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The expansion of education in Europe in the 20th Century

Gabriele Ballarino, Elena Meschi, Francesco Scervini

GINI Discussion Paper 83
August 2013

GROWING INEQUALITIES' IMPACTS

August 2013

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Bibliographic Information

Ballarino G., Meschi E., Scervini F. (2013). The expansion of education in Europe in the 20th Century. AIAS, GINI Discussion Paper 83.

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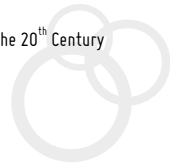


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Abstract

The paper focuses on the expansion of participation to education and on its drivers separately for each level (lower secondary, upper secondary, tertiary). In doing this, we build a bridge between economic research, who typically focuses on *years* of education, and sociological research, who typically considers the *title of study* achieved by individuals.

Building on a new and careful recoding and harmonization of educational levels, we use ESS data for 26 European countries to analyze the process of expansion of participation to three levels of schooling in Europe, from the cohort born in the 20s to the one born in the first half of the 80s. We look at the drivers of this process, studying which factors push the expansion of participation to each school level.

Our analytical strategy includes three steps, for each level of schooling. First, we test sociological theories stressing *path-dependency* as the main driver of educational expansion (whichever the mechanism pushing it), regressing the latter on previous achievement and on measures of direct demand. Second, we add different sets of covariates, each one testing a group of theoretical hypothesis on the factors driving expansion. We consider: a) *economic* factors; b) *political* factors; c) *social (contagion)* factors. Third, we look at *convergence* over time.

Results of our fixed-effects models show both path-dependency and convergence, but there is a strong difference among levels: while participation to lower and upper secondary school shows convergence, no convergence is found for participation to tertiary education.

JEL codes: I21; I25; I28

Keywords: education; educational expansion; educational levels



1. Introduction and motivation

The expansion of participation to the school system is one of the core features of contemporary societies. Today each individual spends a significant portion of her early life in school, participating to activities organized with the explicit aim of transmitting socially available knowledge and skills to younger individuals. This portion can involve up to 30% of the time daily available to the individual, for a time period that goes from age 6 to age 18 and often further, up to age 25 or even more. Most of this time is devoted to learning various kind of information and skills, organized in standardized long-term curricula. Everywhere, curricula are organized hierarchically, going from basic knowledge and skills to advanced and sophisticated ones, and cumulatively, as the individual has to complete the lower-level curriculum to enter the higher-level one. The school system does not only involve the transmission of knowledge and of societal rules and norms, but it also sorts individuals into occupations, thus structuring their life opportunities. The completion of a curriculum, conditional on passing some kind of knowledge and/or competence testing, enables the individual to get a certificate assessing her skills. Such a certificate, called educational title, is typically recognized by the state, and is thus valued in the labour market, enabling its holder to enter a set of occupational positions. The distribution of educational titles is thus an important feature of contemporary societies, and its change is an important component of social change (and of social inequality) overall.

This paper focuses on the expansion of participation to education and on its drivers, separately for each level. In doing this, we build a bridge between economic research, who typically focuses on *years* of education, and sociological research, who typically considers the *title of study* achieved by individuals. Building on a new and careful recoding and harmonization of educational levels (see Meschi and Scervini 201*), we use ESS data for 26 European countries to analyse the process of expansion of participation to three levels of schooling in Europe, from the cohort born in the 20s to the one born in the first half of the 80s.

Our analytical strategy includes three steps, for each level of schooling. First, we test sociological theories stressing *path-dependency* as the main driver of educational expansion (whichever the mechanism pushing it), regressing the latter on previous achievement and on measures of direct demand. Second, we add different sets of covariates, each one testing a group of theoretical hypothesis on the factors driving expansion. We consider: a) *economic* factors,

typically emphasized by the economics of education; b) *political* factors; c) *social (contagion)* factors, i.e. *emulation* among neighboring countries. Third, we look at *convergence* over time.

The paper includes 7 section. After this introduction, section 2 discusses how educational expansion can be defined and measured, and section 3 presents the hypotheses concerning the factors driving it. Section 4 presents the data and the modeling strategy adopted, while section 5 describes the monovariate pattern of school participation over time, at both the European level and by geopolitical area . Section 6 presents the results of models' estimation and section 7 concludes.

2. Educational expansion: definition and measurement

Most of the literature, both sociological and economic, has defined the expansion of education in terms of change. This definition is all the more useful if the causes of the expansion are to be studied, as in this paper. In fact, *levels* of school participation¹ in a given set of countries might be related to many unobserved and unobservable societal features which are not easily controlled for when one wants to study the causal factors underlying it, leading to spurious associations and misspecification bias. However, when one looks at *change* thereof the impact of such unobserved features on the initial level is automatically controlled for (Craig 1981). While economic research has held on to this definition, sociological research, on the other hand, has been less consistent: while some have been looking at change, albeit differently operationalised in different papers (Meyer et al. 1977; 1992; Schofer and Meyer 2005), some have also used levels of school participation in order to operationalise the concept of expansion (Treiman et al. 2003).

In this paper, we shall look at change in the proportion of individuals attaining each of the educational levels we observe in two ways. We define a set of country-cohort units (see below the detail) and measure, first, the *level* of educational attainment in cohort t , controlling for the level of cohort $t-1$ of the same country. In this way, we give weight to path-dependence in the evolution of the educational systems. This choice makes substantive sense, as educational systems are huge institutions, involving a large number of individuals with relevant costs for society, and therefore are not expected to change abruptly, a point typically made by sociological and political science research. Second, we look at the *change* from cohort $t-1$ to cohort t (defined as the difference in the logged percentages). In this way we focus on the dynamic of educational systems and on the trend of educational participation (at each given educational level), abstracting from its actual size. This approach is typical of economic research on growth, where the general interest lies in the comparison of different national growth trends to check whether convergence is observed, and has been recently extended to the study of education (Murtin and Viarengo 2009).

Before coming to the independent variables and to the hypotheses guiding the analyses, some further discussion has to be devoted to the dependent variable. How should education be measured? Economic research typically measures it by means of years of completed schooling (eg Barro and Lee 2010), a measure giving researchers at least three advantages: it allows a quick and simple aggregation from the micro to the macro level; it makes comparisons across countries easy, despite different school designs, and, last but not least, is relatively easy to be modeled. On the

¹ By “school participation”, in this paper we mean the full achievement of the final degree.

contrary, sociological research typically measures education by means of the higher educational title achieved (eg Meyer et al. 1977). As the latter is a categorical measure, it makes the micro-to-macro aggregation less straightforward; can involve sometimes serious comparability problems in cross-national research and it is less easy to be modelled for statistical analysis. However, as a measure it is much more isomorphic with respect to the phenomenon under investigation than years spent in school, for at least two reasons.

First, the occupational value of an individual's education is related more to the achievement of some educational title rather than to the mere accumulation of years of schooling. This proposition is the core of the sociological theory of educational credentials (Collins 1979), is fully consistent with the mechanisms underlined by the economic theories of signalling (Arrow 1973) and screening (Spence 1973), and has been empirically supported by findings of the so-called "sheepskin models" (Hungerford and Solon 1984). Given the importance of educational certificates *per se*, the expansion of education appears to be better described as a change in their distribution on the population than simply as a change in average years of schooling.

Second, when studying educational expansion one has to consider that the levels included in the educational system did not grow cumulatively over time, one after the other, but resulted from the integration into the new mass education system of previously existing schools. Tertiary education is in fact much older than primary mass schooling. Universities, who had been educating the European élites since the Middle Ages, have been integrated into the cumulative structure of the modern curricula as its tertiary level as late as in the 19th century, with some remarkable national differences (Collins 2000). The history of secondary education is similar. On one side, it originates in the lower segment of pre-modern élite schools, including gymnasia, academies and colleges who gave a general education preparing for university. On the other side, it derives from previous institutions of occupational apprenticeship, aiming at giving skills with immediate occupational value: some of them resulted directly from the modernization of older forms of apprenticeship, linked to medieval urban guilds and corporations, while others were born during the industrialization, as vocational industrial schools founded by industry owners interested in the well-being and the skills of their workers' sons (Thelen 2004).

Given this historical background, the patterns of expansion between countries could vary across levels, as well as the factors pushing it: this is why our dependent variable is defined as the

expansion of participation to three different school levels: lower secondary, upper secondary and tertiary².

3. Factors driving the educational expansion

In this section, we present a set of hypotheses concerning the factors underlying the expansion of education. They are divided into four broad groups of factors, each related to a dominant theoretical explanation.

3.1 Path-dependency

The first set of factors to be taken into account is related to the self-propelling dynamic of the expansion of education, i.e. to its *path-dependency*. Very simply stated, the hypothesis is that the better predictor of the participation to a given level of education at time t is the participation to the same level at time $t-1$. While path-dependency has been widely discussed and formalized, especially in political science (eg Page 2006), here we will limit ourselves to a set of arguments taken from the historical sociology of education (Meyer et al. 1977; Collins 2000; Brint 2006), who have also been recently paralleled by political economists interested in the institutional bases of economic development (Galor 2006). While the origins of modern mass educational systems can be attributed to state policies, as a key component of the state-building process (Ramirez and Boli 1987), its expansion is pushed by a double, micro-macro process of socio-economic emulation. At the individual level, those who get education get rewarded on the labour market³, in terms of both income and social status (prestige): those rewards, coupled with the intervention of the state, who keeps the costs relatively low, are the driving force underlying the expanding school participation, as people observes them and invests on education in order to get them. The process is thus self-propelling, similarly to a diffusion or a contagion (Meyer et al. 1977; 1992). When a ceiling effect operates, as an educational level is saturated by almost universal participation, the “race” moves to the following level. Thus, a similar pattern of expansion should hold for all educational levels, albeit with different timing.

² We exclude primary education since it was already universal in almost all European countries by the earliest cohorts we observe.

³ Such rewards can be based on productivity, related to the skills learned while in school, or just on the credentialing (signalling) value of the school title. Human capital theory in its standard form believes in the first explanation, while signalling/screening economic theories and educational credentialing sociological theories prefer the second, albeit with different nuances.

At the macro level a second process of diffusion takes place: the modern school system created in the early European countries who introduced mass schooling, as the German and Scandinavian states, was imitated by the other European countries, and then by the rest of the world, via the European colonial world hegemony of the 19th century (Ramirez and Boli 1987).

Thus, a general *path-dependency hypothesis* can be formulated, stating that the expansion of participation to education, at each level, is a path-dependent and self-propelling process, based on the previous level of expansion and on the available population (path-dependency hypothesis). The second hypothesis concerns *convergence*: given the macro dynamic of imitation among countries and the existence of ceiling effects, the levels of participation in different countries should converge over time, so that more convergence should be observed in the lower than in the higher educational levels.

3.2 Economic factors

A second set of factors that have to be taken into account are the economic ones. All theories interested in modernization and development, both economic and sociological, have underlined the correlation over time between economic development and participation to schooling. While economists, inspired by human capital theory, have generally been more interested in the causal relation going from schooling to economic growth, the “classical” argument on the impact of the economy on the educational system has been typically put forward by sociologists as the *technical-functional hypothesis*, and as such it has been adopted by economic historians (Craig 1981; Viarengo 2007).

