and adult competencies in literacy and numeracy matched with cross-country data series on national unemployment rates to study the effect of business cycle conditions at age 16-18 on both completed education and adult skills in terms of competency in literacy and numeracy. In this way, the paper represents an extension of previous national studies of the relationship between post-compulsory school enrollment and business cycles.

Credit constrained families may experience increased resources available during economic upturns which can mitigate a general countercyclical pattern in enrolment in post-compulsory education. It is possible that families with high educated parents are less likely to be credit constrained than families with low educated ones. As a further contribution, we therefore study whether the relationship between educational attainment and cognitive skills, and unemployment in teenage years depends on parental education².

We find a statistically and economically significant countercyclical pattern in both completed education and measured cognitive skills. This pattern is fairly robust across a series of empirical specifications including country specific trends in addition to individual controls and country and cohort fixed effects. The results suggest that 5 percentage point increase in country unemployment at age 16-18 leads to an increase of 0.1 years of completed education. Further, the estimated effect on measured skills implies that 5 percentage point increase in country unemployment as young increase numeracy test scores by a statistically significant 7.5 percent of a standard deviation. The countercyclical patterns are most pronounced for individuals with highly educated parents.

The paper is organized as follows: Section 2 presents a short overview of the theoretical background in addition to a review of the existing empirical literature. Section 3 presents the empirical strategy and describes the data. Empirical results follow in Section 4, while Section 5 concludes.

2. Theoretical issues and literature review

2.1 Theoretical background

The basic human capital model formulated by Becker (1964) is a natural point of departure for an analysis of the relationship between educational attainment and skills in adulthood and labor market conditions at a young age when important educational choices are made. According to the model, individuals increase their education up to the point when the benefit in terms of expected net future earnings premium is higher than the cost in terms of expected foregone earnings (opportunity cost) and eventual direct costs. In this framework, a business cycle upturn (downturn) in terms of low (high) unemployment rate increase (decrease) the opportunity cost

² Alessandrini (2018) uses Canadian data and show that unemployment stimulates university enrollment especially among individuals with highly educated parents. Christian (2007) uses US data and find no differences in the cyclical of enrollment with respect to households home-owning status, while enrollment appears to be more procyclical among people in households expected to have lower income.

and leads to a countercyclical pattern in educational attainment. However, if families are credit constrained, this opportunity cost effect may be counteracted by the increased (decreased) probability for families to afford further education for their children in economic upturns (downturns). Thus, allowing for credit constraints makes the prediction from the demand side human capital approach ambiguous.

However, the supply side in the educational market may also affect the relationship between realized educational attainment and the labor market conditions. One possibility is that funds available for education and other public services decrease (increase) in a downturn (upturn) because of decreasing (increasing) tax revenue leading to reduced access to study places in post-compulsory education. However, an active government may actively try to counteract the impact of economic downturns by increasing expenditure on education and other services typically provided by the public sector. If this is the case, more people may gain access to post-compulsory education in a downturn than in an upturn. Thus, supply side responses may moderate the demand induced countercyclical pattern in educational attainment as measured by years of education.

While first order demand effects possibly moderated by supply effects may lead to countercyclical enrolment patterns in post-compulsory education, the natural question to ask is whether this also means a countercyclical pattern in skills in adulthood. Framed differently: Is it the case that individuals that happen to finish compulsory school in an economic downturn end up with more years of completed education and higher skills in adulthood than comparable individuals that finish compulsory school in an economic upturn? This is the question we want to answer in this paper. Several mechanisms may be at work. First, individuals leaving education at a young age due to high opportunity costs induced by a business cycle upturn may compensate by taking more formal and informal education as adults. Second, business cycles can affect the quality composition of students enrolling in post-compulsory education. If a business cycle downturn generates enrollment of many weak students in terms of motivation and initial skills into post-compulsory education, the effect of business cycle conditions on completed education and skills measured in adulthood may be small or non-existing. Due to these possible timing and composition mechanisms, it is thus an empirical question to what extent countercyclical enrollment in post-compulsory education typically found in the literature, translates into completed education and skills in adulthood.

2.2. Review of existing empirical evidence

Several studies examine the impact of business cycle conditions on enrollment, both in high school and higher education as well as completed education. This section reviews the literature.

US evidence in Card and Lemieux (2000) and Black, McKinnish and Sanders (2005) and UK evidence in Rice (1999) and Clark (2011) all suggest a countercyclical pattern in high school enrolment, although the quantitative effects differ. The effect in terms of the elasticity of enrollment with respect to unemployment varies from 0.3 (Clark) to 0.05 (Card and Lemieux). Reiling and Strøm (2015) uses regional panel data on upper secondary school completion and regional unemployment from 1981-2004 and find that completion of upper secondary education in Norway is countercyclical. Their results imply an elasticity of completion with respect to unemployment of approximately 0.04.

Enrolment into higher education also appears to be positively associated with unemployment in the US, as shown in Betts and McFarland (1995), Dellas and Sakellaris (2003) and Bedard and Herman (2008), and in Sweden as shown in Fredriksson (1997). The results in Betts and McFarland imply enrolment elasticities of 0.4 and 4 with respect to youth and total unemployment, respectively. The Swedish results imply comparable enrolment elasticities of 0.24 and 0.16 (own calculations based on results in Fredriksson (1997), columns 2 and 3 in Table 1, p. 137). Charles et al. (2015) use across-city variations in housing booms in the US and find positive employment effects and a subsequent reduction in college enrolment.

Countercyclical enrolment has also motivated the use of regional unemployment rates at the time of leaving compulsory education as instruments for schooling in studies of the returns to education, as in Arkes (2010) and Carneiro et al. (2011). The first stage equation in Arkes' analysis indicates that one percentage point increase in state unemployment increases completed education by a statistically significant 0.04 years.

