

After the School Day Is Over: Studying versus Socializing:

A Cross-Country Comparison of Students' Time Allocation

Elsa Fontainha *

The principal questions that this research attempts to answer are: What is the trade-off between the time spent on studying (human capital formation) and the time spent on socializing (leisure, and/or social capital formation) after the school day has ended? Can we draw the production possibility frontier of full-time students? How do the different positions in the production possibility frontier (PPF) affect educational achievement in the various countries (using, for example, OECD-PISA data)?

Time use data of HETUS, in particular for students at the three main levels of education (primary, secondary and tertiary), is particularly suited to shedding light on these aspects, because detailed information is included on activities related to human capital formation that do not usually appear in educational statistics (for example, time spent on reading books, studying at home, etc.) and on socialization.

The time devoted to classes and lectures, considered the in-school time, is assumed as exogenous. There are great differences across European countries in terms of the time spent in class, i.e. the school day. Compulsory attendance policy varies across countries and education levels. In the present study, it is considered that only homework, free-time study or reading books, for example, are effective choices made by the student. Time in school is assumed to be compulsory at least until the tertiary level.

The main time use data sources for this paper are the Harmonized European Time Use Survey (HETUS) of Eurostat, and the Multinational Time Use Surveys (MTUS). Whenever possible, non-European countries are included in the analysis, in particular, the USA and Canada. The contextual variables are obtained from the time use surveys, Eurostat and OECD sources.

The research concludes for the existence of a trade-off between study and leisure in general. Complete empirical evidence of an inverse relationship between study and socialization was not found. However, the results for different education levels suggest a path of expansion of both study and socialization activities (the two contributing to personal capital formation). The results contribute to a better knowledge of human capital and social capital investment behavior and illustrate the use in empirical research of time use data.

* Department of Economics, ISEG -Technical University of Lisbon

R.Miguel Lupi, 20 , 1249-078 Lisboa, Portugal

Phone: (+351) 213925993;FAX: (+351) 213922808; elmano@iseg.utl.pt

1. Introduction

Students' time allocation draws attention from economists, education sociologists and social psychologists, among others. The economic perspective emphasizes in the student behavior models the utility of the student, which depends on the study effort, the skills or human capital and the future wage rate. The study effort includes time spent on study-related activities (e.g. classes, homework), which could be interpreted as having a cost in terms of foregone leisure or potential wages.¹

The literature on individual educational achievement identifies the factors contributing to the various educational outcomes. These include, for example: study time or effort, motivation, peer effects, school or teaching quality and background factors such as the parents' educational level.

Education policies, such as the construction of the European Higher Education Area (EHEA), have set the facilitation of students' mobility and international curriculum development as goals. They stress the important role played by the European Credit Transfer System (ECTS). The ECTS introduced in 1989, is based on parameters such as student workload (time required for learning activities, consisting of attending lectures, independent and private study, preparation of projects and examinations, and so on), learning outcomes and contact hours (EU, 2007).

However, the theoretical and political importance of students' time allocation, illustrated in the three approaches referred to above, has not been followed up by large-scale, comprehensive surveys which could be comparable across time and countries.² Most of the studies, which will be briefly surveyed in section 2 of this paper, analyze small samples or specific student time-allocation categories, for example, time spent in libraries.³

Time use surveys, based on diaries such as Harmonized European Time Use Surveys (HETUS), which follow the Eurostat Guidelines (Eurostat, 2000), allow cross-country comparisons of students' time allocation. The American Time Use Survey (ATUS) initiated in 2004 and based on a 'yesterday activity report', also includes

¹ The intensity of the study activity and its impact on study efficiency is usually ignored. Kelly (1975) pioneered the empirical research on study intensity. Later, Schmidt (1983) conducted research into this aspect.

² An exercise to construct time series for the schooling time in the USA was recently carried out by Ramsey and Francis (2007). Additionally, see Goldin and Katz's (1998) study into the human and social capital in the USA from an historical perspective.

³ One example of the detailed allocation of time of students in a library is presented in Grimes (2000).

information on students aged over 15. Both data sources will be used in the present research, as well as the OECD Programme for International Student Assessment -PISA data from OECD (2003).

Students could be analyzed as consumers who choose options (or whose options are chosen by their parents or educational tutors) between alternative uses of a scarce resource, the twenty-four hours in a day. Examples might include choosing between studying for a Principles of Economics examination or an English examination, between attending a class or going to the gym or to a party.

Students could also be analyzed as 'producers' of different 'industries', study being an input for the industry of learning. With regard to going to the gym or to a party, are these inputs for the 'industry of pleasure'? The answer is not definitive. If gymnastics contributes to better health, such activity 'produces' human capital, according to the original concepts and posterior developments.⁴ If physical exercise contributes to the improvement of one's 'looks' or to the increase of one's 'beauty', the same occurs.⁵ Going to a party could be considered as a strictly leisurely activity, or, in a broad sense as a contribution to the building of social capital.

The socializing activity, the inter-relations or non-monetary interactions and the social networks are included, among others, in the models explaining labor markets, migration fluxes or spatial organization. Student behavior is also considered to be strongly influenced by peer behavior. The student utility model proposed recently by Kooreman (2007), using time use data, includes as an explanatory variable 'student identity', which summarizes individual preferences, i.e., preferences by 'student categories' ('nerds' and other types).

The present paper considers the existence of a trade-off between learning and socializing represented by the production possibility frontier (PPF) of the student.⁶ Additionally, it is assumed that the student's PPF could also illustrate respectively, human capital building and social capital building, restricted to time availability. Each student combines both types of capital building for attaining the best mix in the present and a better personal total capital, which will translate into a higher wage and job characteristics in the future.

⁴ The human capital concept was developed in the seminal works of Shultz (1961) and Becker (1962) and developed later by Becker (1965, 1975) and Ben-Porath (1967).

⁵ For the study of the effects of beauty on earnings, see Hamermesh and Biddle (1994).

⁶ The PPF is interpreted as in Hamermesh (2004).

The principal questions that the present research seeks to answer are: what is the trade-off between the time spent on studying and the time spent on socializing? How is that trade-off managed after the school day has ended?

From the above questions arises another: can the student's production possibility frontier (PPF) be drawn on the basis of data of time use surveys? The author illustrates and discusses this question in this paper. Indeed, the following emerging facts have served to stimulate the present research:

a) The countries with the highest rates of economic success are not those in which the students spend more time in class or in school-related activities. Also, the study time productivity seems to differ from country to country, and this productivity is not exclusively related to the material and financial resources allocated;

b) When the students evaluate their own success in learning, they place a greater emphasis on the personal results achieved than on their educational performance;

c) The importance of non-formal and informal learning and of inter-personal relations in formal learning and in the construction of human capital is in evidence in research results and in some educational policies, but poorly reflected upon in theoretical studies;

d) The new information and communications technologies (ICT) have dramatically changed the way in which students and teachers interact, i.e., the availability of university services (some with 24/7 availability), study time (in and after class), socialization (time and mode), as well as the combinations between leisure time and learning time.