As critically exposed by Collins (1979), the technical-functional hypothesis states that economic development fosters *per se* participation to schooling. In our reconstruction, the argument has three steps. First, it is assumed that, on average, schooling makes workers more productive, *ceteris paribus*. Second, it is observed that in a competitive environment employers have to recruit the most productive workers, if they do not want to lag behind their competitors. The third step can be based either on individual choices or on public policies. According to the former version, closer to the original human capital theory, the more educated people will get the better-paid jobs, and this wage premium sets an emulative-competitive process in motion, pushing people into schools in order to improve their own skills and thereby to get better-paying jobs. According to the latter version, the government invests in schooling in order to improve the general welfare of the population and to face competition from foreign countries. More will be said below on the role of government, but for now the mechanism relating the positive impact of

schooling on individuals and their educational choices does not matter: the *technical-functional hypothesis* states that a higher level of development should produce an expansion of education, at all its levels.

While the technical-functional hypothesis states that people enter education because its (perceived) future benefits exceed the present costs, some sociologists have observed that often people enter education, in particular at its post-compulsory levels, because the present cost-opportunities are low. In absence of attractive employment opportunities, staying in education can be the best choice, even without expecting high future returns. Education becomes thus a “parking lot” where young people avoid unemployment. This is a pattern typical of Southern European countries, and the parking lot idea was in fact introduced for the Italian case (Barbagli 1982), but it has also been extended to other ones, including the US (Walters 1984). It is thus possible to formulate a *parking-lot hypothesis*, according to which participation to upper secondary and tertiary schooling increases as a negative function of economic development.

A further pattern relating economic growth and the expansion of education has been recently proposed by economists. The key concept is the distance from the technological frontier (Vandenbussche et al. 2004). According to neo-Schumpeterian theories of growth, primary and secondary education can act as a substitute for technology (with respect to development), and thus investment in compulsory education could be a means for less developed countries to catch up with the leading ones. Thus, a *catch-up hypothesis* can be formulated: the more distant a country is from the leading ones, the faster the expansion of compulsory education will be, while for higher education the relation should be the opposite, as investment in higher education increases when the technological frontier becomes closer.

3.3 Political factors

Sociological research has since long underlined the role of political and institutional factors in the expansion of education, and in the last years political economy has joined back this stance. First of all, the direct effect of public policies concerning mandatory schooling should be considered, but it will not be considered here because it has been the subject of a couple of recent papers (Viarengo and Murtin 2009; Braga, Checchi and Meschi 2013), and also because of the econometric problems related to the high correlation between compulsory and actual participation. State policies will be taken into account by looking at the impact of their main features on expansion. In particular, following neo-institutional sociologists, it can be argued that the democratization of the political system is the main political factor underlying the expansion of

education: if all social groups are represented in the polity, as it is in a democracy, it cannot be tolerated that the members of some group are excluded from the economic and social benefits associated to school participation (Meyer et al. 1977; Schofer and Meyer 2005).

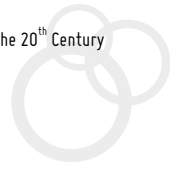
The *democracy hypothesis*, thus, states that the higher the level of democracy in a country, the larger the participation to schooling will be, in particular at the higher levels. In fact, historical evidence shows that also authoritarian states have invested on mass education, as a means to foster the popular consent to the state: a well-known example is 18th-century Prussia, the first European state to adopt compulsory education, but also 20th century Communism has supported the expansion of participation to compulsory and secondary schooling (Schofer and Meyer 2005, Treiman et al. 2003). Concerning higher education, however, the role of democratic governments is likely to have been instrumental to overcome the resistance to widening participation on the part of the European social and political élites, who fought for long against the inclusion of the offspring of the lower classes in what they felt to be their own educational institutions (Brint 2006). A related hypothesis, the *political left hypothesis*, could be formulated concerning the weight of left-oriented parties in democratic polities, given the strong emphasis socialist and social-democratic parties have historically given to investment in education as a means to increase school participation and to decrease income inequality (Iversen and Stephens 2008).

Our final institutional hypothesis is a classical Smithian argument, concerning the *economic openness* of a country. Economic research has generally shown a positive relation between economic openness and development, but recently this relation has been empirically shown to be causally uncertain, and possibly spurious (Andersen and Babula 2009), so we do not formulate a specific prediction concerning the positive or negative nature of the effect and its different pattern across educational levels.

3.4 Contagion factors

As stated above, many sociologists look at the expansion of education as a process of diffusion and emulation at both the micro- and the macro-level. Given that there are available no microdata detailed enough in order to directly model this process, one has to rely on auto-correlation over time of macro-measures, such as GDP. However, other measures can be constructed at the macro level, looking at the emulation process among states (see Ramirez and Boli 1987 for historical evidence on this point). First, it can be hypothesized that a *spatial contagion pattern* operates among neighboring countries: according to this hypothesis, the imitation among countries follows the territorial lines, and a country will expand its own educational system, at all levels, as a

function of the level of participation attained in its neighboring countries. A second hypothesis states, however, that the contagion operates via mechanisms which are not related to geographical proximity but to political and cultural affinity. In the European case, political and cultural affinity have given birth to the European Union. While the UE, as well as its precedent organizations (European Community, European Common Market) have never directly legislated on education, which remained the domain of the national member states, membership to it (both actual and requested) can be taken as an indicator of affinity with respect to a policy model strongly emphasizing the expansion of education as a means to achieve both economic efficiency and social equality of opportunity (Powell et al. 2012). The *policy model hypothesis*, thus, proposed that requested and actual membership to the Union (and its precedents) increases, at all levels, the expansion of participation to schooling.



4. Data and methodology

4.1 Dataset and definitions

A long-run analyses of education expansion requires data on education attainment over a long time-span. Unfortunately, these data are difficult to be collected from primary sources. The two most known datasets concerning education are Barro and Lee (2010) and Cohen and Soto (2007), including long time series of educational levels of the whole population, in several countries. However, as already pointed out previously, our perspective is different: we do not focus on education as an *input* of some “production function”, but as the *output* of political, social and economic processes. Under this perspective, we are not interested in *stock* of education, but rather in the *flows*, that is the official educational level attained by individuals belonging to each cohort as a result of political and socio-economic characteristics peculiar of a specific context.

To this goal, we build a pseudo-panel relying on the five waves of ESS data, collected every other year from 2002 to 2010. The ESS is a comparative project started in 2001, directed by a consortium of seven academic institutions and funded by the European Commission, the European Science Foundation and several national academic funding bodies. It is a repeated cross-section survey that provides detailed information on attitudes, beliefs, and behaviour patterns collected from nationally representative population samples (see <http://www.europeansocialsurvey.org>). It is an interesting source for comparative research on education as it provides more detailed information than usual on the educational attainment of the interviewed individuals. Differently from other comparative surveys, ESS collects the individual’s educational attainment according to the national structure of school qualifications, and this information is made available in the distributed file, together with the usual recoded and internationally comparable information derived from it. This allows to carefully recode it in order to achieve the better international comparability.

Our definition of educational level is slightly different from that provided by ESS, because of comparability issues. As widely discussed in Schneider (2009; 2010), ESS definitions may differ across countries and over time. Given the trade off between the accuracy of the definition of country specific school systems and the cross-country comparability, for the goals of the present paper we prefer to focus on the latter. Therefore, building on the work of Schneider (2009; 2010), we recoded the detailed education attainment variable into a broader definition of school levels, focusing on the four standard aggregates: primary, (lower) secondary, upper secondary, and

tertiary. Primary school is defined as the first stage of basic education, and corresponds to ISCED level 1. It is compulsory in all European countries and starts at the age of 5 or 6. Its attainment rate in Europe in the years we focus on is very close to 100% for the vast majority of countries and cohorts, so we decided not to use this variable in our empirical analysis. Secondary school coincides with the end of the second cycle of education, or with the end of the single longer primary cycle in several Eastern and Nordic systems. It corresponds to ISCED level 2. Secondary education is mainly undifferentiated and is now compulsory in all European countries. However, since it was not compulsory in the older cohorts, there is some variability that we can exploit in the empirical analysis. Upper secondary education includes all the ISCED levels 3 and 4 stages of education, that is all the upper secondary curricula, independently of being vocational or academic, and all the post-secondary non-tertiary education. Finally, tertiary education includes all the stages of tertiary education, irrespectively of the duration, and of the academic title provided. It corresponds to ISCED levels 5 and 6.

The five waves of ESS were merged in a single dataset, from which a pseudo-panel was extracted, by partitioning the observations in 22 three-years cohorts of birth (from 1920-22 to 1983-85) for each of 26 countries. Therefore, all ESS observations were partitioned in 572 cells, each including individuals born in the same country and in the same cohort, even if possibly surveyed in different waves. For each cell, we computed the share of individuals who completed primary, secondary, upper secondary, and tertiary level. Because of small sample size, we decided to drop all cells with less than 50 individuals. For this reason, we excluded 10 cells. However, the graphs presented below are created on the basis of 13 five-years cohorts, in order to avoid possible irregularities.

In addition to educational data, we use also data on macroeconomic situation and technological advance (real GDP per capita, real GDP growth, real total GDP, and the GDP gap with respect to the United States, as a measure of development), demographic structure (population growth rate), political framework (openness of the economy, political orientation of the parliament, degree of democracy, membership to EU, or application to membership, from various sources).⁴ Descriptive statistics are reported in table 1.

⁴ Data on GDP and openness are taken from Penn tables (<https://pwt.sas.upenn.edu/>), political orientation and degree of democracy from ParlGov (<http://parl.gov.org/>) and PolityIV (<http://systemicpeace.org/polity/polity4.htm>) datasets, respectively, while data on EU membership are available on the EU official website.

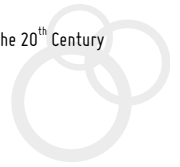


Table 1 descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Attainment of secondary education — all population	549	82.68443	23.26262	6.799406	100
Attainment of upper secondary education — all population	549	62.94603	24.80619	0	97.67477
Attainment of tertiary education — all population	549	22.71672	12.9747	0	69.29725
Attainment of secondary education — males	549	84.20768	21.65451	8.847299	100
Attainment of upper secondary education — males	549	65.79247	23.39325	0	98.09524
Attainment of tertiary education — males	549	22.8801	11.72924	0	67.21539
Attainment of secondary education — females	549	81.4231	25.02015	3.40701	100
Attainment of upper secondary education — females	549	60.51079	26.92705	0	98.80021
Attainment of tertiary education — females	549	22.59892	15.67401	0	77.55042
Real GDP per capita	428	17800.88	10486.39	1598.923	77581.57
Economic openness	428	61.851	48.46026	2.348656	301.4117
Growth real GDP per capita	424	3.041991	3.103124	-14.11617	15.73689
Level of democracy (polity IV)	690	5.031522	7.069652	-10	10
Left (0) — right (10) government	548	3.687167	2.555989	0	8.137465
Left (0) — right (10) parliament	548	3.663482	2.361436	0	7.177318
EU applicants for membership	762	.0669291	.2411462	0	1
EU member	762	.2751531	.4436055	0	1
Attainment of secondary education — bordering countries	554	83.73385	19.1265	12.98381	100
Attainment of upper secondary education — bordering countries	554	64.68129	21.3697	7.185773	95.50622
Attainment of tertiary education — bordering countries	554	22.70645	10.69396	1.81892	63.30437
Population growth rate	494	1.448194	1.578787	-4.513367	7.493957
Total real GDP	428	332.3739	480.4234	4.280816	2579.667
Real GDP — gap from US	428	2.051699	1.324497	.5513627	9.13884

Note: The number of observations can be higher than 562 because of lagged variables.