Using Norwegian register data, Raaum and Røed (2006) find that high local unemployment when graduating from secondary school (age 16-19) has a persistent negative effect on labor market participation in adult life. Further, when decomposing this net effect into the direct effect on entry experiences and the indirect effect on educational attainment, using cohorts born 1961-1967, they find no effect on the latter outcome. Other recent studies also find that business cycle conditions at labor market entry affect income differences later in life, as shown in Oreopoulos et al. (2012) for Canada, Kahn (2010) for the US and Genda et al. (2010) for US and Japan. However, none of these three studies the effects on educational attainment.

To sum up, while numerical effects vary a lot, most studies find that enrolment into post compulsory education and completed education is countercyclical. However, the studies available so far do not provide evidence on whether this pattern is accompanied by similar patterns in measured skill in adulthood which is the focus of this paper.

3. Data description and empirical specification

3.1. Empirical specification

We want to investigate the influence of unemployment on different outcomes within a cross-country framework. As argued above, both theory and empirical evidence indicates that enrolment in post-compulsory education is counter-cyclical, while the research question we ask is to what extent this pattern translates into a similar pattern in adult skills. Our baseline approach is to link unemployment to a set of educational attainment and cognitive skills measures in adulthood in a reduced form framework.

To investigate the research questions proposed in the introduction, we estimate variants of the reduced form relationships as formulated in equation (1).

$$(1) \quad y_{icj} = \alpha_0 + \alpha_1 \overline{UNEMP(16 - 18)}_{cj} + Z_{cj} \alpha_2 + X_{icj} \alpha_3 + \beta_c + \gamma_j + \varepsilon_{icj}$$

y_{icj} represents our outcome variables; the number of years of formal education and cognitive skills in numeracy and literacy that individual i of cohort j in country c has obtained as measured in PIAAC. In models using data extended by the survey in ALL, we also add a survey dummy.

The variable of main interest is $\overline{UNEMP(16 - 18)}_{cj}$. This variable is our indicator of business cycle conditions and measures the mean unemployment in the three years when individuals of cohort j in country c is between 16 and 18 years old. X_{ijc} is a (row) vector of individual control variables with α_3 as the corresponding coefficient vector. In order to interpret the effect of unemployment as causal and avoid the “bad control problem”, we include a limited set of individual controls and only include variables that are arguably determined at the time the individual was born³. Thus, the individual controls include dummy variables for mothers’ education, fathers’ education and gender. The dummy variable for parental education takes the value 1 if mother (father) has an education level above high school, and it takes the value 0 if

³ See Angrist and Pischke (2009) p. 64–68 for a discussion of the “bad control problem”.

mother's (father's) highest education level is high school or below. The gender dummy takes the value 1 if the individual is a male.

Many studies find that reforms changing the compulsory school length affects length of schooling and subsequently other outcomes, see Oreopoulos (2006) and Black et al (2006) among others. If the length of compulsory schooling varies between cohorts within the country over time and is correlated with the unemployment rate at age 16-17, our estimates would be biased. To avoid this, we include a (row) vector of indicator variables Z_{cj} representing the length of compulsory schooling that individuals of cohort j in country c experienced. α_2 is the corresponding coefficient vector. Brunello et al. (2009) and Murin and Viarengo (2011) document the reforms that have taken place in Western countries. Our indicator variables contained in the Z_{cj} vector is based on this information. Table 1 presents an overview of the education system for the countries represented in our study.

Table 1: List of education reforms that influence number of years of compulsory schooling

Country	Source	reform year	First coh. Affected	Starting Age	Min. schol leaving age		Years comp. school		Change (years)
					Before	After	Before	After	
Belgium	Brunello et al (2009)	1983	1969	6	14	18	8	12	+ 4
Denmark	Brunello et al (2009)	1971	1957	7	14	16	7	9	+ 2
Finland	Murtin et al (2011)	1977	1964	7	13	16	6	9	+ 3
France	Brunello et al (2009)	1959	1953	6	14	16	8	10	+ 2
Ireland	Brunello et al (2009)	1972	1958	6	14	15	8	9	+ 1
Italy	Brunello et al (2009)	1963	1949	6	11	14	5	9	+ 4
Japan ^a		No reform			15		9		
Netherlands	Murtin et al (2011)	1971	1956	7	15	16	8	9	+ 1
	Murtin et al (2011)	1975	1959	7	16	17	9	10	+ 1
	Murtin et al (2011)	1985	1980	5			10	12	+ 1.5 (on avg.)
New Zealand ^a		No reform			16		10		
Norway ^b	Murtin et al (2011)	1969	1955	7	14	16	7	9	+ 2
Spain	Brunello et al (2009)	1970	1957	6	12	14	6	8	+ 2
Sweden	Brunello et al (2009)	1962	1950	6 or 7	14/15	15/16	8	9	+ 1
Switzerland	Murtin et al (2011)	1970	1956	5 or 6	13/14	14/15	8	9	+ 1
United Kingdom	Murtin et al (2011)	1973	1958	5	15	16	10	11	+ 1

Notes:

a: For Japan and New Zealand, documentation found on the Internet indicates that there has been no reform relevant for the length on compulsory schooling during the relevant years

b: In Murtin et al. (2011) school starting age in Norway is set to 6 (which is true at the moment due to the reform in 1997), but at the time of the reform in 1969, starting age was 7.

β_c and γ_j refers to fixed country and cohort effects, respectively and are included in all variants of the model. By including these fixed effects we purge our regressions of omitted unobservables that are fixed over time within countries as well as omitted unobservables that affect individuals in cohorts over time in all countries. However, we are still concerned that changing characteristics of the countries that could be correlated with unemployment are omitted from the model. As we exploit unemployment data that covers a long period – from 1960 to 2002 –in subsequent specification checks we add country specific linear and quadratic cohort trends to the model in an attempt to capture as much as possible of the influence of omitted country specific variables that evolve over time.