The paper proceeds as follows. In the next section, the economics literature and empirical results concerning students' time allocation is presented. In section 3, the databases and empirical strategies are described. In section 4, the results for several European countries are displayed and discussed. Finally, section 5 brings the paper to a conclusion, identifying some limitations and shortcomings of this ongoing research, including questions which remain to be more completely answered, and indicating future avenues of research.

2. Student Behavior and Time Use

The economic theories applied to study time can be grouped as follows:

First, student time allocation is an input to the creation of human capital and therefore, from a microeconomic perspective, as a means for insuring a higher income in the future. In this case, the approach is conducted: i) from the parents' perspective (e.g. parental time of care and teaching) – generally for those children up to around primary level of education; ii) from the individual student's perspective – generally for students attending higher education or secondary school.

Second, time of study and training is also investigated as a national economic growth factor and several ways were found for its measurement, for example by monetary measures as education expenditure, or physical measures as student/teacher ratio.⁷

Third, time study is one of the factors explaining general education outcomes or results in a specific course. There are many analysis applied to small or specific samples seeking to identify the determinants of student's outcomes. Not only the time spent in class, but also the effect of attendance is studied. Stanca (2006), using panel data, found a weak association between performance and attendance. The student outcomes are evaluated by the student herself/himself, or by standardized tests.⁸

All three approaches take into consideration additional factors such as the quantity and quality of educational and training supply, cultural aspects, the family background and specific individual characteristics. The present study focuses on the first category of studies mentioned above.

In order to bring into the equation the aspects reflected in facts a) to d) previously referred, there has been an effort to develop models dealing with student behavior that include non-economic phenomena. The contributions from the advances in social psychology, pedagogy and the sociology of education are considered in recent models, but they are considered still 'an open question' (Kooreman, 2007).

One of the problems with the empirical testing of these models is the absence of individual and detailed information on the various activities contributing to the learning process, as well as on individual and family characteristics. Time use data allows us to mitigate this absence, but only partially, as this investigation will attempt to illustrate.

⁷ Since the pioneer works of Griliches (1964) a large literature has been developed on this aspect. For a recent approach, see Mulligan Sala-i-Martin (1997) and Wossmann (2003), who summarizes the measures of human capital in growth accounting.

⁸ For example, in the USA and for students of economics, the TUCE is frequently used to study the educational results of student of economics. Dolton, Marcenaro and Navarro (2003) combined time use data with student results for a sample of students at a Spanish university and computed the stochastic frontier production function.

Based on the concepts of human capital and social capital, we will try to explain how its formation is combined, using the student as the unit of observation. The human capital concept and theories are particularly suited for the analysis of this paper's main research question.

The theories of human capital that appeared in the 1960s as part of a theoretical body, but in fact containing certain principles expressed by Adam Smith, by analogy to physical capital, considered that similarly to the latter, human capital is formed on the basis of investments of a particular nature. Studying, taking care of one's health and following a balanced diet are all ways of increasing the individual human capital. Various inputs can be associated with the production of this capital, such as learning or physical exercise, and the time spent on those activities. Human capital theory has macroeconomic and microeconomic perspectives.

From a macroeconomic perspective, the concept of human capital has contributed to a better explanation of the levels of productivity and the product growth of countries and regions. The immense empirical literature on the subject has sought to overcome the difficulties in measuring the factors that contribute to the creation of human capital, as well as the measurement of human capital itself. Classroom time has only been adopted in few empirical studies as an input measure for human capital creation. As has been highlighted by certain authors, this is due to the scarcity and lack of quality of data on effective study time. This explains why classroom time i.e. compulsory school attendance has mostly been considered. The information yielded by time use surveys on studying outside-of-classroom time is therefore an invaluable complementary source of data.

The work of Jorgensen and Fraumeni (1989), which evaluates human capital in various countries, constitutes a reference in the domain and illustrates the problems of measuring human capital at aggregated level. Formal schooling activities are generally considered as proxies in the measurement. However, these measurements have not been without criticism, one of the most common being with regard to the enrolment rate. Krueger and Lindahl (2001) discuss the perfecting human capital measurement.

From the microeconomic perspective, the production function of the student as producer of human capital and utility-maximizing agent has also been the focus of several authors' interest, inspiring a number of theoretical and empirical studies. Following the original models of Becker (1962, 1975) and Mincer (1970), other researchers, recognizing the complex behavior involved in the creation of human

capital, added further explanatory variables, such as identity and peer effects, among others (Akerlof and Kranton, 2002). Moreover, in this domain, time use data reveal an important resource for the purposes of empirical research, which had previously been omitted in relation to several way of building the human capital of the *same* individual. Most of the studies focused in only one aspect, as schooling. More specifically, we know the amount of time invested in building several facets of human capital (e.g. health, learning, care). However, time use data do not include in general information about the immediate results of human capital investment, for example, the grades obtained in school tests.⁹

The student (at different education levels) as an economic agent has generated an interesting debate in the economics literature. The present paper does not aspire to encapsulate all of the literature, yet it outlines some of its most essential ideas:

Firstly, the student is not the only consumer of education; often, the costs of her/him education are not borne by the student her/himself.

Secondly, the student's behavior, in particular that of a teenage student, is influenced by the behavior of her/him peers and family – and so are her/him economic decisions. The importance of the group to which she/he belongs or wishes to belong is therefore relevant in her/him decision making.

Finally, at what age is the border of economic rationality crossed, i.e., at what age does an individual begin to make informed decisions based mainly on economic factors? The economic theory leaves this question largely unanswered.

Additionally, there are also specificities of the domain in which the student lives and acts: education. Education is also a complex research matter because it could be considered as a joint-production, producing utility and potential income gains (Lazear, 2001).

How do students spend their time and why? What is the rationale of student behavior in the context of human and social capital formation? This study aims to answer these questions considering the previous debates and results.

⁹ In relation to future outcomes, to be reflected in future earning levels, clearly these cannot be known by the student. They can only be forecast.

3. Data Sources and Empirical Strategy

In order to analyze the eventual trade-offs between study time and leisure time, and the trade-off between studying and socialization by country and academic level, three databases will be used, the contents of which are discussed individually and in more detail in *Appendix 3*.