4.2 Econometric problems and methods

In order to analyse the pseudo-panel data constructed as explained above, we use a least square dummy variable estimator for dynamic panels, with the bias correction described in Bruno (2005). This estimation method allows us exploiting the dynamic panel and testing the effect of exogenous variables on the evolution of educational trends.

The model can be written as follows:

$$y_{i,t} = a * y_{i,t-1} + x_{i,t} * b + u_i + e_{i,t}$$

where the scalar y represents the share of people with at least secondary, upper secondary, or tertiary education, the vector x represents a set of exogenous variables, described above, that are supposed to affect the level of y , u is the country fixed-effect term, and e is the idiosyncratic error term. The subscript t refers to individual cohorts and i refers to every country in the dataset. The fixed-effect term, u_i , captures all the unobservable country characteristics that are supposed to be invariant over time, but heterogeneous across countries. The term is assumed to be uncorrelated to the idiosyncratic error term.

The least square dummy variable corrected model extends the usual “fixed effect” model (based on the variation around the mean) including an autoregressive term, $y_{i,t-1}$, and correcting for the bias originating by the correlation between the error term, $e_{i,t}$, and the lagged dependent variable, $y_{i,t-1}$ (see Behr, 2003, for a complete survey of the problem and of the various solutions proposed, and Bruno, 2005, for more details on this model).

With respect to the controls, we forward the variables included in the vector x in order to make them coherent with the educational level. For instance, when we test the model for upper secondary education, we forward the exogenous variables by four 3-years cohorts, so that it is the GDP level when an individual is 12 years old to determine its probability to complete upper secondary education. Analogously, we forward the variables by three and five cohorts for lower secondary and tertiary education, respectively.

Interpretation of the coefficient a deserves some discussion. Following the literature on convergence in economic growth (see Barro and Sala-i-Martin, 1992), we refer to beta-convergence whenever there is a cross-country convergence toward a given level. Stated

differently, convergence implies that the greater the level of the interest variable in a period, the lower the growth of this variable in the successive period. In our model, there is convergence if the parameter a is bounded between 0 and 1, excluding the extreme values. Provided convergence exists, the rate of convergence is given by the negative logarithm of a , that is the share of the gap between the present value and the convergence value that is filled in every period (in our case, every three years).⁵

⁵ The model described above can be restated in terms of logarithms, to make it clearer the growth rate of the variable of interest, y . By subtracting $y_{i,t-1}$ in both sides and taking the logarithm, it is easy to see that the convergence rate is equal to $-\ln(a)$.

5. Descriptive results: trends of educational expansion

Dividing the ESS sample into 5-years cohorts of birth, this section looks at the pattern over time of schooling participation at the three levels considered. First, all the countries all pooled together and divided by gender. Second, they are divided into 5 geo-political areas. Third, a categorical recoding of the level of participation is proposed, in order to have a more synthetic measure of school expansion.

5.1 The European pattern

Figures 1, 2 and 3 show the general pattern over time of our dependent variable, namely participation to the three educational level we consider. The ESS sample is pooled over countries, divided into 5-years cohorts, and broken down to gender, in order to enrich the descriptive picture and to test research results showing that the gender gap in favour of men, once observed in all schooling systems, has now disappeared all over Europe (Breen et al. 2010).

Figure 1. Participation to lower secondary education, all countries pooled, M and F

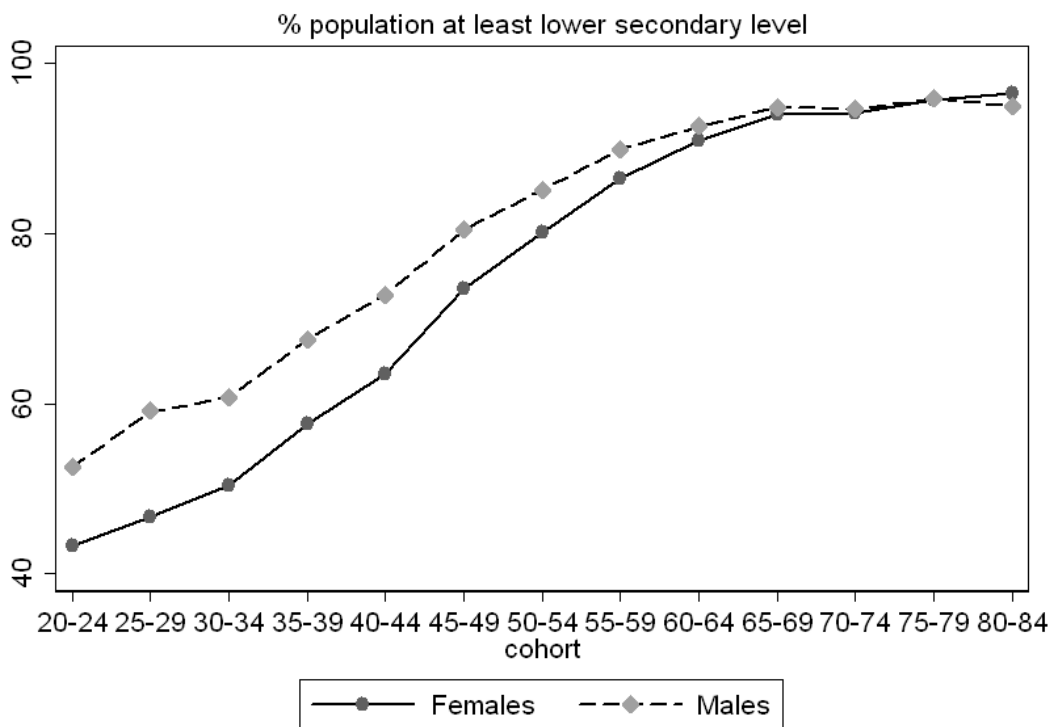


Figure 1 shows the expansion of participation to lower secondary school. The general pattern is quite similar to the logistic curve referred to by the neo-institutional sociology of education (Meyer et al. 1977; Brint 2006), with a first stage of slow growth, of which we see only the final part (as the oldest cohorts in our sample show an already high level of participation, starting from over 40% for women and over 50% for men); a second stage of “explosion”, starting with cohort 30-34, when the curve gets steeper; a third stage, starting with cohort 65-69, when the expansion slows down as a saturation point beyond 90% has been reached.

Concerning gender, a catch-up process on the part of females can be observed: they start disadvantaged, but then the stage of explosion is more strong for them and they catch up with males by the 65-69 cohort.

Figure 2. Participation to upper secondary education, all countries pooled, M and F

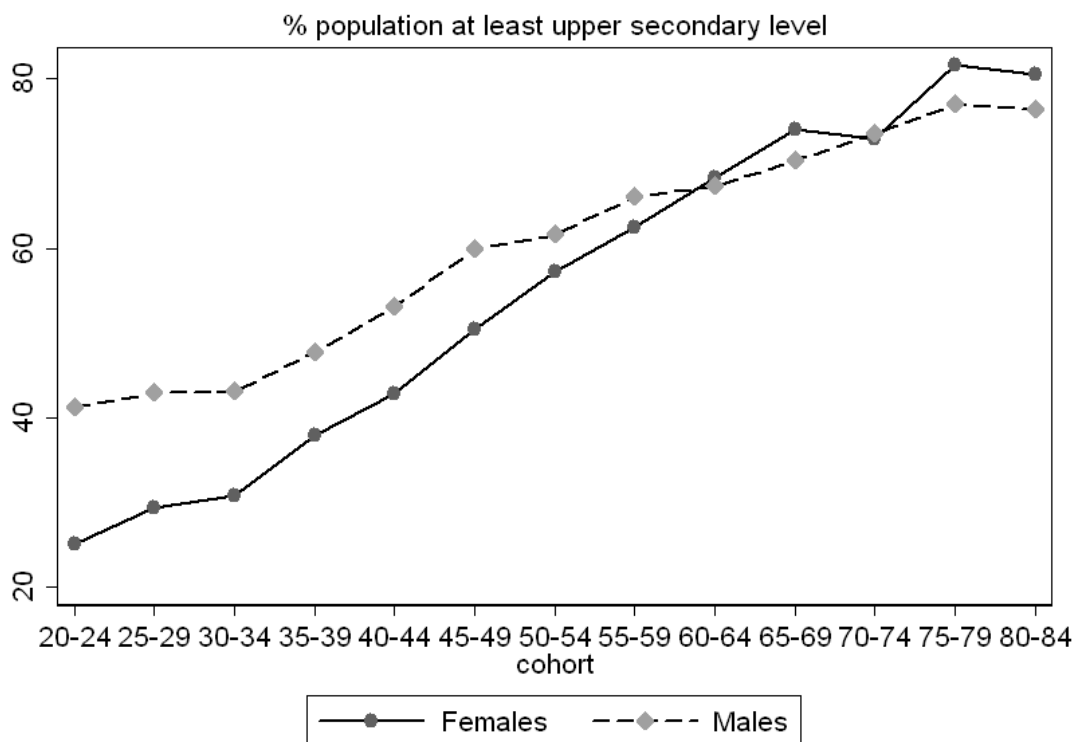
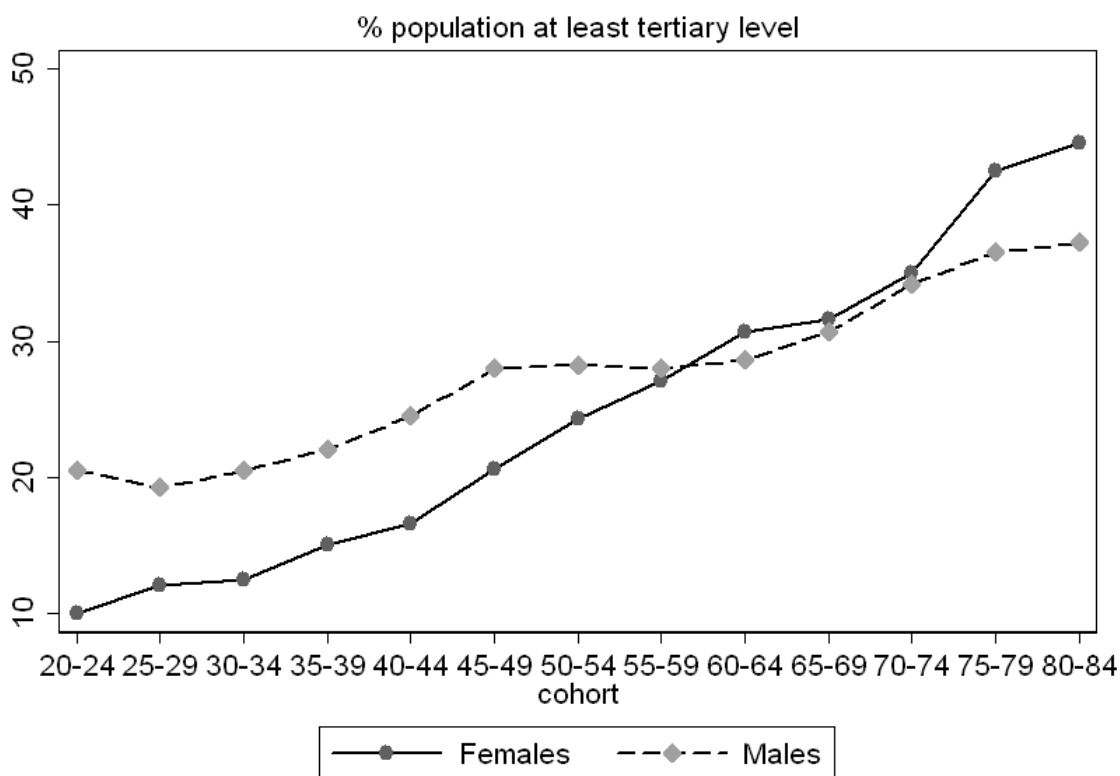


Figure 2 shows the pattern of participation to upper secondary. The logistic pattern is less regular than in the previous case. This could depend on measurement errors, as numbers are lower, but it could also depend on a weaker ceiling effect. The stage of explosion also starts with the

cohort born 1930-34, but saturation is reached later, with the cohort born in the late 70, and at a lower level, between 70 and 80%.