3.2. Data sources

We exploit three sources of data in this study; the PIAAC data, the ALL data, and unemployment data from the OECD Annual Labour Force Statistics (ALFS) database.

PIAAC and ALL are both surveys that are designed to measure the level and distribution of adult skills across countries for a representative sample of the adult population, including individuals at age 16-65. PIAAC was conducted in 23 countries in 2011.⁴ ALL was undertaken in 2003 and 2006 in 10 countries.⁵ PIAAC provide links to ALL in the domain of literacy and in the domain of numeracy. While PIAAC data is primary data source, this makes it possible to pool the two data sets in order to enlarge the number of observations in the analysis of skills and to investigate the robustness of our results. In addition to the measure of skills, both surveys includes background information such as educational attainment, family background and outcome variables such as labor market status and income.

To measure unemployment, we use the rate of unemployment as percent of civilian labour force. By using the civilian labour force instead of total labour force, the comparability between OECD countries increase. The main reason for this is that, in a majority of OECD Member countries, labour force surveys only covers private households (see the full documentation of the ALFS Summary tables, OECD:

<http://www.oecd.org/employment/labour-stats/2771299.pdf>).

⁴ Participating countries in the first round of PIAAC are: Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Estonia, Finland, France, Germany, Finland, France, Germany, Ireland, Italy, Japan, Korea, the Netherlands, Norway, Poland, Russian Federation, Slovak Republic, Spain, Sweden, United Kingdom, and United States.

⁵ Participating countries in ALL (2003) are: Bermuda, Canada, Italy, Norway, Switzerland, the United States and, the Mexican State of Nuevo Leon; and in (2006): New Zealand, the Netherlands and, Hungary.

3.3. Restrictions to the sample

In order to match data on adult competences with cross-country data on unemployment at the time when the individuals were approximately 16-18 years old, we restrict our sample to include the countries with information about unemployment, as well as exact information about the respondent's age.⁶ This restriction excludes Austria, Canada, Germany and USA where the publicly available data files we used only include age intervals for the respondents.

This gives us a sample consisting of 14 countries:

Table 2: List of countries in our sample

Country	Survey data source
Belgium	PIAAC
Denmark	PIAAC
Finland	PIAAC
France	PIAAC
Ireland	PIAAC
Italy	PIAAC and ALL
Japan	PIAAC
Netherlands	PIAAC and ALL
New Zealand	ALL
Norway	PIAAC and ALL
Spain	PIAAC
Sweden	PIAAC
Switzerland	ALL
United Kingdom	PIAAC

As we can see from Table 2, we have a sample of 12 countries if we only use PIAAC data. By adding ALL data to the sample, we extend the sample to include two extra countries, and we add extra observations to three of the countries that are present in the PIAAC sample.

Further, we only include the individuals that are born in the country. This excludes immigrants from the sample. By this sample restriction, we include in the sample only individuals that are likely to have been exposed to the country's educational system and labour market conditions during their educational career. As we are interested in how unemployment at age 16-18 affects investment in education and long term cognitive skills, we also restrict our sample to include only individuals that were 25 years or older at the time of the survey. This is an arbitrary set cut off, but it captures the idea that most of the individuals have finished education by age 25. Although we also have information about education activity at the time of the survey, we do

⁶ The information about the respondent's age at the time of testing together with the year the survey was undertaken makes it possible to calculate the year of birth, and further calculate the years the respondent was 16-18 years old.

not exploit this information to restrict the sample as this is a potential outcome variable. Since we only use unemployment rates from 1960 and onwards, this excludes the oldest respondents in the ALL data set. Thus, the oldest respondent from the ALL data set is 62 years old.

3.4. Data description

Three types of competencies are tested in the PIAAC survey; literacy, numeracy and problem solving in technology-rich environments. PIAAC provide links to ALL in the domain of literacy and in the domain of numeracy, we therefore focus only on these two types of adult competencies⁷. Tables 3 and 4 provide descriptive statistics for the PIAAC sample and the merged PIAAC and ALL sample, respectively.

Using only PIAAC data, the pooled sample of all 12 countries, has a total of 47,054 observations. Sample size for each country varies between 2,860 for Sweden and 4,868 for Denmark. Information about the length of formal education is available in the PIAAC data set. Table 3 show the distribution of years of schooling between countries for respondents above age 25. As we can see, mean length of education varies between a minimum of 11.5 for Spain, and a maximum of 14.8 for Ireland. As we can see from the table, there are both some within and between country variation.

Respondents in Japan (Sweden) achieve the highest average literacy (numeracy) score, and respondents in Spain lowest for both type of skills. When we merge data from PIAAC with ALL (table 4), then Italy is the country with the lowest average literacy and numeracy score, and Norway (Switzerland) is the country with the highest average literacy (numeracy) score.⁸ The average pooled numeracy and literacy scores are only slightly changed when ALL data is appended to the PIAAC sample.

⁷ We follow Hanushek et al. (2015) who use 'plausible value 1 to represent the skills

⁸ As ALL have two measures of literacy (prose and document), we use the average of prose and document to measure literacy.