3.1. Data Bases

Three main databases were used: Harmonized European Time Use Surveys (HETUS) from Eurostat, OECD Programme for International Student Assessment (PISA) and Multinational Time Use Surveys (MTUS).

Harmonized European Time Use Surveys (HETUS)

One of the advantages of using this data on student time allocation is that it is obtained at 3 educational levels, in accordance with the international classification¹⁰ ISCED 1-2 (primary), ISCED 3-4 (secondary and tertiary) and ISCED 5+ (university education and equivalent). The other advantage is the access to information on several study activities (attending classes, doing homework, studying autonomously) and to those activities which contribute indirectly to the formation of human capital (such as reading books and magazines)¹¹. The main disadvantage is that the data is tabulated data, with only observations (12 per country, male, female and total for all students and 3 levels of education). This prevents the construction of a time allocation model. Moreover, and despite the adoption of EUROSTAT's General Guidelines (EC, 2000), the concept /definition of 'student' adopted in the time use surveys was not the same for all European countries. (*Table 1A, Appendix 1*).

OECD Programme for International Student Assessment (PISA)

The PISA Programme conducted in 2000, 2003 and 2006 focused on secondary level education 15-16 year-old students and the specific learning areas of mathematics,

reading and problem solving. The information gathered by surveyed schools and students in more than 50 countries includes, for instance, the amount of time spent by students in study activities.

Since the objective of this programme is to map and explain the level of results achieved in specific domains of study, student time is one of the many variables considered (along with, but not limited to, family material, cultural background and the student's attitude towards learning, study subjects and school).

The advantage of this database is the existence of individual student data; 127,388 students were surveyed in the year 2000 and 276,165 in 2003.¹² The questionnaire distributed to the students (there are also specific questionnaires used with the schools that will not be considered in the present study) was different for each year.

The results presented in this paper are relative to the 2003 questionnaire (PISA, 2003). The information gathered includes time spent in an average week on study activities in general and on mathematics courses in particular (free study, tutored study, in-class study), average duration of classes, as well as student absenteeism and lateness.

This information was used to assess the quality of the information made available in relation to the other two sources concerning class time and study time, as well as class duration (i.e., mandatory school attendance). However, the database presents a disadvantage, in that no information on other time uses was gathered, including the non-study activity patterns. It is thus impossible to base the FPP on this data. PISA is mostly concerned with the information on parents and material study conditions; it ignores factors such as the activities that compete with study (e.g. video gaming or socializing).

Multinational Time Use Surveys (MTUS)

The advantage of MTUS is that we gain insights into approximately forty activities carried out by students in several countries in different years.¹³ The educational levels can be identified, although they are not entirely comparable to the UNESCO ISCED classification (*Table 2-Ai, Appendix 1*). The main disadvantage of this database is that the student output indicators or student results indicators are entirely unknown. The 'production possibilities frontier' of students for each country and academic level

¹⁰ UNESCO (1997).

¹¹ Fahar (2005) studied the demand for informal education of adults, based on German time use data and concludes that taste, as well as income, affects demand for informal education.

¹² The PISA micro-database for the year 2006 had not yet been made available in April 2007.

¹³ The present paper only analyses a sub sample of all countries. The countries considered are listed on *Appendix 1*.

was based on the aggregation of the different activities of socializing and the non-mandatory time of study.

3.2. Empirical Strategy

The empirical approach to the relationship between student time allocation in study activities and all the other market and non-market activities is analyzed in two stages in the present paper.

First, based on aggregated data for eight European countries, by gender and for each education level, the relationships between study and leisure in general and socialization are characterized and compared. The study time is decomposed in two main components: the 'mandatory' or contracted study time (the time spent in classes and lectures) and all the other study time. The four categories proposed by Aas (1977) are adopted here: 1) 'contracted time' depending of the agreement of study, corresponds to the mandatory time of studies; 2) 'committed time' related with domestic work and here including homework from school; 3) 'necessary time', the time required to maintain one's self (sleeping, eating); 4) 'free time' is the time which remain from the total 1440 minutes day, after deducting the time spent on the first three categories.

Several measures of weight of the activities are computed, stressing the aspects related with actual free time, i.e. the time which is really available when decisions on its allocation are made by students.¹⁴

In the second stage, the research goes deeper in the empirical analysis of the learning-socialization relation and the mix of mandatory and non-mandatory time of schooling, using individual micro data on time allocation from MTUS and PISA sources. The research stresses the necessity of an accurate knowledge of the real time budget restriction, in other words the actual free time, which is the effective available resource to be allocated through economic choices. It explores and tests different specifications of student behavior in relation to time allocation. In addition, and related with educational results, time spent in education (including formal, informal and non-formal education) and socialization (with family, peers or others) are also tested as explanatory variables of students' achievements and outcomes, introducing some innovative elements in the more common student results determinants.

¹⁴ The classification proposed by Aas (1977)

The analysis of the student characteristics of time use and student behavior is based, among other sources in a subsample extracted from all the individual observations from nine countries time use studies. That subsample is composed by full students who do not participate in the labor market and corresponds to a day of school. The methodology of construction of the sub sample is explained in detail on *Appendix 2*.

The descriptive analysis of the data shows that the free time available to the students is occupied fundamentally in leisure pursuits. This finding contrast with the result obtained for workers in which the time at work represents substantial amount of the total time available, or the housewives in whom the time spent in domestic tasks has a significant weight on total time available.

To achieve a more detailed analysis of the data in relation to study time and leisure time, and particularly socializing time, the quartiles for each country were calculated and each student was attributed to the category of the quartile in which he/she was located (increasing from 1 to 4). The median and the forms in which the times were distributed were also calculated.

The probability of belonging to the highest scale of independent study time, will be evaluated through a Probit model. It is be recalled that two categories of study time are taken into consideration: studying at school (classes) and independent study, outside the classroom.

With the aim of including in the function of the student time allocation the variable, 'Identity', i.e., belonging to, or identifying with, a determined group¹⁵, three student typologies were constructed, according to their time distribution, which is felt to reflect the respective life style. To the best of our knowledge, this typology construction has not previously been made in studies of this type. However, it is inspired by studies conducted with small samples, in which the respondent is asked directly to which group he/she belongs. In the present study, the group is identified according to life styles, or rather, the forms of time occupation/allocation.

The categories were created by taking in account the proportion of time spent on study and that spent on leisure, paying particular attention to socializing time, one of the components of leisure time. Each of these categories was associated with an individual human and social capital formation pattern strategy.

¹⁵ This is an aspect on which social psychology places great importance and which Akerlof and Kraton (2002) introduced into the utility functions of the student.