The gender effect is stronger for upper secondary than it was for the lower level. In the early cohorts, female disadvantage is stronger. This could depend on the fact that the early expansion of higher secondary education had a strong vocational component, particularly addressed to males. Then, the gender effect in the steepness of the stage of explosion is stronger than in the previous case, so that the catch-up again takes place for the cohorts born in the 60s. Labour market demand, in particular for clerical positions in private and public administrations, could have played a role in the gender catch-up.

Figure 3. Participation to tertiary education, all countries pooled, M and F



In figure 3 the pattern of expansion of participation to higher education is shown. The logistic pattern is harder to be seen at this level, but this could depend on measurement errors, as numbers are much lower (notice the scale). The increase of participation of both genders show something like a two-stage pattern. Men's participation grows with the cohorts born in the 30s and 40s, who went to university after WW2, then the growth stops, to start again for the cohorts born in the 60s and 70s. Women start lower, grow as men with the cohorts of the 30s and the 40s, but then

continue in growing up to the cohort born in the 70, when they catch up, then slow down for a decade and then grow faster again with the latest cohorts, as men do but more strongly. A similar two-stage expansion pattern can be seen in Schofer and Meyer (2005, figure 1), who plot the world's higher education students per 10,000 capita in the XX century with UNESCO data. This is an important robustness check for the ESS data and for our results in general.

The gender pattern is stronger than at the previous levels (in general, with each of the three cumulative levels the gender pattern gets stronger): women are more disadvantaged in the early cohorts, then have a faster growth, catch up in the 60 and then get a bigger advantage on men. This could depend on many reasons. First, in this case there is no ceiling effect: at the lower levels participation has already reached the level of saturation, and there is not much space for the gender gap to increase, at the advantage of women. Second, it might be a performance effect: women's school performance is better than men's, and performance gets increasingly important at the higher and more selective educational levels. Third, it could be an effect of the structure of the school system: higher secondary's tracking is gendered, as men more often choose vocational tracks that do not lead to university; this in turn leads to the feminization of higher education. Finally, it could be an occupational effect: typically female occupations in social services, school and administration increasingly require a higher education degree.

5.2 Geo-political areas

To look at the geographical variation of the pattern described above, in this paragraph the ESS data are divided into 5 groups of countries: Nordic (Denmark, Finland, Norway and Sweden); Anglo-Saxon (Ireland and UK); Continental European (Austria, Belgium, France, Germany, Luxemburg, the Netherlands and Switzerland)⁶; Mediterranean (Greece, Italy, Portugal and Spain); Eastern European, former Communist (Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Poland, Romania, Slovakia and Slovenia). For each of the groups, we plot, as in the graphs of the previous paragraph, the total participation to education of the population, for each educational level and distinguishing genders.

Figure 4 refers to participation to lower secondary. There is a clear process of convergence to be seen: in the oldest cohorts the levels of the different geo-political areas vary substantially, from more than 60% to more than 20%, while in the more recent cohorts the variation goes from 90% to 100%. Those areas who start at a lower level grow faster (see below more evidence for this).

⁶ Sometimes the term "Central European" is also used.

The Continental (Central) and the Nordic areas start at the highest level, above 60%. These areas are also the ones where mass schooling started earlier: as already known in the literature (Brint 2006), this depends on both cultural (Protestantism) and geo-political reasons (the latter especially strong for Germany and France, who make up most of the Continental European area). The Continental area has a more regular growth, while the Nordic has a flatter curve in the earlier cohorts, then explodes from the 30-34 cohort on and reaches the saturation point already with the cohort born in the second half of the 60s. The Eastern European area starts lower but then has a stronger explosion with the cohorts born after 1935, so that it catches up with the Continental European area by the cohort born after WW2. Such a stronger growth surely has to do with the Communist regimes that ruled all of the area after the war and their educational policies, that fostered school participation of the lower classes as a means to reach their egalitarian goals. The Anglo-Saxon area, that is the UK (we are considering the population, so Ireland does not weight much in this two-country area) starts at a considerably lower level, and fully catches up only with the cohort born in the 70s. The same catch-up point can be observed for the Mediterranean area, who started at the lowest (slightly above 20% in the 1920-24 cohort) and grows slowly until cohorts born after WW2. In this area there is a dip in participation for the cohort 1930-34. This could depend on WW2 and on the Spanish Civil War; something similar has been observed in other analyses concerning the expansion of schooling in Italy and Spain (Ballarino *et al.* 2009). As figure 5 will show, this dip is mostly a male phenomenon.

Figure 4. Participation to lower secondary education, by geopolitical area

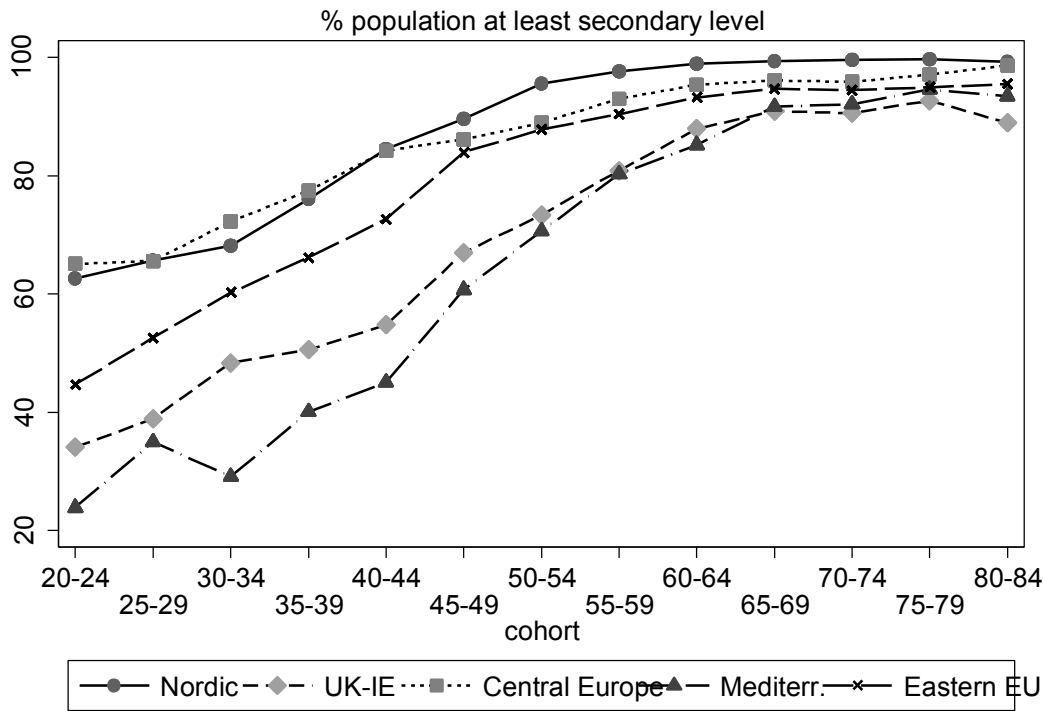


Figure 5 shows the pattern of participation to lower secondary separately for the five areas, broken down by gender. The scale of the 5 graphs is the same so they can be directly compared. It can easily be seen how the gender gap and its subsequent reversal work quite differently for the 5 areas: the timing of female catch-up varies from the earliest to the latest cohorts. The gender pattern, indeed, does not seem to be directly related to expansion of participation.

The Nordic area shows almost no gender bias: participation is more or less the same for both genders since the earliest cohorts. In the Anglo-Saxon area there is something strange in the first cohort (we would ascribe this to measurement error), but in any case the gender gap is not strong and disappears by the cohort born in the first half of the 50s. In Continental and Eastern Europe the catch-up takes place one decade later, while in the Mediterranean area the gender gap is at his strongest and persists until the start of the following decade.

Figure 5. Participation to lower secondary education, by geopolitical area, M and F

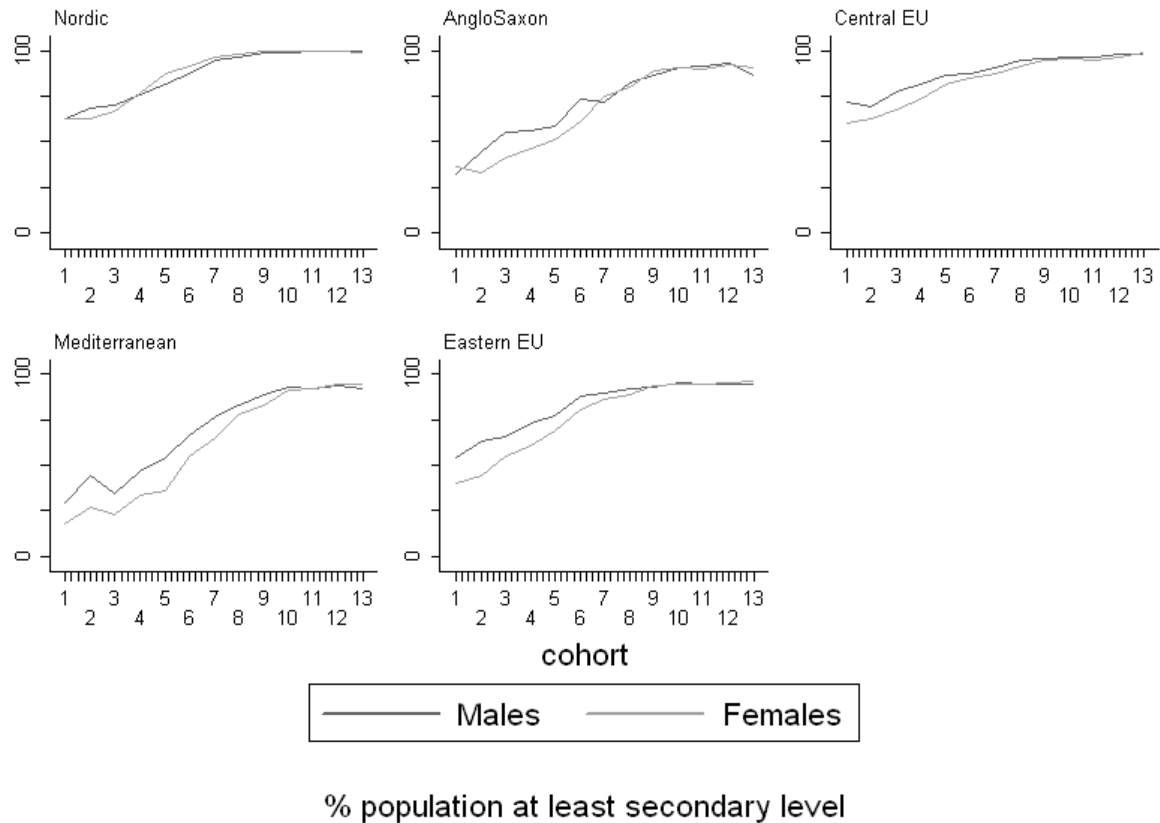


Figure 6 shows the pattern of participation to upper secondary by geo-political area. It is interesting to note that, with respect to the previous graph concerning lower secondary, in the early cohorts we can observe a lower variation among the areas, while in the more recent there is more variation (the scale of the graphs is the same). In other words, there is less converge of participation at this level.