Table 3: Descriptive statistics - PIAAC sample

	PIAAC												
	Pooled	Italy	Netherlands	Norway	Belgium	Denmark	Finland	France	Ireland	Japan	Spain	Sweden	UK
Unemployment (16-18)	6.41 (4.78)	9.05 (2.34)	5.33 (3.51)	2.79 (1.55)	7.67 (4.07)	4.62 (3.25)	6.10 (4.21)	5.80 (3.07)	10.14 (4.38)	2.37 (1.08)	12.70 (7.56)	3.61 (2.50)	6.41 (3.20)
Years of formal education	13.07 (3.13)	11.83 (4.01)	13.54 (2.52)	14.65 (2.32)	12.67 (2.87)	13.27 (2.57)	12.89 (3.09)	11.88 (3.55)	14.83 (3.36)	13.45 (2.31)	11.48 (3.71)	12.83 (2.37)	13.42 (2.33)
Share of mothers with education above high school	0.11 (0.32)	0.03 (0.17)	0.07 (0.26)	0.17 (0.37)	0.12 (0.33)	0.16 (0.36)	0.09 (0.29)	0.10 (0.30)	0.10 (0.30)	0.18 (0.38)	0.05 (0.21)	0.22 (0.41)	0.12 (0.32)
Share of fathers with education above HS	0.16 (0.36)	0.05 (0.21)	0.18 (0.38)	0.25 (0.43)	0.17 (0.38)	0.19 (0.39)	0.11 (0.32)	0.14 (0.34)	0.11 (0.31)	0.23 (0.42)	0.09 (0.29)	0.23 (0.42)	0.15 (0.36)
Age	45.63 (11.43)	44.03 (10.20)	46.47 (11.38)	45.39 (11.38)	45.65 (11.31)	49.61 (11.34)	45.85 (11.70)	45.98 (11.58)	44.14 (11.43)	45.42 (11.55)	43.91 (10.65)	46.30 (11.91)	44.16 (11.31)
Share male	0.48 (0.50)	0.49 (0.50)	0.49 (0.50)	0.52 (0.50)	0.50 (0.50)	0.50 (0.50)	0.51 (0.50)	0.49 (0.50)	0.46 (0.50)	0.47 (0.50)	0.49 (0.50)	0.51 (0.50)	0.41 (0.49)
Years compulsory schooling	8.93 (1.33)	9 (0)	9.65 (1.24)	8.58 (0.82)	9.58 (1.96)	8.12 (0.99)	7.56 (1.50)	9.64 (0.77)	8.75 (0.43)	9 (0)	7.59 (0.81)	8.87 (0.34)	10.76 (0.43)
Literacy score	278.48 (46.12)	257.32 (43.37)	287.60 (44.53)	288.15 (41.20)	278.45 (45.32)	274.66 (42.75)	291.57 (47.77)	268.40 (45.57)	269.48 (46.17)	297.97 (39.29)	253.86 (48.36)	291.37 (41.58)	284.30 (42.53)
Numeracy score	276.25 (50.80)	254.63 (49.49)	285.80 (46.27)	291.17 (47.09)	283.57 (49.58)	285.56 (46.83)	287.99 (48.70)	264.00 (52.88)	258.27 (52.22)	291.56 (42.88)	248.15 (50.88)	293.08 (46.14)	274.30 (47.90)
Observations	47054	3338	3723	3385	3566	4868	4180	4164	3990	4117	4033	2860	4830

Note: Means, standard deviations (in parenthesis) and number of observations for the variables used in our baseline regression. The sample consist of respondents above age 25 that are born in the country.

Table 4: Descriptive statistics - merged PIAAC and ALL sample

	PIAAC+ALL					
	Pooled	Italy	Netherlands	Norway	Switzerland	New Zealand
Unemployment (16-18)	5.89 (4.62)	8.75 (2.37)	5.43 (3.64)	2.63 (1.58)	0.58 (0.79)	3.50 (3.28)
Share of mothers with education above high school	0.11 (0.31)	0.02 (0.15)	0.08 (0.27)	0.15 (0.36)	0.07 (0.25)	0.19 (0.39)
Share of fathers with education above high school	0.16 (0.36)	0.04 (0.20)	0.19 (0.39)	0.23 (0.42)	0.24 (0.42)	0.13 (0.34)
Age	44.64 (11.09)	41.62 (9.51)	45.39 (10.77)	43.46 (10.64)	41.36 (8.66)	42.78 (10.39)
Share male	0.48 (0.50)	0.48 (0.50)	0.47 (0.50)	0.51 (0.50)	0.49 (0.50)	0.42 (0.49)
Years of compulsory schooling	8.98 (1.22)	9 (0)	9.49 (1.13)	8.50 (0.87)	8.73 (0.44)	10 (0)
Literacy score	278.38 (47.31)	244.07 (51.49)	288.50 (40.67)	296.60 (41.98)	283.83 (36.40)	286.18 (42.80)
Numeracy score	277.08 (50.65)	245.09 (50.31)	291.08 (43.98)	293.63 (44.10)	297.21 (36.93)	278.79 (48.57)
Observations	64386	7273	7676	6745	2587	3497

Note: Means, standard deviations (in parenthesis) and number of observations for the variables used in our baseline regression. The sample consist of respondents above age 25 that are born in the country.

To increase comparability over countries, we normalize the score (both numeracy and literacy) to have a mean of zero and standard deviation one, within each country and survey (ALL and PIAAC).

Our main variable of interest is the country unemployment rate when the individuals were 16-18 years old. Figure 1 shows the development in the unemployment rate for the countries in our sample in the relevant period from 1960 to 2002. From the graphs, we see that the development in unemployment varies between countries over the relevant period, but the main picture is that unemployment is quite flat for most countries from 1960 until 1970. In appendix table A.1 we report some descriptive statistics on the unemployment rates. It turns out that most countries experienced substantial variations in unemployment in the post-1970 period, partly due to OPEC I and OPEC II macroeconomic shocks. Further, some countries experienced marked unemployment increases in the 1990's, e.g. Finland due to the collapse of the Soviet Union.

Importantly for our empirical strategy, there are substantial variations in the timing of unemployment shocks across countries. To illustrate, while the unemployment rate was at an

average of 3.8 (4.7) and 2.2 (2.7) percentages in Finland (Sweden) in the 1971-79 and 1980-89 periods respectively, it increased dramatically to 11.9 (7.5) percentages in the period 1990-2002. In comparison, the unemployment rate in UK increased from an average of 3.9 percentages in 1970-79 period to 9.87 in the 1980-89 period and subsequently decreased to an average of 7.4 in the 1990-2002 period. These numbers show that there is substantial within variation across countries in the unemployment variable, which is a necessary condition for obtaining credible estimates for the unemployment effect on the outcome variables using our empirical strategy.