Three groups were created: 1) 'studious & sociable', composed of those students with time allocations above the median for both study time and socializing time); 2) 'non-studious & non-sociable', comprising those students with time allocations below the median for both study time and socializing time; 3) made up of students not included in either of the two groups above. The identification in one of these groups was assigned to each individual in the dummy variable I_i (identification of the individual i). One of the premises on which this analysis is based assumes that the human capital investment patterns should differ among those who are destined to have different occupational futures. Lazear (2004). In consequence, each student follows a particular investment profile, for example mixing study and socialization in a manner which optimizes the individual future goals.

Various specifications of the student behavioral model were estimated, with and without the inclusion of the identity.

4. Results and Discussion¹⁶

When all students and average country data are considered, an inverse relation between time allocated to study and time allocated to leisure exists. The countries in which time allocated to study is high also present low values of average leisure time: France Belgium and Hungary¹⁷. This is particularly the case for male students. (Figures 1g and 1h). However, this inverse relation is not evident when a more detailed observation by education level is made (Figures 1a to Figure 1f).

The differences between females and males considering country average in all the three levels of education (primary, secondary and tertiary)¹⁸ are clear. On average, girls and women spend more time studying than boys and men and spend less time on leisure activities. This is true for most of the countries represented and at the three educational levels. This differential converges with the results obtained for the secondary students, adolescents of 15-16 years old using PISA data (OECD, 2003).

The fact that the findings present gender divergences is not unexpected, since they confirm those obtained in previous research, where girls score, on average, are

higher than boys scores. However, while females achieve academic outcomes that are equal to, or better than male students and also better college access and higher persistence, they are under-represented in the scientific and technical fields.¹⁹ The differences in the results for males and females, in addition to the gender differences found in the patterns of time allocation (as discussed in the previous point), are relatively well documented in numerous works. However, explanations for these findings from an economic perspective are less common. Nevertheless, among the reasons put forward is that males and females differ in respect of their career aspirations, as do the respective opportunity costs.

At the tertiary level of education, the relative patterns for men and women show sharper differences when compared with the results for the previous two levels of education. Figure 1f, compared with Figure 1e suggests that for women, there is a negative relation between leisure and study times which is non-existent in the case of men. This could be explained by a gender difference in time opportunity costs.²⁰ The labor market participation at this level is higher for men than for women, even when the total work time (market and non-market) is considered. Possibly, this happens because the study - leisure trade-off changes to a study - work trade-off as students became older, in particular for men (Figures 2a to 2b).

The average time spent on total study decreases from secondary education to the tertiary level, with few exceptions. Parallel with this change, there is a decrease also in total leisure time, as the NE-SW orientation in the last arrow of the line on Figure 3a through Figure 3h for the majority of the countries illustrated. This is, to a certain extent, unexpected²¹ because higher education is considered to be more demanding in terms of study effort required and study duration. One possible explanation for these results is that at this level of education, the older students have many other study-related activities (directly or indirectly), which are not declared in the diaries (or questionnaires) as study activity. However, it must be pointed out that when a similar analysis is carried out in relative terms, considering the percentage of time spent on study in relation to total free time, the sequence reverses. In fact, the tertiary students,

¹⁶ (incomplete)

¹⁷ The results for these 3 countries could be biased due to the fact that students are defined by 'main activity status'. The definitions in the other 5 countries do not coincide. See Table 1-A1, Appendix 1 of this paper.

¹⁸ Table 2-A1 on Appendix 1 presents the contents of The Classification ISCED from UNESCO (1997).

¹⁹ This aspect assumes importance when comparisons are made between countries. If, for example, differences exist between countries in relation to the female enrolment ratio, or to academic discipline, this could give rise to bias in the results.

²⁰ The author intends to study this hypothesis in more depth.

²¹ Unless we consider the current (and recurrent?) complaints of university teachers concerning the weak students' evolution in class in homework, in addition to students' absenteeism.

when compared with their counterparts from the primary and secondary education levels, are those who allocate the largest part of their free time to study outside school, as illustrated by Figures 4a to 5h.

The relative measures assist the identification of a similar association between study and leisure across the countries. With only one clear exception (Estonia), the average values of time spent on study (only out-of-school) and leisure time, both evaluated as a percentage of free time²², are inversely related. Moreover, the weight of the leisure decrease and the weight of the study increase accompany the progression at all three educational levels.

The assumption expressed at the beginning of this paper with regard to the student's behavior reflecting that of an investor in learning *and* in socialization seems to find some support in the results obtained. In fact, as shown in Figures 6a to 6h, both time allocations increase with the education level. Socialization²³ increases in parallel with the importance of study.

Figure 7 illustrates the 'expansion' path of the two activities, study (only out-of-school study) and socialization evaluated as average diary time. The upper education level (tertiary) tends to present greater importance in those activities and the lowest level (primary education) exhibits the least importance in respect of those activities.

5. Conclusions , Limits and Future Avenues of Research²⁴

This analysis has sought to expand on the previous research into the production function of students, in two directions. On one hand, we compare the results obtained from two sources on a similar population and countries, incorporating into the study a broader range of individual input and output variables to consider the learning process. On the other hand, the standard learning function is modified to include peer groups and socializing time as generators of social capital. We considered the hypothesis that non-market interactions play an important role in the learning process, in addition to expectations regarding future earnings. This hypothesis has already been considered in some of the theories on the functioning of the labor market, particularly within enterprises.

When measured by country average, the time of study and the time of leisure present inverse relations. The study of sub-categories of study time (time in school assumed as mandatory or quasi-mandatory) and the computation of a proxy of 'free time' proved useful in the description of the relationship between study and socialization.

The results by country obtained from two different data sources (HETUS and PISA) for the secondary education analyses are convergent with regard to the study time allocation and the mix in school and out-of-school study time.

Any research on student economic behavior must take into consideration the educational stage (i.e. the life cycle of the student as a student, which is included in a general life cycle). The 'student' category presents much heterogeneity.

The general production possibility frontier is traced for all the countries and for different student groups according to educational level and gender. The frontiers for the set of countries suggest that the differences found among countries are not associated with national macroeconomic characteristics, such as productivity and level of development, but rather arising probably from cultural and institutional differences.

From the perspective of education policy and the implications at EU level, the results obtained by the present research provide insights into the potential impacts of a common European Union policy for university education, highlighting the putative differences among countries in relation to levels and composition of study time, which stem not only from institutional differences from country to country (e.g. the number of hours of compulsory school attendance; selection criteria), which are possibly easier to eradicate or reduce, but also from cultural differences that are far more resistant to change.