The pattern of expansion for the Nordic and the Continental areas is quite similar to that of the lower secondary level: the former start somewhat lower but then have a stronger expansion starting with the 1930-34 cohort, while the latter have a more constant growth. The Anglo-Saxon area has also a regular growth, while the Continental European increases the pace of its expansion with the cohorts born after 1940. The Mediterranean have a drop in participation with the cohort born in the 30s, as observed for lower secondary. In the last cohort there appears a decline in participation for the Nordic, the Continental European and the Mediterranean areas, but this probably depends on individuals who were still at school at the time they were interviewed.

Figure 6. Participation to upper secondary education, by geopolitical area

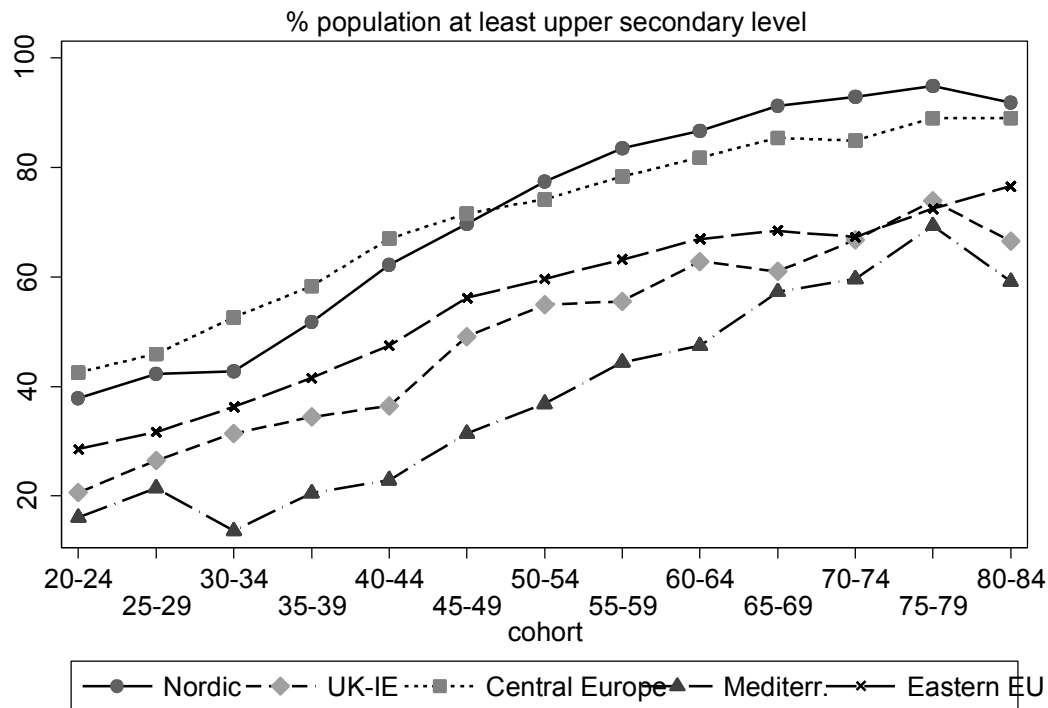
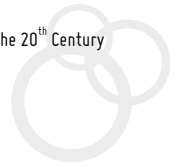
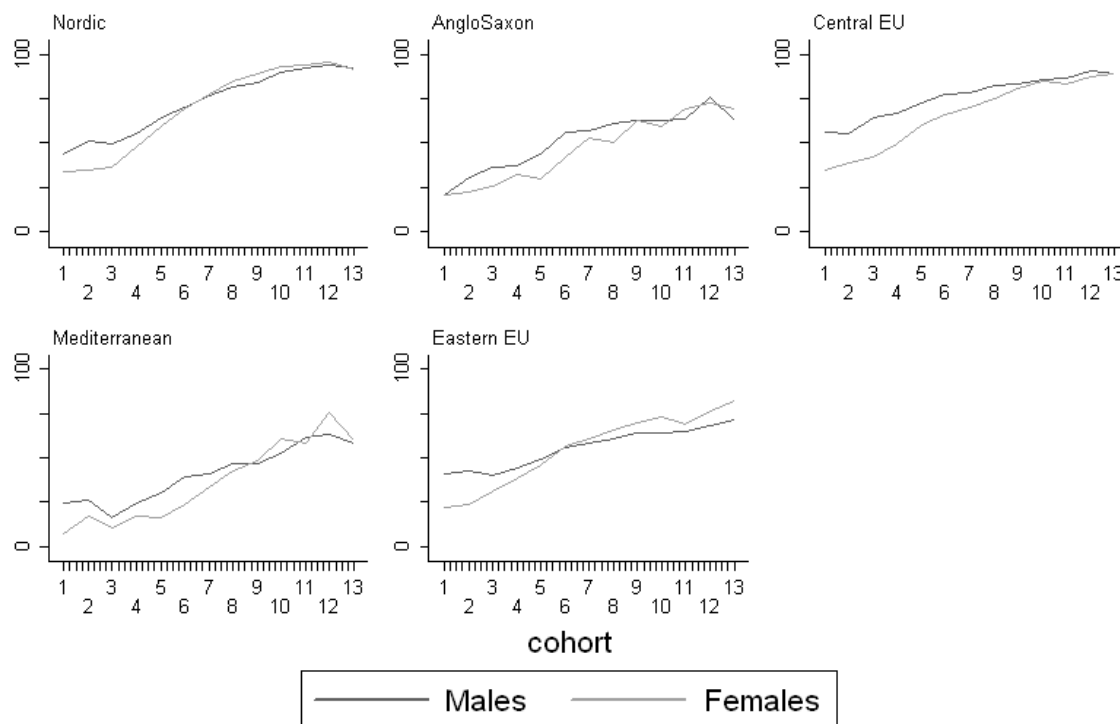


Figure 7 adds gender to the picture. With respect to the lower secondary level, in the oldest cohorts the gender gap seems in most of the areas somewhat stronger. In the Nordic area, where there was almost no gender bias for lower secondary, women catch up with men only with the cohort born in the first half of the 50s. In the Anglo-Saxon area we observe a similar pattern, although at lower levels of participation and with more irregularities (probably depending on lower numbers). For the oldest cohort this pattern holds also for the Eastern European area, but there after the female catch-up there is a reversal of the gender bias, and since the cohorts born in the second half of the 50s women show a higher participation than men. In the Continental European area the catch-up takes place later, with the cohort born in the second half of the 60, and afterwards there is no gender bias. The same happens, at lower levels, in the case of the Mediterranean area.

Figure 7. Participation to upper secondary education, by geopolitical area, M and F



% population at least upper secondary level

Figure 8 shows the pattern of participation to higher education of our five geo-political areas. Concerning variation among areas, we observe that it increases across cohorts, and there is no appearing process of convergence. In the oldest cohorts, the Nordic, Continental European and Anglo-Saxon areas are the ones with higher participation. Since the cohorts born in the 30s, the Continental European one remains somewhat behind and does not catch up (figures for the last cohorts are biased by individuals still at university when interviewed). This makes a difference with secondary school, where this area was generally one of the ones with the highest participation. The difference depends on the educational policies of Germany and of the German-speaking countries, that have traditionally constrained access to tertiary education in favour of vocational training at the secondary and post-secondary level.

In the previous graph pooling all countries together (figure 3 above) a two-stage pattern of expansion could be seen: a first one, stronger for males, for the cohort born after WW2, and a second one, stronger for women, for the cohorts born in the 60s and the 70s. Here we can see that the first stage was stronger in the Nordic and Anglo-Saxon areas, while the second was strong in all the areas, but especially in the Anglo-Saxon and in the Continental European areas.

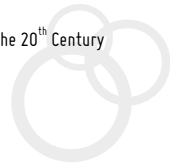
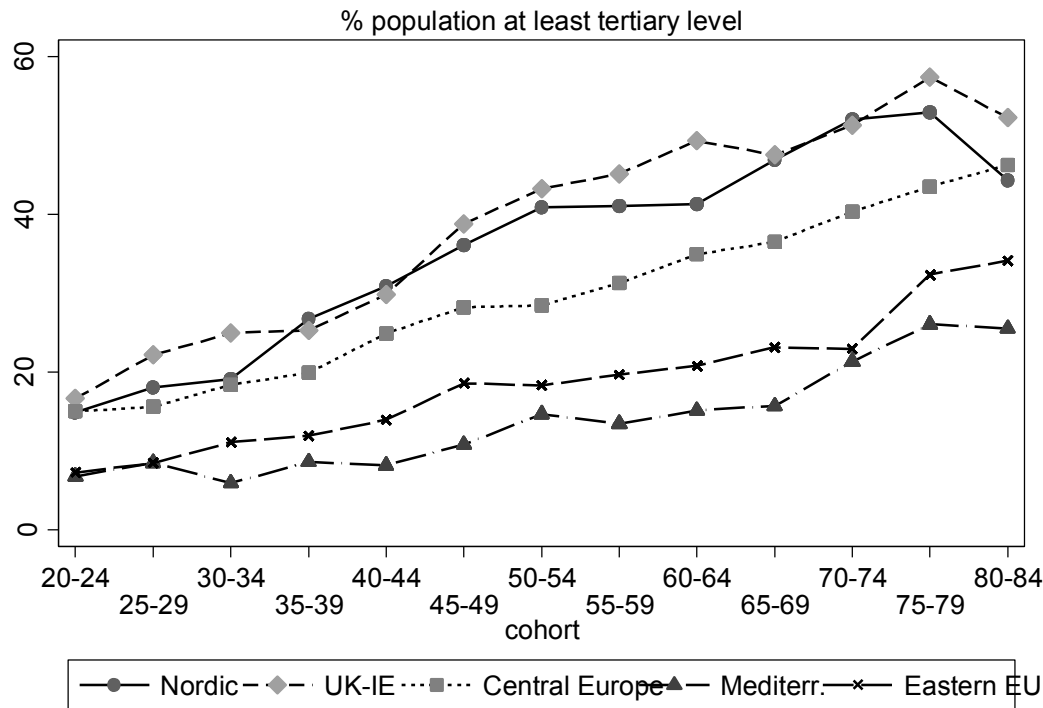