Figure 1: The development in unemployment rates for the period 1960 to 2002

4. Empirical results

4.1. Completed formal education

We start out by investigating the relationship between unemployment and the number of years of completed formal education using the PIAAC dataset. Table 5 presents the results for three different specifications. The model in column 1 does not include trends, while column (2)

extends the model to include linear and quadratic country specific cohort trends to capture possible omitted country specific variables evolving in a smooth fashion over time. In column (3) we include interaction between parental education and unemployment to the specification in column (2) in order to investigate the hypothesis that unemployment effects on formal education completed is heterogenous with respect to parental education.

Table 5: Completed formal education and unemployment rate at age 16-18. Regression results.

	Years of formal education		
	(1)	(2)	(3)
Unemployment (16-18)	0.0711** (0.0259)	0.0429** (0.0162)	0.0303* (0.0144)
Parent's ed. Ref. cat.: ed. below high school			
Mother's education: Above high school	0.893*** (0.133)	0.998*** (0.165)	0.625*** (0.0959)
Father's education: Above high school	1.772*** (0.240)	1.825*** (0.257)	1.551*** (0.182)
Set of dummies for compulsory ed. Ref. cat.: 5-7 years of comp. ed.			
8 years	0.104 (0.474)	0.591*** (0.105)	0.588*** (0.105)
9 years	-0.0760 (0.506)	0.0535 (0.211)	0.0653 (0.204)
10-12 years	0.470 (0.749)	0.102 (0.180)	0.106 (0.172)
Interaction between parental ed. and unemployment			
Interaction with mother's education			0.0685** (0.0253)
Interaction with father's education			0.0495** (0.0196)
Gender (Male=1)	0.0657 (0.192)	0.0618 (0.195)	0.0602 (0.196)
Constant	11.02*** (0.416)	2,891** (1,115)	3,020** (1,017)
Observations	47,053	47,053	47,053
R-squared	0.221	0.244	0.246
Number of countries	12	12	12
Country fixed effects	Yes	Yes	Yes
Cohort dummies	Yes	Yes	Yes
Country specific linear and quadratic cohort trends	No	Yes	Yes

Note: AREG regressions weighted by sampling weights. Robust standard errors clustered at the country level in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Reading across the columns of Table 5, we see that unemployment has a positive and significant influence on completed formal education. In the specification with no trend variables (column (1)), we find that an increase of one percentage point in the average unemployment rate a person faced in the three years between 16 and 18 is estimated to increase the number of years of formal education completed by 0.07. The estimate is statistically significant at the 5 percent level.

When we include country specific linear and quadratic trends (column 2), we find a somewhat weaker, but still positive and statistically significant effect of unemployment. The estimate of 0.04 implies that an increase in the unemployment rate of one percentage points lead to an increase in completed years formal education by 0.04. The estimate indicates that if one country's unemployment rate rises by one percentage point relative to other countries, and if this change influence the decision to invest in one more year of education or not, then about 4 percent of the individuals in the country (over 25 years and born in the country) would acquire one more year of schooling. This result is in line with the finding in Arkes (2010), who finds – in the first stage equation of the analysis – that one percentage point increase in state unemployment increases completed education by a statistically significant 0.04 years. To set this number in perspective, if a country experiences an increase in unemployment by 5 percentage points relatively to other countries, which typically happened in many European countries from the 1970's to the 1980's, then about 20 percent of the individuals in the country would acquire one more year of schooling, all else equal.

The effect of the control variables are mainly as expected. Males and individuals with highly educated parents complete more years of education than females individuals with lower educated parents, respectively. We also find that having 8 years of compulsory schooling increase formal education by 0.56 years compared to those having less than 8 years. Although positive in sign in column (2), coefficients for dummy variables for having 9 and 10-12 years of compulsory schooling are not significant.

Heterogenous effects

As discussed in the theory section, the countercyclical pattern in educational attainment due to the opportunity cost mechanism can be counteracted if more families become credit constrained in the education market during economic downturns. While our empirical strategy and data does not allow us to study the role of credit constraints per se, the argument motivates an investigation of possible heterogeneity in the unemployment effects between individuals with high vs low educated parents. If individuals with low (high) educated parents are more (less) likely to be credit constrained, we would expect the countercyclical pattern to be less pronounced for the former group. A counter-argument however, is that individuals with high educated parents have more inherent motivation for education in the first place and thus react

less to changes in the opportunity costs than individuals with low educated parents being closer to the margin between investing in further education or not.

To study possible heterogeneous effects with respect to parental education, column (3) in Table 5 extends the model to include interaction terms between unemployment rate at age 16-18 and a dummy for mother and father having more than high school education. The model results suggest a significantly positive interaction term for mother's and father's education. The largest interaction effect is found for mother's education. This indicates that a rise in unemployment during teenage years have the largest effect on completed formal education for individuals with high educated parents. Taken literally, the estimates in column (3) suggest that a one percentage point increase in unemployment increase formal education by 0.03 years (0.095 years) for a person with a mother having education at or below high school level (above high school level). Broadly speaking, this is consistent with the credit constraints story, but further research is needed to confirm this conclusion.

4.2. Adult skills and unemployment

A novel question asked in this paper is whether the countercyclical pattern found in educational attainment has long term effects on adult skills measured by tests of competence in literacy and numeracy.

Table 6 presents the results for analysis of the influence of unemployment rate on skills (literacy or numeracy) when we use the PIAAC sample. Columns (1) and (3) estimate the baseline model in equation (1), while column (2) and (4) extends the model by adding country by cohort linear and quadratic trends.