Limits

In the course of this research, a number of limitations became evident, some of which were overcome, while others were not. It is therefore recommended that some caution be used in interpreting the results, since:

The data does not cover a fixed period of time; nevertheless, and for a certain number of countries, it does cover the same period (circa the year 2000 for HETUS).

²² Free time computed as 1440-Personal Time – School Time-Work Time (and alternatively, total work time = Work time + Domestic Time).

²³ Note that socialization is one of the components of leisure time.

²⁴ Incomplete.

The comparison between educational levels should be preferably conducted with panel data and not with cross-section data, because the generation or cohort effect is present in cross-sectional data of students of different ages.

The comparability between different statistical categories, although harmonized, has not been entirely achieved.

The effect of technological progress on the efficiency of the learning process was not explicitly considered.

Future Avenues of Research

I plan to develop certain aspects in this on-going research based on time use data, namely:

The computation of the peer-group effect with the ‘with whom’ information available through time use surveys applying social network analysis;

The explanation of the differences found between gender patterns based on the opportunity cost of time for each group and in each country;

The trend in benefits and costs of education, from an individual perspective;

The effects of digital technology on both learning and socializing and on the possible interaction of these two activities.

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Figure 1 – Total Study Time and Total Leisure Time
by Country and Education Level (ISCED)

Figure 1a ISCED 1_2-Primary and Lower
Secondary Education

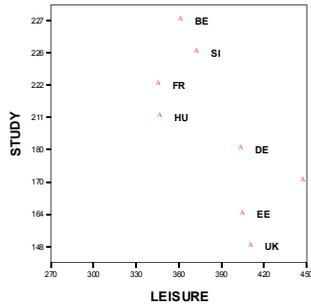


Figure 1b ISCED 1_2-Primary and Lower
Secondary Education (Female)

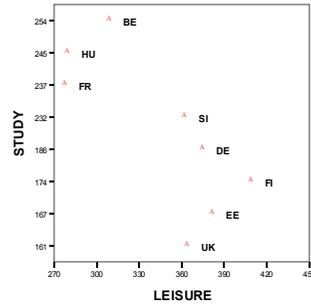


Figure 1 (cont.) – Total Study Time and Total Leisure Time
by Country and Education Level (ISCED)

Figure 1g All Students (Male)

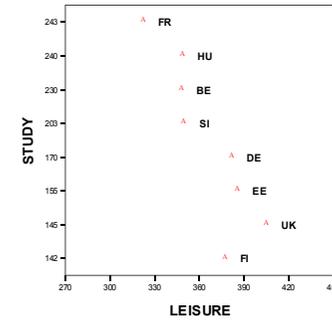
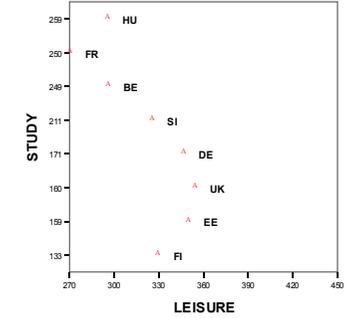


Figure 1h All Students (Female)



(Male)

Figure 1c ISCED 3_4- Upper Secondary and post-
secondary non-tertiary education
(Male)

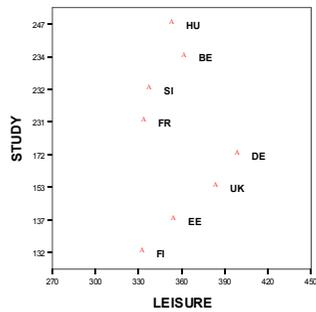


Figure 1d ISCED 3_4- Upper Secondary and post-
secondary non-tertiary education (Female)

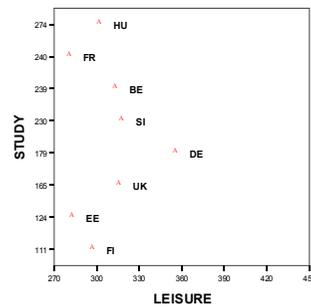


Figure 2 – Total Study Time, Total Leisure Time and Work Time
ISCED 5+ Tertiary education (ISCED)

Figure 2a) ISCED 5+ Tertiary education
(Male)
Study Leisure and Work

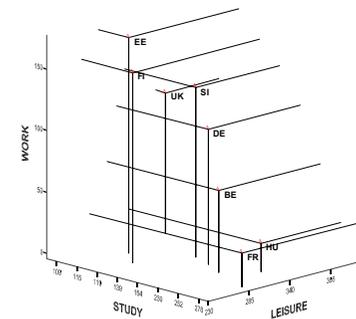


Figure 2b) ISCED 5+ Tertiary education
(Female)
Study Leisure and Work

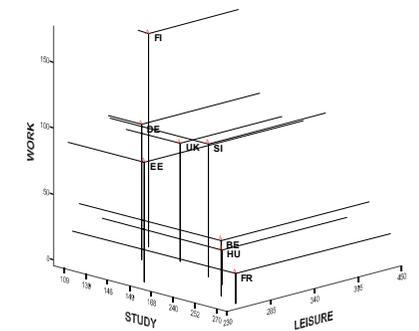


Figure 1e ISCED 5+ Tertiary education (Male)

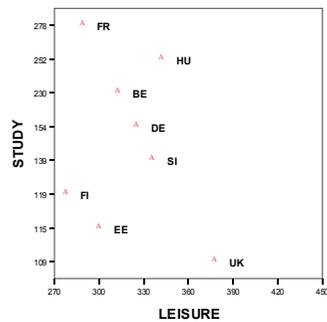
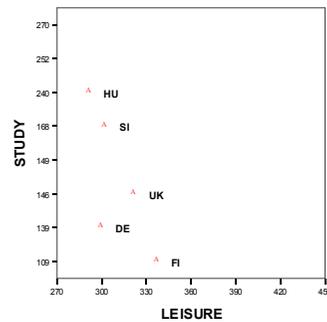


Figure 1f ISCED 5+ Tertiary education (Female)