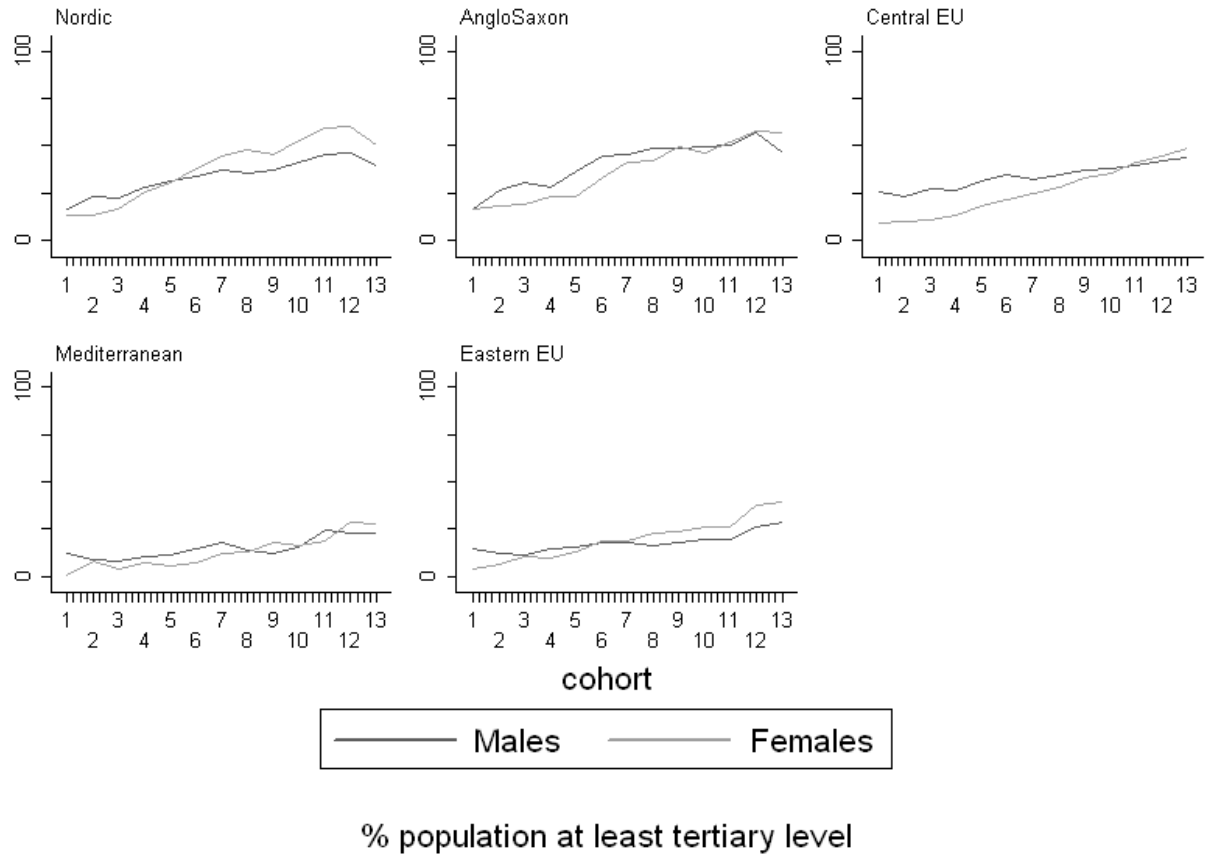
Figure 8. Participation to tertiary education, by geopolitical area



In figure 9 we observe the pattern for gender of the five geo-political areas we consider. The reversal of the gender bias that was apparent in the graph pooling all countries together is stronger in the Nordic and in the Eastern European areas, where females catch up with males already with the cohort born in the first half of the 40s. In the Anglo-Saxon and in the Continental European areas the catch up takes places 20-25 years later, and there is no female advantage in the more recent cohorts. In the Mediterranean area there are more irregularities, so it is not really clear when the catch-up precisely takes places, but in the younger cohorts there seems to be a female advantage even in this area.

We would attribute this contemporary strong gender bias favouring females, observed in the more recent cohorts of the Nordic area, to the occupational structure of those countries, where there is a high occupation rate of women, concentrated in relatively qualified jobs in education and in the social services, and in particular to the fact that since some decades similar jobs typically require a university degree.

Figure 9. Participation to tertiary education, by geopolitical area, M and F



5.3 An ordered categorical measure

The expansion of participation to the various educational levels can also be measured as a categorical variable, distinguishing various stages for each nation or geo-political area. In the field of higher education there is a popular descriptive categorisation, first proposed by Martin Trow (1973; 2000), distinguishing three stages of expansion of participation to higher education: an elite stage, where less than 15% of the population participates; a mass stage, where participation grows up to 35%, and an universal one, where participation gets beyond 35%. A measure of this kind can be of interest for macro analyses, in order to have a broad and easily understandable picture of the situation. We thus applied it to the ESS participation data, with just a small change: concerning lower and upper secondary, the threshold between the mass and the universal stage was moved from 35% to 50%, in order to increase variation. For tertiary education, thresholds were kept as established by Trow.

Tables 2-4 report the situation of each country, divided into the 5 geo-political areas we use.

Of course the picture is the same seen above with percentages, but somehow more clear-cut, as the measure is more crude. Looking at lower secondary, in the Continental European area participation at this level was already universal for the cohort born in the first half of the 30s, while this happens in the following cohort for the Nordic, the Continental European and the Anglo-Saxon ones. The Mediterranean area comes later (mostly because of the very low participation found in Portugal), with the cohort born in the second half of the 60s.

Concerning upper secondary, the Nordic area is the first to reach universal participation, in the cohort born in the first half of the 40s, followed in the following cohort by the Anglo-Saxon and the Continental European. The Eastern European area reaches universal participation to higher secondary in the cohort born in the first half of the 60s (Hungary is the latest comer), while the Mediterranean area reaches that level only with the latest cohort. Portugal again is a latecomer, while the other countries of the area reach universal participation already in the cohort born in the second half of the 60s.

tables 2-4 about here

Table 2. Stages of expansion of participation to lower secondary school, by country

	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84
Nordic countries													
Denmark	U	U	U	U	U	U	U	U	U	U	U	U	U
Finland	M	M	M	U	U	U	U	U	U	U	U	U	U
Norway	U	U	U	U	U	U	U	U	U	U	U	U	U
Sweden	M	M	M	U	U	U	U	U	U	U	U	U	U
Anglo-Saxon countries													
Ireland	M	M	M	U	U	U	U	U	U	U	U	U	U
United Kingdom	U	U	U	U	U	U	U	U	U	U	U	U	U
Central Europe													
Austria	U	U	U	U	U	U	U	U	U	U	U	U	U
Belgium	U	U	U	U	U	U	U	U	U	U	U	U	U
France	M	M	U	U	U	U	U	U	U	U	U	U	U
Germany	U	U	U	U	U	U	U	U	U	U	U	U	U
Luxemburg		M	U	M	U	U	U	U	U	U	U	U	
Netherlands	U	U	U	U	U	U	U	U	U	U	U	U	U
Switzerland	U	U	U	U	U	U	U	U	U	U	U	U	U
Mediterranean countries													
Greece	M	M	M	M	M	M	U	U	U	U	U	U	U
Italy	M	M	M	M	M	U	U	U	U	U	U	U	
Portugal	E	E	E	E	M	M	M	M	M	U	U	U	U
Spain	M	M	M	M	M	U	U	U	U	U	U	U	U

	Eastern Europe												
Bulgaria		U	U	U	U	U	U	U	U	U	U	U	U
Czech Republic	U	U	U	U	U	U	U	U	U	U	U	U	U
Estonia	U	U	U	U	U	U	U	U	U	U	U	U	U
Hungary	M	U	U	U	U	U	U	U	U	U	U	U	U
Latvia		U	U	U	U	U	U	U	U	U	U	U	U
Poland	M	M	M	U	U	U	U	U	U	U	U	U	U
Romania		U	U	U	U	U	U	U	U	U	U	U	U
Slovak Republic	U	U	U	U	U	U	U	U	U	U	U	U	U
Slovenia	M	M	M	U	U	U	U	U	U	U	U	U	U

E=elite (<15%); M=mass (from 15% to 50%); U=universal (>50%)

Table 3. Stages of expansion of participation to upper secondary school, by country

	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84
	Nordic countries												
Denmark	U	U	U	U	U	U	U	U	U	U	U	U	U
Finland	M	M	M	M	U	U	U	U	U	U	U	U	U
Norway	U	U	U	U	U	U	U	U	U	U	U	U	U
Sweden	M	M	M	M	U	U	U	U	U	U	U	U	U
	Anglo-Saxon countries												
Ireland	M	M	M	M	M	M	U	U	U	U	U	U	U
United Kingdom	M	M	M	U	M	U	U	U	U	U	U	U	U
	Continental Europe												
Austria	U	U	U	U	U	U	U	U	U	U	U	U	U

Belgium	M	M	M	M	M	U	U	U	U	U	U	U	U
France	M	M	M	M	U	U	U	U	U	U	U	U	U
Germany	U	U	U	U	U	U	U	U	U	U	U	U	U
Luxemburg		M	M	M	U	M	U	U	U	U	U	U	
Netherlands	M	M	M	M	M	U	U	U	U	U	U	U	U
Switzerland	M	U	U	U	U	U	U	U	U	U	U	U	U
	Mediterranean countries												
Greece	E	E	E	M	M	M	M	U	U	U	U	U	U
Italy	M	M	M	M	M	M	M	M	M	U	U	U	
Portugal	E	E	E	E	E	E	M	M	M	M	M	M	U
Spain	E	E	E	E	M	M	M	M	M	U	U	U	U
	Eastern Europe												
Bulgaria		M	M	M	U	U	U	U	U	U	U	U	U
Czech Republic	U	U	U	U	U	U	U	U	U	U	U	U	U
Estonia	M	M	U	U	U	U	U	U	U	U	U	U	U
Hungary	M	M	M	M	M	M	M	M	M	U	M	U	U
Latvia		M	M	U	U	U	U	U	U	U	U	U	U
Poland	M	M	M	M	M	M	M	M	U	U	U	U	U
Romania		M	M	M	M	U	U	U	U	U	U	U	U
Slovak Republic	M	U	U	U	U	U	U	U	U	U	U	U	U
Slovenia	M	M	M	M	M	M	M	M	U	U	U	U	U

E=elite (<15%); M=mass (from 15% to 50%); U=universal (>50%)

Table 4. Stages of expansion of participation to tertiary education, by country

	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79
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Nordic countries												
Denmark	M	M	M	M	M	U	U	U	U	U	U	U
Finland	E	E	E	M	M	M	M	U	U	U	U	U
Norway	E	M	M	M	M	M	U	U	U	U	U	U
Sweden	E	E	E	M	M	M	M	M	M	M	U	U
Anglo-Saxon countries												
Ireland	M	E	M	E	M	M	M	M	M	M	U	U
United Kingdom	E	E	M	M	M	M	M	U	U	U	U	U
Continental Europe												
Austria	E	E	E	E	E	E	E	E	E	E	M	E
Belgium	E	E	M	M	M	M	M	M	M	U	U	U
France	E	E	E	E	M	M	M	M	M	M	U	U
Germany	M	M	M	M	M	M	M	M	M	M	M	M
Luxemburg	E	E	E	E	E	E	M	M	M	M	M	M
Netherlands	E	E	M	M	M	M	M	M	M	M	M	U
Switzerland	E	M	M	M	M	M	M	M	M	M	U	M
Mediterranean countries												
Greece	E	E	E	E	E	E	E	E	E	M	M	M
Italy	E	E	E	E	E	E	M	M	M	M	M	U
Portugal	E	E	E	E	E	E	E	E	E	E	M	M
Spain	E	E	E	E	E	E	E	E	E	E	M	M
Eastern Europe												
Bulgaria	E	M	E	M	M	M	M	M	M	M	M	M
Czech Republic	E	E	E	E	E	E	E	E	M	E	E	M