Table 6: The effect of unemployment at age 16-18 on adult numeracy skills and literacy skills using PIAAC

	PIAAC		PIAAC	
	Numeracy		Literacy	
	(1)	(2)	(3)	(4)
Unemployment (16-18)	0.00939*	0.0150**	-0.00530	0.0148***
	(0.00431)	(0.00554)	(0.00605)	(0.00470)
Parent's ed. Ref. cat.: ed. below high school				
Mother's education: Above high school	0.214***	0.230***	0.177**	0.184**
	(0.0273)	(0.0283)	(0.0650)	(0.0648)
Father's education: Above high school	0.424***	0.430***	0.422***	0.420***
	(0.0351)	(0.0332)	(0.0359)	(0.0353)
Gender (Male=1)	0.272***	0.272***	0.0450*	0.0464*
	(0.0201)	(0.0201)	(0.0238)	(0.0233)
Set of dummies for compulsory ed. Ref. cat.: 5-7 years of comp. ed.				
8 years	0.130*	0.0326	0.142*	0.127**
	(0.0693)	(0.0528)	(0.0755)	(0.0534)
9 years	0.0917	-0.0889	0.0703	-0.0169
	(0.0865)	(0.0593)	(0.111)	(0.0597)
10-12 years	0.165	-0.0448	0.104	0.0565
	(0.135)	(0.0837)	(0.161)	(0.0536)
Constant	-0.728***	-384.6	-0.754***	-1,531***
	(0.0718)	(351.6)	(0.0648)	(188.5)
Observations	47,053	47,053	47,053	47,053
R-squared	0.128	0.135	0.148	0.154
Country fixed effects	Yes	Yes	Yes	Yes
Cohort dummies	Yes	Yes	Yes	Yes
Country specific linear and quadratic cohort trends	No	Yes	No	Yes
ALL included	No	No	No	No
Number of countries	12	12	12	12

Note: AREG regressions weighted by sampling weights. Robust standard errors clustered at the country level in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Reading across the columns of table 6, we find that unemployment rate when teenager has an effect on numeracy skills regardless of model specification (columns (1) and (2) of table 6), while for literacy skills (columns (3) and (4) of table 6), we find only a significant effect in the model where linear and quadratic trends are included (column (4)). Comparing columns (2) and (4), we see that when trends are included, the estimates of unemployment on numeracy and literacy are almost the same.

Evaluated for numeracy skills where both linear and quadratic trend are included and only (column 2 of table 6), we find that a one percentage point increase in unemployment when

teenager leads to an increase in numeracy skills as an adult of about 1.5 percent of a standard deviation. One way to illustrate the economic impact of the unemployment rate in teenage years is to combine our estimates with the estimated income returns to skills found in Hanushek et al. (2015) using PIAAC data. Assume for a moment that skills measured by the PIACC tests fully capture human capital differences between individuals. Further, assume that the average estimated earnings return to a one standard deviation increase in numeracy of 18 % found in Hanushek et al is representative for the sample used in our analysis. This estimate is likely to be downward biased if the difference between skills as measured in PIACC and the true human capital of an individual can be thought of as classical measurement error, as discussed in Hanushek et al. Thus, a conservative estimate is that an unemployment increase of 5 percentage points at age 16-18, translates into approximately 1.3 percent increase in earnings in adulthood, all else constant.

To check how robust our results are, we extend our sample to include ALL data in addition to PIAAC data. The estimates in Table 7 is based on the sample of both PIAAC and ALL. The regression models are similar to those of Table 6, the only difference being the sample.

Reading across the two tables, we see that we get the most robust estimates of unemployment on numeracy skills (columns (1) and (2) of tables 6 and 7). If we compare the models that include trends – columns 2 and 4 of tables 6 and 7 – we see that the magnitude of the effect is similar regardless of the type of skill included on the left hand side. The estimates gets slightly smaller when we extend the sample to include ALL data in addition to PIAAC data (columns (2) and (4) of Table 7). Evaluated for numeracy skills in the extended sample (column 2 of table 7), we find that a one percentage point increase in the unemployment rate is 1.4 percent of a standard deviation.

Table 7: The effect of unemployment at age 16-18 on adult numeracy and literacy skills using the pooled dataset with PIAAC and ALL

	PIAAC+ALL		PIAAC+ALL	
	Numeracy		Literacy	
	(1)	(2)	(3)	(4)
Unemployment (16-18)	0.0104*** (0.00343)	0.0140** (0.00513)	-0.00308 (0.00530)	0.0133*** (0.00398)
Parent's ed. Ref. cat.: ed. below high school				
Mother's education: Above high school	0.220*** (0.0310)	0.235*** (0.0288)	0.182** (0.0642)	0.188*** (0.0620)
Father's education: Above high school	0.426*** (0.0322)	0.430*** (0.0311)	0.421*** (0.0327)	0.419*** (0.0320)
Gender (Male=1)	0.281*** (0.0174)	0.282*** (0.0176)	0.0524*** (0.0166)	0.0540*** (0.0165)
Set of dummies for compulsory ed. Ref. cat.: 5-7 years of comp. ed.				
8 years	0.113* (0.0540)	0.00561 (0.0468)	0.128* (0.0598)	0.0997* (0.0519)
9 years	0.127* (0.0676)	-0.0226 (0.0511)	0.0889 (0.0869)	0.0272 (0.0528)
10-12 years	0.172 (0.114)	-0.0200 (0.0733)	0.138 (0.143)	0.0924 (0.0565)
Constant	-0.758*** (0.0707)	1,152*** (281.8)	-0.782*** (0.0696)	345.2 (197.2)
Observations	64,385	64,385	64,385	64,385
R-squared	0.118	0.124	0.131	0.137
Country fixed effects	Yes	Yes	Yes	Yes
Cohort dummies	Yes	Yes	Yes	Yes
Country specific linear and quadratic cohort trends	No	Yes	No	Yes
ALL included	No	No	No	No
Number of countries	14	14	14	14

Note: AREG regressions weighted by sampling weights. Robust standard errors clustered at the country level in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Heterogenous effects

As for the education attainment regression, we extend the model to include interaction terms between unemployment rate at age 16-18 and a dummy for mother and father having more than high school education. Table 8 presents the results for numeracy skills (columns (1) and (2)) and literacy skills (columns (3) and (4)). As we can see from reading across the columns of Table 8, only the interaction term for mother's education is positive and significant. The interaction term for father's education is positive, but not statistically significant. The result indicates that a rise in unemployment during teenage years have the largest effect on completed

formal education for individuals with high educated mother. The results are strongest for numeracy skills.