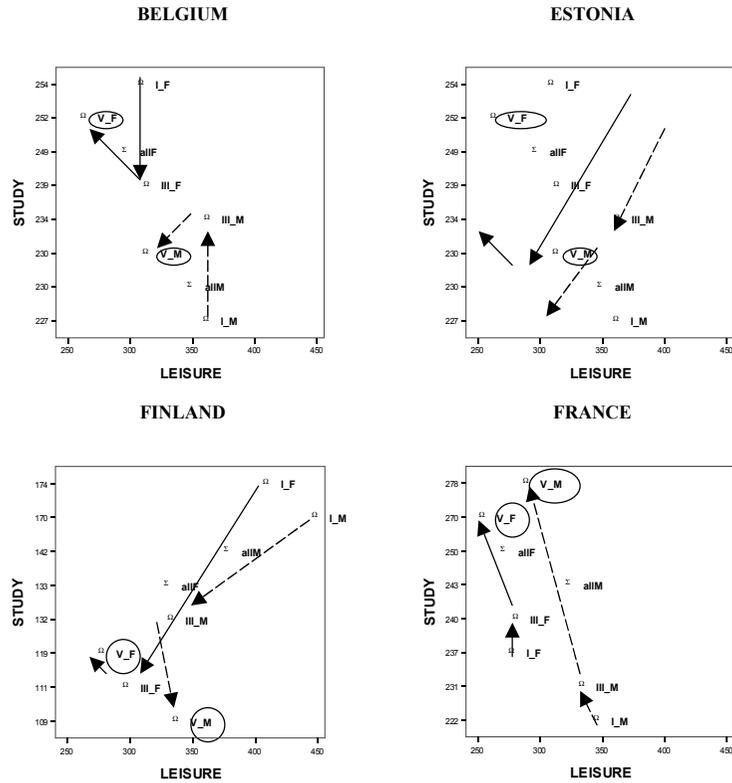


Country codes: BE=Belgium; EE=Estonia; FI=Finland; FR=France; DE= Germany; HU=Hungary; SI=Slovenia; UK=United Kingdom.

FR and EE not represented; leisure time less than 270m

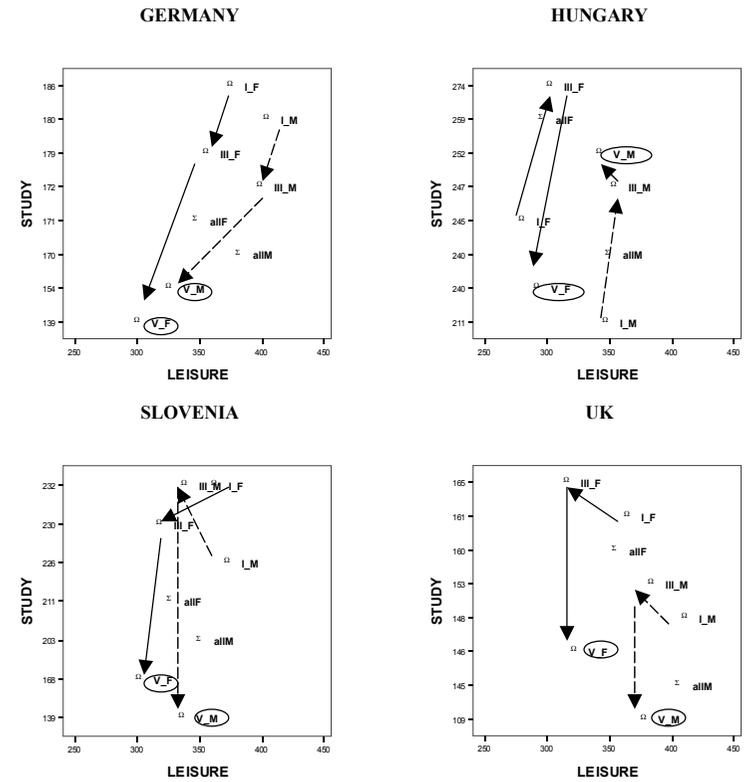
Note:

Figure 3 - Total Study Time and Total Leisure Time by Education Level (ISCED) and Country



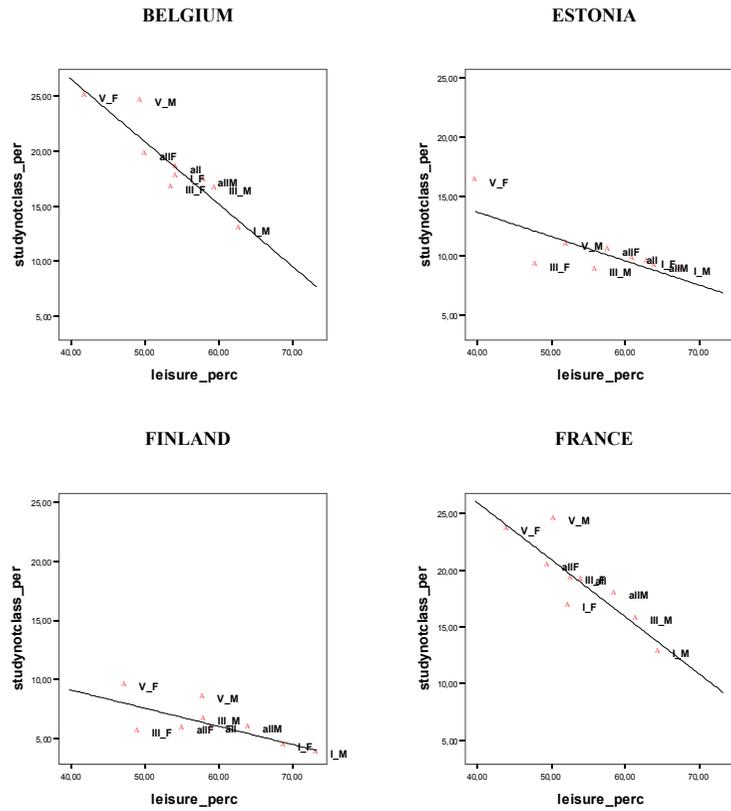
Key: F=Female; M=Male; Education Level: I =Primary (ISCED 1-2); III=Secondary (ISCED 3-4); V=Tertiary (ISCED 5+)

Figure 3 (cont.) - Total Study Time and Total Leisure Time by Education Level (ISCED) and Country



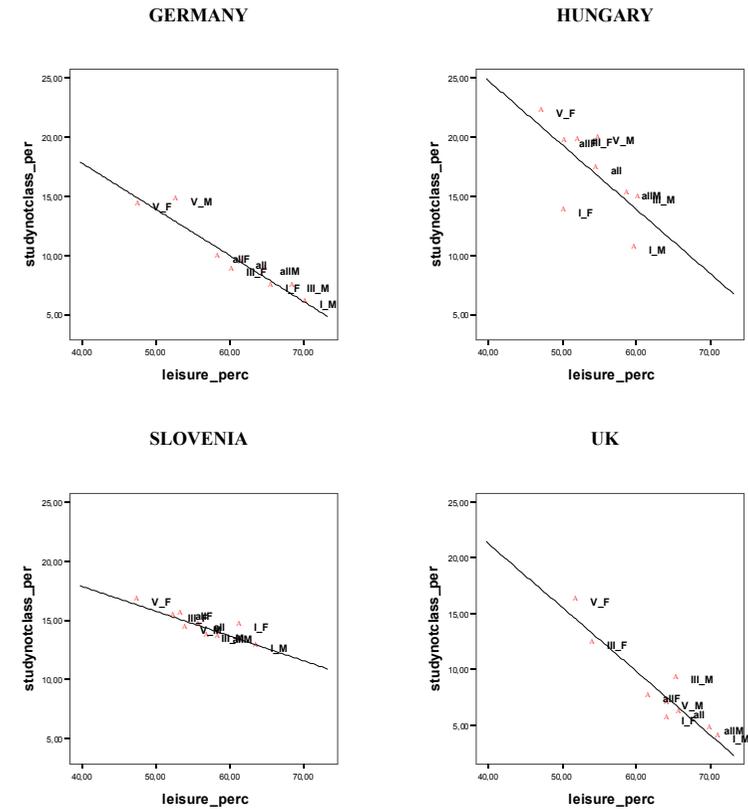
Key: F=Female; M=Male; Education Level: I =Primary (ISCED 1-2); III=Secondary (ISCED 3-4); V=Tertiary (ISCED 5+)