Estonia	M	M	M	M	M	M	M	M	U	U	U	U	U
Hungary	E	E	E	E	M	M	M	M	M	M	M	M	M
Latvia	E	E	E	E	E	M	M	M	M	M	M	M	M
Poland	E	E	E	E	E	E	E	E	E	E	M	M	M
Romania	E	E	E	E	E	M	M	E	M	M	M	M	M
Slovak Republic	E	E	E	M	M	M	M	M	M	M	M	M	M
Slovenia	E	E	E	E	E	E	E	E	E	E	E	M	M

E=elite (<15%); M=mass (from 15% to 35%); U=universal (>35%)

Looking at higher education, there is of course more variation both between and within geographical areas. The Nordic countries reach mass participation with the cohorts born just after WW2, and most of them reach universal participation by the most recent cohorts. The UK and Ireland behave in a similar way. In Continental Europe there is more variation: only France and Belgium have already reached the universal stage, Switzerland comes pretty close, while Germany remains stable at the mass level and Austria is just reaching it. The pattern of the Eastern European area is similar, as seen above. The Czech Republic is a “negative” outlier, going back and forth from the elite to the mass level until the youngest cohorts. Poland has a similar pattern, but enlarges participation in the youngest cohorts. Estonia is a “positive” outlier, similar to the geographically close Nordic countries, as it reaches the universal level already with the cohort born in the second half of the 50s.

In the Mediterranean area, participation to higher education remains everywhere an élite thing up to the cohorts born in the 60. Spain is the fastest in expanding, and the only country in this area who has already reached the stage of universal participation.

Graphs 10-12 synthesize the tables already discussed, showing the percentage of countries who reach each of the three levels by cohorts.

6. Results: explanations of educational expansion

In this section, the results of the estimation of the model for level of participation described in section 4 above are presented. For each level, the analysis proceeds in five blocks. First, a model including only terms for path-dependency and self-propulsion is presented as a baseline. Then, three sets of terms, respectively measuring economic, political and social factors are separately added to this baseline, and finally a model is estimated including all the significant regressors.

6.1 Lower secondary education

Table 5 shows the results of the analysis concerning participation to the lower segment of secondary school. The baseline model shows, as expected, a strong and significant effect of the autoregressive term a , meaning there is path-dependency in the expansion of education at this level. As the estimated value for this term is lower than 1, there is convergence (to which we shall come back below). There is no effect of the demographic dynamic.

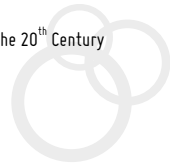


Table 5. Factors explaining participation to schooling, secondary level

	baseline model	economic factors					social (contagion) factors					political factors				all
Autoregressive term (a)	0.853**	0.885**	0.860**	0.875**	0.847**	0.884**	0.864**	0.855**	0.801**	0.853**	0.792**	0.811**	0.810**	0.872**	0.821**	0.779**
	[0.036]	[0.050]	[0.043]	[0.042]	[0.046]	[0.047]	[0.092]	[0.080]	[0.079]	[0.036]	[0.067]	[0.053]	[0.081]	[0.050]	[0.048]	[0.056]
Population growth	0.091					-0.038				0.091	0.014				0.073	-0.023
	[0.182]					[0.219]				[0.182]	[0.178]				[0.193]	[0.215]
Real per-capita GDP		0				0										0
		[0.000]				[0.000]										[0.000]
Real per-capita GDP growth			0.061			0.046										0.077
			[0.069]			[0.071]										[0.085]
Real total GDP				-0.003		-0.002										
				[0.002]		[0.002]										
Real per-capita GDP gap wrt to US					-0.207	-0.38										
					[1.019]	[1.038]										
% attainment of secondary school							-0.04				-0.01					

- bordering countries							1				5					
							[0.046]				[0.082]					
EU membership requested							-0.647				0.564					
							[0.760]				[0.852]					
EU member								1.728**			2.135*					1.775*
								[0.767]			[1.109]					[1.060]
Left-Right parliament											0.343*				0.219	
											[0.179]				[0.387]	
Democracy (Polity 2)												0.124**			0.068	0.155**
												[0.054]			[0.130]	[0.077]
Economic openness													-0.023	-0.022	-0.022	
													[0.024]	[0.025]	[0.041]	
Obs.	187	187	187	187	187	187	187	187	187	187	187	187	187	187	187	187
Countries	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23

Bootstrapped standard error in parenthesis. * 10% significance level, ** 5% significance level, *** 1% significance level.

In the second block of models a set of terms measuring economic development is added. GDP per-capita and total and GDP per-capita growth are used to test the technical-functional

hypothesis⁷, while the gap with respect to the US, the economic world leader, is used as a measure of distance from the development frontier, in order to test the catch-up hypothesis. However, there are no significant effects, and the positive sign of the parameter for GDP growth is the only one conforming to the hypotheses.

In the third block, measures for the social processes of diffusion are entered. The level of participation to secondary education of the bordering countries is used to test the spatial contagion hypothesis, while requested and attained membership to the UE tests the policy model hypothesis. The parameter estimate for membership to the UE is strong and significant, while the others are neither significant nor consistent in their signs with what expected from the hypotheses.

In the fourth block, a set of measures for political factors are added: the left-right composition of the parliament as a test of the political left hypothesis, the level of democracy and the degree of economic openness as tests of the hypotheses with the same name. While the latter has no significant effect, both the strength of the left in the national parliament and the degree of democracy of the polity have a significant positive effect on the level of participation, as predicted by the theory. However, when both are entered together in the same equation the significance gets lost, because of the high level of correlation among the two variables.⁸ The final model, in the last column on the right of the table, shows significant and positive effects of EU membership and of the level of democracy.

6.2 Upper secondary education

With the same analytical approach, we now move to the models explaining participation to upper secondary education, reported in table 6.

⁷ Murin and Viarengo (2009) interpret GDP per-capita growth as a measure of the strength of the state, given the weight of budget constraints on the capacity of the state to finance education. However, they find this measure to be non-significant as we do.

⁸ It has to be remembered that our left-right measure refers to democratic countries.

Table 6. Factors explaining participation to schooling, upper secondary level

	baseline model	economic factors						social (contagion) factors						political factors				all	
Autoregressive term	0.775***	0.717**	0.784**	0.779**	0.767**	0.781**	0.673**	0.747**	0.780**	0.782**	0.775**	0.781**	0.742**	0.780**	0.782**	0.712**	0.781**	0.706**	0.692**
	[0.064]	[0.077]	[0.065]	[0.071]	[0.062]	[0.070]	[0.080]	[0.074]	[0.071]	[0.071]	[0.064]	[0.070]	[0.070]	[0.070]	[0.073]	[0.076]	[0.070]	[0.078]	[0.087]
perc_sec_2	0.159**	0.196**	0.149*	0.156*	0.175*	0.151*	0.235**	0.159*	0.154*	0.157*	0.159*	0.151*	0.168*	0.140*	0.143*	0.196**	0.151*	0.190*	0.204*
	[0.071]	[0.070]	[0.070]	[0.068]	[0.071]	[0.067]	[0.071]	[0.071]	[0.069]	[0.078]	[0.071]	[0.067]	[0.087]	[0.078]	[0.078]	[0.069]	[0.067]	[0.079]	[0.094]
Population growth	-0.018						0.105				-0.018		0.058					0.006	0.062
	[0.282]						[0.374]				[0.282]		[0.315]					[0.300]	[0.371]
Real per-capita GDP		0					0												0
		[0.000]					[0.000]												[0.000]
Real per-capita GDP growth			-0.007				-0.011												-0.002
			[0.131]				[0.132]												[0.147]
Real total GDP				0			-0.001												
				[0.003]			[0.004]												
Real per-capita GDP gap wrt to US					1.362		2.158												

					[1.6 79]		[1.8 97]											
% attainment of upper secondary school																		
- bordering countries								0.0 38					0.0 41					
								[0.0 64]					[0.0 73]					
EU membership requested								0.1 97					0.2 28					
								[1.0 31]					[1.3 29]					
EU member								- 0.2 78					- 0.0 56					- 0.2 94
								[1.5 15]					[1.9 86]					[1.6 85]
Left-Right parliament													0.1 33				0.2 58	
													[0.2 70]				[0.6 37]	
Democracy (Polity 2)													0.0 3				- 0.0 41	0.0 35
													[0.0 89]				[0.2 12]	[0.1 00]
Economic openness														0.0 32			0.0 35	0.0 32
														[0.0 40]			[0.0 43]	[0.0 60]
Obs.	187	187	187	187	187	187	187	187	187	187	187	187	187	187	187	187	187	187
Countries	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23

Bootstrapped standard error in parenthesis. * 10% significance level, ** 5% significance level, *** 1% significance level.

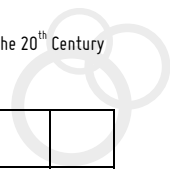
In this case, to the baseline model a second term for demand is added, namely the degree of attainment of a lower secondary educational title, with a two-period lag. While the demographic dynamic is not significant in any model, the percentage of upper secondary graduated is always significant, meaning that a component of the path-dependency of the expansion of education is made up by the demand created by the lower educational levels. In fact, the effect of the a term, while strong and significant, is lower than in the case of lower secondary, where participation to the previous level has not been included in the equation. When the economic factors are added, in the second block of models, no term comes out to be significant. In the third block of models, when measures for diffusion are added, no term results to be significant. Also the political factors, added in the fourth block of models, turn out to be not significant, and also the final model does not show any significant term.

6.3 Tertiary education

Table 7 shows the estimation for participation to tertiary level education. Looking at the baseline model, it can be noticed that the estimated value of the a term is higher than unity, meaning there is no convergence among countries at this educational level. Unexpectedly, the percentage of upper secondary graduates has a non significant and negative effect, while the dynamic of demand appears to be caught by the term for population growth, whose effect is positive, significant and relatively strong in all estimated models.