Table 8: Interaction between parent's education and unemployment

	Numeracy		Literacy	
	PIAAC (1)	PIAAC+ALL (2)	PIAAC (3)	PIAAC+ALL (4)
Unemployment (16-18)	0.0139** (0.00512)	0.0128** (0.00469)	0.0124** (0.00411)	0.0112*** (0.00330)
Parent's ed. Ref. cat.: ed. below high school				
Mother's education: Above high school	0.169*** (0.0222)	0.177*** (0.0258)	0.0898 (0.0645)	0.102 (0.0670)
Father's education: Above high school	0.426*** (0.0337)	0.417*** (0.0293)	0.383*** (0.0217)	0.384*** (0.0198)
Interaction between parental ed. and unemployment				
Interaction with mother's education	0.0115*** (0.00356)	0.0108*** (0.00343)	0.0174* (0.00939)	0.0158* (0.00823)
Interaction with father's education	0.000392 (0.00231)	0.00205 (0.00210)	0.00652 (0.00366)	0.00608 (0.00393)
Constant	-359.8 (340.2)	1,114*** (260.1)	-1,496*** (156.5)	281.2 (166.9)
Observations	47,053	64,385	47,053	64,385
R-squared	0.135	0.124	0.155	0.138
Number of countries	12	14	12	14
Gender dummy	Yes	Yes	Yes	Yes
Compulsory school length dummies	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes
Cohort dummies	Yes	Yes	Yes	Yes
Country specific linear and quadratic cohort trends	Yes	Yes	Yes	Yes
ALL included	No	Yes	No	Yes

Note: AREG regressions weighted by sampling weights. Robust standard errors clustered at the country level in parentheses. *** p<0.01, ** p<0.05, * p<0.1

5. Concluding remarks

The paper explores data from the Program for the International Assessment of Adult Competencies (PIAAC) and the Adult Literacy and Life Skills Survey (ALL) to provide cross-country evidence on the relationship between individuals completed education and skills in adulthood and country unemployment rates during teenage years. In line with the majority of previous studies of post-compulsory school enrolment, we find that higher unemployment in teenage years have a positive effect on completed years of education. A novel finding is that we document a similar counter cyclical pattern in numeracy and literacy as measured by the tests in PIAAC and ALL. Our econometric results show that a one percentage point increase in unemployment increases length of education by 0.04 years and nearly 1.5 percent of a standard deviation in numeracy skills. This means that an increase in unemployment by 5 percentage points, which typically many European countries experienced from the 1970's to the 1980's lead to an increase in years of formal education by 0.2 years and approximately 7.5 percent of a standard deviation increase in adult skills in numeracy.

Our paper is related to the study of Hanushek et al (2015) who find substantial earnings returns to numeracy skills using the PIAAC data. Our study complements their paper by explicitly studying how variations in labor market conditions in teenage years across countries affect these skills as measured in PIAAC. By combining our results with the findings in Hanushek et al, we can illustrate the potential earnings effect in adulthood from differences in labour market conditions in teenage years. To illustrate the economic impact of our findings in terms of earnings, assume for a moment that skills measured by the PIAAC tests fully capture human capital differences between individuals. Using the estimated earnings return to numeracy as found in Hanushek et al (2015), our findings then suggest that an increase in unemployment rate in teenage years by 5 percentage points represents an earnings difference of approximately 1.3 percent. These numbers illustrates that labor market conditions at the time individuals make crucial educational decisions has economically and statistically long lasting effect on their skills and earnings potential in adulthood.

References

- Alessandrini, D. (2018): Is post-secondary education a safe port and for whom? Evidence from Canadian data. *Economics of Education Review* 67, 1–13
- Angrist, J. D. and J.-S. Pischke (2009), *Mostly Harmless Econometrics: An Empiricist's Companion*, Princeton University Press.
- Arkes, J. (2010), Using unemployment rates as instruments to estimate returns to schooling, *Southern Economic Journal* 76, 711-722.
- Barr, A. and S. Turner (2013), Expanding enrollments and contracting state budgets: The effect of the Great Recession on higher education, *The Annals of the American Academy of Political and Social Science* 650, 168-193.
- Becker, G. (1964), *Human Capital: A Theoretical Analysis of Special Reference to Education*, Columbia University Press, New York.
- Bedard, K. and Herman, D. (2008), Who goes to graduate/professional school? The importance of economic fluctuations, undergraduate field, and ability, *Economics of Education Review* 27, 197-210
- Betts, J.R. and McFarland, L.L. (1995), Safe Port in a Storm: The Impact on Labor Market Conditions on Community Colleges Enrollments, *Journal of Human Resources* 30, 741-765.
- Black, S. E., Devereux, P. J. and Salvanes, K. G. (2005), Why the apple doesn't fall far: understanding intergenerational transmission of human capital. *American Economic Review* 95, 437–49.
- Bradley, S. and Lenton, P. (2007), Dropping out of post-compulsory education in the UK: an analysis of determinants and outcomes, *Journal of Population Economics* 20, 299-328.
- Brunello, G., Fort, M. and Weber, G. (2009), Changes in compulsory schooling, education and the distribution of wages in Europe, *The Economic Journal* 119, 516-539.
- Card, D. and Lemieux, T. (2001), Dropout and enrolment trends in the post-war period: What went wrong in the 1970's?, in J. Gruber (ed), *Risky Behavior Among Youths: An Economic Analysis*, University of Chicago Press.