Figure 4 - Study after School and Leisure Time
(as percentage of non-committed time*)
by Education Level (ISCED) and Country



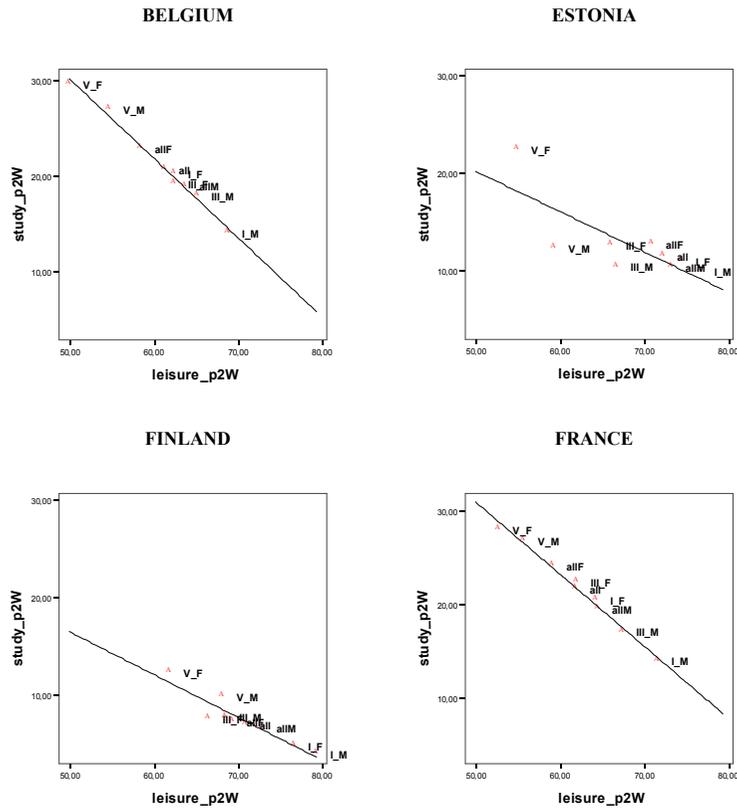
(*) non-committed time (day)=1440-School Time -Work Time
Key: F=Female; M=Male; Education Level: I =Primary (ISCED 1-2); III=Secondary (ISCED 3-4); V=
Tertiary (ISCED 5+)

Figure 4 (cont.) - Study after School and Leisure Time
(as percentage of non-committed time*)
by Education Level (ISCED) and Country



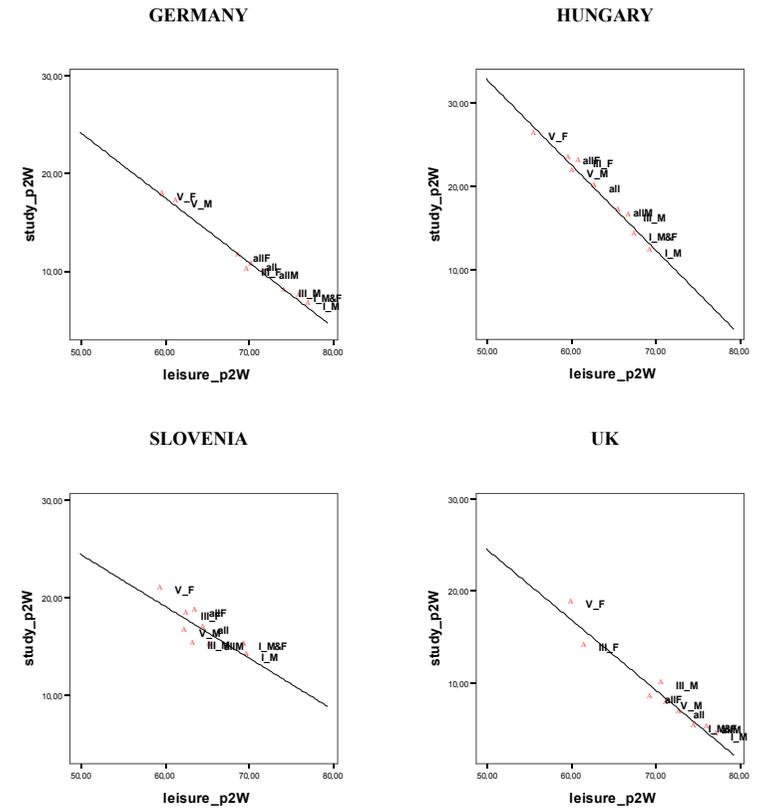
(*) non-committed time (day)=1440-School Time -Work Time
Key: F=Female; M=Male; Education Level: I =Primary (ISCED 1-2); III=Secondary (ISCED 3-4); V=
Tertiary (ISCED 5+)

Figure 5 - Study after School and Leisure Time
 (as percentage of non-committed time extended **)
 by Education Level (ISCED) and Country