Table 7. Factors explaining participation to schooling, tertiary level

	baseline model	economic factors						social (contagion) factors						political factors				all	
L.% tertiary	1.035 ***	1.0 54* **	1.0 40* **	1.0 29* **	1.0 16* **	1.0 35* **	1.0 20* **	1.0 04* **	1.0 32* **	1.00 6** *	1.0 35* **	1.0 53* **	0.9 50* **	1.0 31* **	1.0 23* **	1.0 40* **	1.0 53* **	1.0 24* **	0.99 7** *
	[0.05 3]	[0.0 51]	[0.0 53]	[0.0 58]	[0.0 56]	[0.0 53]	[0.0 56]	[0.0 63]	[0.0 52]	[0.0 54]	[0.0 53]	[0.0 72]	[0.0 65]	[0.0 56]	[0.0 56]	[0.0 54]	[0.0 72]	[0.0 56]	[0.0 56]
perc_upsec_2	-0.04	- 0.0 02	- 0.0 46	- 0.0 46	- 0.0 29	- 0.0 4	- 0.0 27	- 0.0 53	- 0.0 3	- 0.03 9	- 0.0 4	- 0.0 55	- 0.0 1	- 0.0 63*	- 0.0 74*	- 0.0 15	- 0.0 55	- 0.0 5	0.03 9



															*				
	[0.034]	[0.048]	[0.034]	[0.037]	[0.035]	[0.034]	[0.049]	[0.044]	[0.034]	[0.045]	[0.034]	[0.035]	[0.052]	[0.035]	[0.035]	[0.049]	[0.035]	[0.050]	[0.061]
Population growth	0.568**	0.452	0.575*	0.591*	0.648*	0.568*	0.647*	0.604*	0.722**	0.728**	0.568*		0.863**	0.583*	0.567*	0.543*		0.519*	0.721**
	[0.268]	[0.316]	[0.270]	[0.288]	[0.275]	[0.268]	[0.352]	[0.278]	[0.279]	[0.271]	[0.268]		[0.286]	[0.268]	[0.267]	[0.276]		[0.278]	[0.317]
Real per-capita GDP		0					0												0
		[0.000]					[0.000]												[0.000]
Real per-capita GDP growth			-0.087				-0.119												0.037
			[0.136]				[0.134]												[0.134]
Real total GDP				0.001			0.002												
				[0.003]			[0.004]												
Real per-capita GDP gap wrt to US					3.088*		2.906												
					[1.736]		[1.898]												
% attainment of tertiary school - bordering countries								0.074						0.15					
								[0.108]						[0.105]					
EU membership									2.108*					0.6					

requested									*										82
									[0.942]										[1.043]
EU member									-3.307**										-3.221*
									[1.260]										[1.283]
Left-Right parliament																			0.402
																			[0.269]
Democracy (Polity 2)																			0.182*
																			[0.088]
Economic openness																			-0.022
																			[0.037]
Obs.	187	187	187	187	187	187	187	187	187	187	187	187	187	187	187	187	187	187	187
Countries	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23

Bootstrapped standard error in parenthesis. * 10% significance level, ** 5% significance level, *** 1% significance level.

In the second block of models, a positive and significant effect of the distance from the economic leader (the US) is found, but the sign is contrary to what predicted by the theory. However, the term is significant only at 10% when entered alone, and become not significant when other controls are added. In the third block, both effects of EU membership turn out to be strong and significant, but only the one for requested membership is positive, as predicted by the

hypothesis, while the one for actual membership is negative. In the model where both factors are entered together, only the negative effect of actual membership remains significant. Finally, in the last block of models, a significant and positive effect of the level of democracy, as predicted by the theory, is found, and it becomes stronger when the other political factors are added. The final model for tertiary attainment shows a positive effect of population growth and level of democracy, and a strong and negative effect of EU membership.

6.4 Convergence

As argued above, the negative natural logarithm of the autoregressive term a can be taken as a measure of convergence, stating how much, in percentage, the estimated value of participation has come closer to the convergence level during the period considered (three years in this case, given we work with three-years cohorts). According to the value of the parameter estimated in the baseline model, the rate of convergence is 16% for lower secondary, 25% for upper secondary and -.03% for tertiary. According to the estimates of the preferred model for each level, estimates grow to 25% for lower secondary, 37% for upper secondary and -.003 for tertiary.

6.5 Gender

Finally, table 8 reports for each level of education the preferred model, estimated for the whole ESS sample and separately for males and females. Generally speaking, the pattern of effects does not change much between men and women, but there are some discrepancies.

Table 8. Factors explaining participation to schooling, all levels, by gender

	Share of attainment of secondary education			Share of attainment of upper secondary education			Share of attainment of tertiary education		
	All	Male	Female	All	Male	Female	All	Male	Female
Autoregressive term	0.779***	0.613***	0.747***	0.692***	0.572***	0.498***	0.997***	0.846** *	0.827** *
	[0.056]	[0.070]	[0.063]	[0.087]	[0.085]	[0.087]	[0.056]	[0.079]	[0.075]
Population growth	-0.023	-0.028	0.115	0.062	0.161	0.159	0.721**	0.741*	0.896*
	[0.215]	[0.268]	[0.293]	[0.371]	[0.523]	[0.474]	[0.317]	[0.428]	[0.518]
perc_sec_2				0.204**	0.169	0.350***			
				[0.094]	[0.110]	[0.102]			
perc_upsec_2							0.039	-0.005	0.078
							[0.061]	[0.086]	[0.081]
Real per-capita GDP	0	0	0	0	0	0	0	0	0
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Real per-capita GDP growth	0.077	0.045	0.118	-0.002	-0.353*	0.22	0.037	0.021	0.072
	[0.085]	[0.109]	[0.115]	[0.147]	[0.204]	[0.189]	[0.134]	[0.173]	[0.207]
Economic openness	-0.022	-0.042	-0.015	0.032	0.033	0.069	-0.016	0.017	-0.007
	[0.041]	[0.053]	[0.056]	[0.060]	[0.080]	[0.071]	[0.041]	[0.056]	[0.066]
EU member	1.775*	3.005**	2.27	-0.294	0.258	-0.232	- 3.891***	- 4.325**	-3.508*
	[1.060]	[1.281]	[1.442]	[1.685]	[2.228]	[2.130]	[1.277]	[1.862]	[1.968]
Democracy (Polity 2)	0.155**	0.165*	0.227**	0.035	0.038	0.059	0.207**	0.234*	0.296*
	[0.077]	[0.096]	[0.102]	[0.100]	[0.139]	[0.130]	[0.095]	[0.128]	[0.152]
Obs.	187	187	187	187	187	187	187	187	187
Countries	23	23	23	23	23	23	23	23	23

Bootstrapped standard error in parenthesis. * 10% significance level, ** 5% significance level, *** 1% significance level.

For what lower secondary is concerned, the positive effect of EU membership on participation appears to concern mostly males, as the term is stronger in the model for males only and is not significant in the model for females. Correspondingly, the parameter for the a term is stronger for females, meaning that there is more convergence for males than for females. Concerning upper secondary, in the model for males the term for GDP growth turns out to be negative and significant (in fact, it is the only significant term found in this set of models). To the contrary, in the case of females the term is positive, albeit not significant. This gives some support to the parking lot hypothesis, which was in fact originally formulated for men, referring to an era when female participation to education beyond the compulsory level was very low, as seen in the descriptive section.

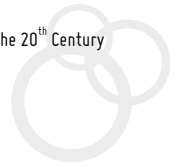
In the models for participation to tertiary education gender appears to be less relevant. The negative effect of EU membership is stronger for males, while the terms for the demographic dynamic and for democracy are stronger for females.

Conclusions

It is now possible to briefly state the main conclusions from the empirical analyses presented above. First, the point generally made by the sociology of education, according to which the expansion of education is a self-propelling and path-dependent process, is confirmed for all levels of schooling. In all analyses, the a term for the autoregressive effect of educational participation at time $t-1$ on participation at time t has proved to be strong, even when a wide set of covariates was included. However, a clear difference among levels was found: the a term is much higher for participation at the tertiary level than for lower and upper secondary. Following the economic literature, it was also hypothesized that the levels of participation to schooling converge over time, and that this process should be stronger at the lower levels. Indeed, convergence was found, but only at the lower and upper secondary levels, while at the tertiary level, no convergence was found at all.

Many reasons can be given for this difference among levels, which appears to be the most interesting finding of this paper. Our analyses included, in the baseline model, two terms for demand: participation to the previous level, and population growth. It should be noted that the effect of the previous level of participation was significant in the case of upper secondary, but not in the case of tertiary, while the effect of population growth was strong and significant for tertiary but neither for lower nor for upper secondary. This differential effect is not easily interpreted. Moreover, there are many other possible explanations of the different pattern across educational levels, ranging from the absence of a ceiling effect for the tertiary level, where participation levels are much lower, to the higher costs of tertiary education and the much stronger political resistances on the part of national élites. Our data does not allow, for the time being, to judge among such possible explanations.

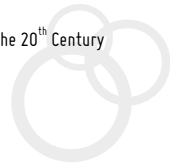
Coming to the other determinants, beside path-dependency, of the change of the level of participation, we distinguished three groups of hypotheses: economic, political and social factors related to contagion dynamics. Concerning economic factors, their impact on the expansion resulted not significant in all the specifications for all the three schooling levels, with just one exception: for upper secondary, a significant, negative effect of per-capita GDP growth was found in our preferred specification, but only for males. This finding is indeed consistent with the parking-lot hypothesis, according to which participation to education at the higher levels expands when the economy does not grow, because of the lack of employment opportunities on the labour market: this pattern is mostly a male one, as women's choices concerning education are typically less oriented towards occupation than in the case of men.



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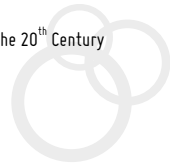
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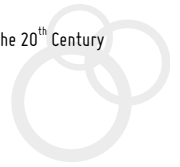
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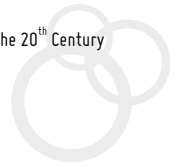
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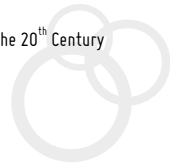
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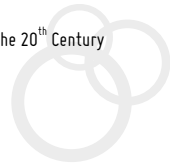
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Information on the GINI project

Aims

The core objective of GINI is to deliver important new answers to questions of great interest to European societies: What are the social, cultural and political impacts that increasing inequalities in income, wealth and education may have? For the answers, GINI combines an interdisciplinary analysis that draws on economics, sociology, political science and health studies, with improved methodologies, uniform measurement, wide country coverage, a clear policy dimension and broad dissemination.

Methodologically, GINI aims to:

- exploit differences between and within 29 countries in inequality levels and trends for understanding the impacts and teasing out implications for policy and institutions,
- elaborate on the effects of both individual distributional positions and aggregate inequalities, and
- allow for feedback from impacts to inequality in a two-way causality approach.

The project operates in a framework of policy-oriented debate and international comparisons across all EU countries (except Cyprus and Malta), the USA, Japan, Canada and Australia.

Inequality Impacts and Analysis

Social impacts of inequality include educational access and achievement, individual employment opportunities and labour market behaviour, household joblessness, living standards and deprivation, family and household formation/breakdown, housing and intergenerational social mobility, individual health and life expectancy, and social cohesion versus polarisation. Underlying long-term trends, the economic cycle and the current financial and economic crisis will be incorporated. Politico-cultural impacts investigated are: Do increasing income/educational inequalities widen cultural and political 'distances', alienating people from politics, globalisation and European integration? Do they affect individuals' participation and general social trust? Is acceptance of inequality and policies of redistribution affected by inequality itself? What effects do political systems (coalitions/winner-takes-all) have? Finally, it focuses on costs and benefits of policies limiting income inequality and its efficiency for mitigating other inequalities (health, housing, education and opportunity), and addresses the question what contributions policy making itself may have made to the growth of inequalities.

Support and Activities

The project receives EU research support to the amount of Euro 2.7 million. The work will result in four main reports and a final report, some 70 discussion papers and 29 country reports. The start of the project is 1 February 2010 for a three-year period. Detailed information can be found on the website.

www.gini-research.org





GINI GROWING INEQUALITIES' IMPACTS

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Project funded under the
Socio-Economic sciences
and Humanities theme.