Carneiro, P., Heckman, J. J. and Vytlacil, E. J. (2011), Estimating marginal returns to education, *American Economic Review* 101, 2754-2781.

Christian, M. S. (2007): Liquidity constraints and the cyclicalities of college enrollment in the United States, *Oxford Economic Papers* 59, 141–169

Clark, D. (2011), Do recessions keep students in school? The impact of youth unemployment on enrolment in post-compulsory education in England, *Economica* 78, 523–545.

Dellas, H. and Sakellaris, P. (2003), On the cyclicalities of schooling: theory and evidence, *Oxford Economic Papers* 55, 148-172.

Genda, Y, Kondo, A. and Ohta, S. (2010), Long-term effects of a recession at labor market entry in Japan and the United States, *Journal of Human Resources* 45: 157-196.

Hanushek, E. A. and Woessmann, L. (2012): Do better schools lead to more growth? Cognitive skills, economic outcomes, and causation, *Journal of Economic Growth* 17, 267–321

Hanushek, E. A. Schwerdt G., Wiederhold, S. and Woessmann, L. (2015): Returns to skill around the world: Evidence from PIAAC. *European Economic Review* 73, 103-130.

Hanushek, E. A., Ruhose, J. and Woessmann, L. (2017): Knowledge capital quality and aggregate income differences: Development accounting for U.S. states, *American Economic Journal: Macroeconomics* 9, 184-224.

Kahn, L. B. (2010), The long-term labor market consequences of graduating from college in a bad economy, *Labour Economics* 17, 303-316.

Lin, M-J. (2008), Does unemployment increase crime?: Evidence from US data 1974-2000, *Journal of Human Resources* 43, 413-436.

Murtin, F. and Viarengo, M. (2011), The expansion and Convergence of Compulsory Schooling in Western Europe, 1950-2000, *Economica* 78, 501-522

Oreopoulos, P. (2006), Estimating average and local average treatment effects of education: When compulsory schooling laws really matter. *American Economic Review* 96, 152–75.

Oreopoulos, P., von Wachter, T. and Heisz, A. (2012), The short- and long-term career effects of graduating in a recession, *American Economic Journal: Applied Economics* 4, 1-29.

Reiling, R. B and Strøm, B. (2015), Upper secondary school completion and the business cycle. *Scandinavian Journal of Economics* 117, 195–219.

Appendix

Table A 1: Development in unemployment rates for the period 1960-2002

Country	1960-2002		1960-1969		1970-1979		1980-1989		1990-2002	
	Mean/ Std.dev.	Min/ Max	Mean/ Std.dev.	Min/ Max	Mean/ Std.dev.	Min/ Max	Mean/ Std.dev.	Min/ Max	Mean/ Std.dev.	Min/ Max
Belgium	7.30	1.5	2.21	1.5	4.99	1.9	11.46	8.9	10.41	6.6
	4.30	13.5	0.57	3.3	2.49	8.1	1.59	13.5	2.47	13.1
Denmark	5.23	0.7	1.47	0.7	4.66	0.9	8.30	6	6.59	4.2
	3.20	11.1	0.45	2.1	2.84	8.4	1.77	11.1	2.19	10.7
Finland	5.85	1.2	1.95	1.2	3.89	1.7	4.74	3.1	11.98	6.7
	4.45	16.6	0.89	4	1.97	7.3	0.88	5.5	3.20	16.6
France	5.64	1.1	1.60	1.1	3.63	2.4	8.06	6.3	8.99	7.2
	3.28	10.2	0.46	2.4	1.14	5.4	1.01	9.2	1.15	10.2
Ireland	9.34	3.9	5.33	4.6	7.39	5.4	14.71	10.5	10.17	3.9
	4.40	17.1	0.58	6.4	1.42	9.3	2.35	17.1	4.59	15.8
Italy	8.38	3.9	5.21	3.9	6.64	5.4	10.57	8	10.92	9.1
	2.70	12.1	0.65	5.9	0.87	7.8	1.48	12.1	0.91	11.9
Japan	2.33	1.1	1.27	1.1	1.75	1.2	2.50	2.1	3.63	2.1
	1.12	5.4	0.17	1.7	0.38	2.2	0.24	2.8	1.13	5.4
Netherlands	4.97	0.5	0.85	0.5	4.22	1.3	10.12	7.7	5.08	2.1
	3.62	12.2	0.39	1.6	1.81	6.2	1.51	12.2	1.93	7.3
New Zealand	3.53	0	0.17	0	0.76	0.1	5.16	3.5	7.55	5.3
	3.41	10.6	0.22	0.8	0.82	2.2	1.53	8	1.88	10.6
Norway	2.65	0.7	0.99	0.7	1.67	0.8	3.17	2	4.55	3.2
	1.64	6.1	0.19	1.3	0.39	2.3	1.16	5.3	1.09	6.1
Spain	10.96	1.2	1.52	1.2	5.26	2	18.38	14.2	18.18	10.6
	8.24	24.2	0.21	1.9	3.00	11.5	2.47	21.6	4.60	24.2
Sweden	3.66	1.2	1.68	1.2	2.20	1.6	2.73	1.6	7.48	3.3
	2.74	10.2	0.29	2.2	0.37	2.7	0.80	3.9	2.35	10.2
Switzerland	1.04	0	0.00	0	0.22	0	0.66	0.2	2.98	1.6
	1.30	3.9	0.00	0	0.23	0.7	0.27	1.1	0.67	3.9
United Kingdom	5.71	1.1	1.68	1.1	3.92	2.1	9.87	6.9	7.44	4.8
	3.48	11.9	0.43	2.2	1.36	5.7	1.77	11.9	1.93	10.3