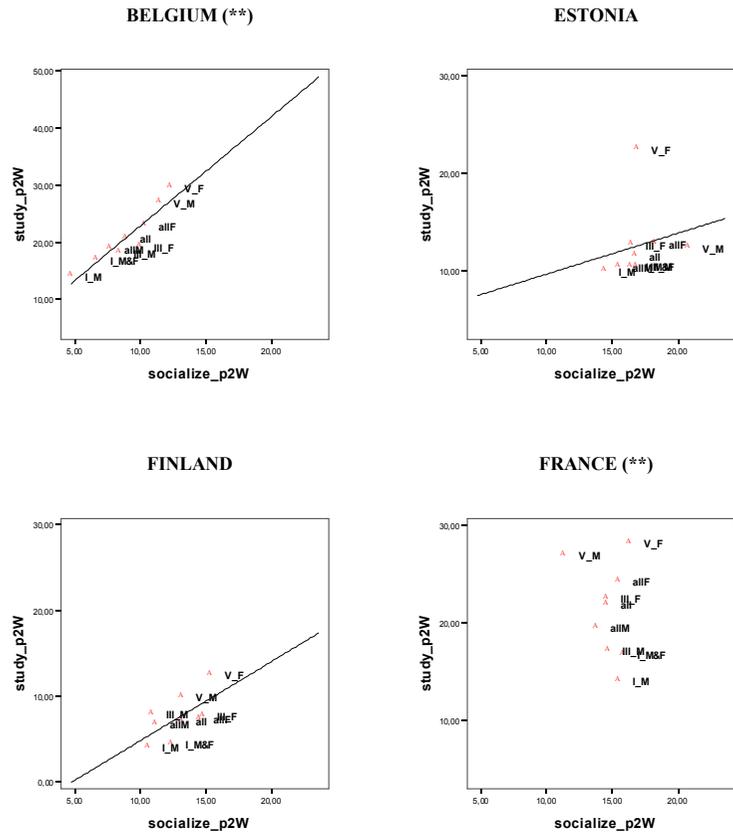
(*) non-committed time extended (day)=1440-School Time -Work Time Extended (Work + Domestic)
 Key: F=Female; M=Male; Education Level: I=Primary (ISCED 1-2); III=Secondary (ISCED 3-4); V= Tertiary (ISCED 5+)

Figure 5 (cont.) - Study after School and Leisure Time
 (as percentage of non-committed time extended *)
 by Education Level (ISCED) and Country

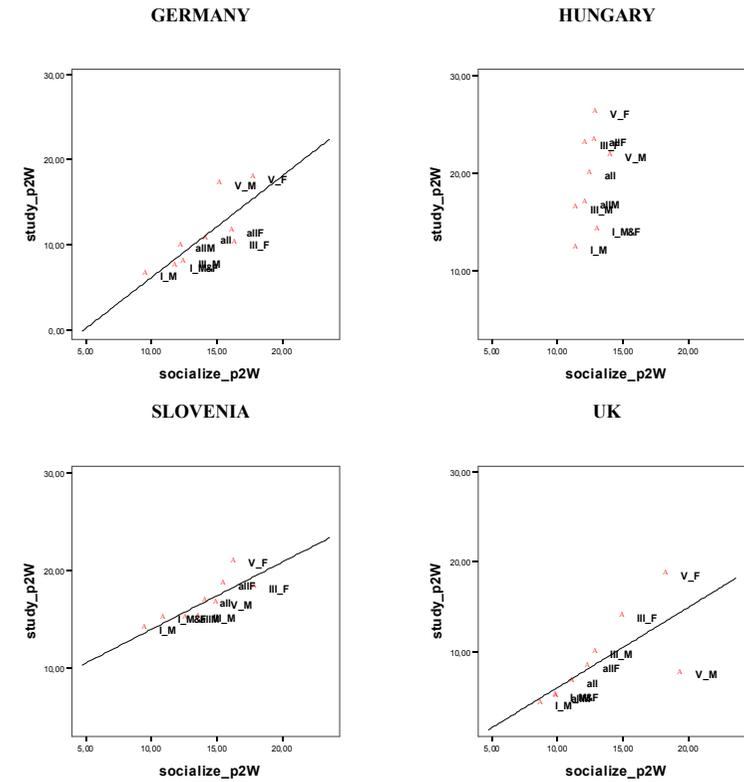


(*) non-committed time extended (day)=1440-School Time -Work Time Extended (Work + Domestic)
 Key: F=Female; M=Male; Education Level: I=Primary (ISCED 1-2); III=Secondary (ISCED 3-4); V= Tertiary (ISCED 5+)

**Figure 6 - Study after School and Socialization Time
(as percentage of non-committed time extended *)
by Education Level (ISCED) and Country**



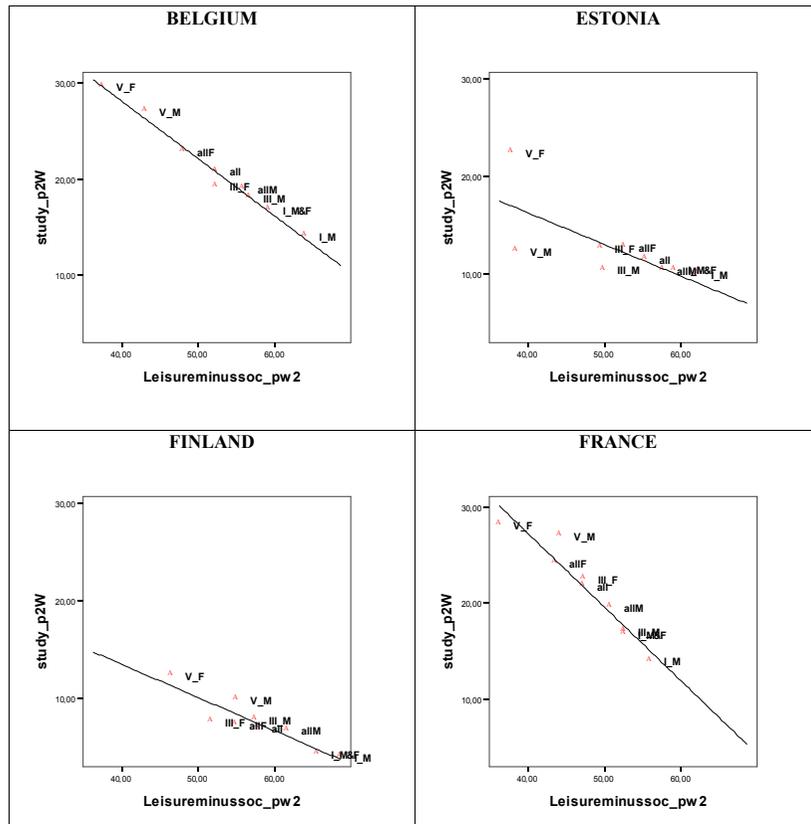
**Figure 6 (cont.) - Study after School and Socialization Time
(as percentage of non-committed time extended *)
by Education Level (ISCED) and Country**



(*) non-committed time extended (day)=1440-School Time -Work Time Extended (Work + Domestic)
Key: F=Female; M=Male; Education Level: I=Primary (ISCED 1-2); III=Secondary (ISCED 3-4); V= Tertiary (ISCED 5+)
(**) France and Belgium both have a specific organization of socialization category of time use . See Appendix 1 Table 1-A1 of this paper.

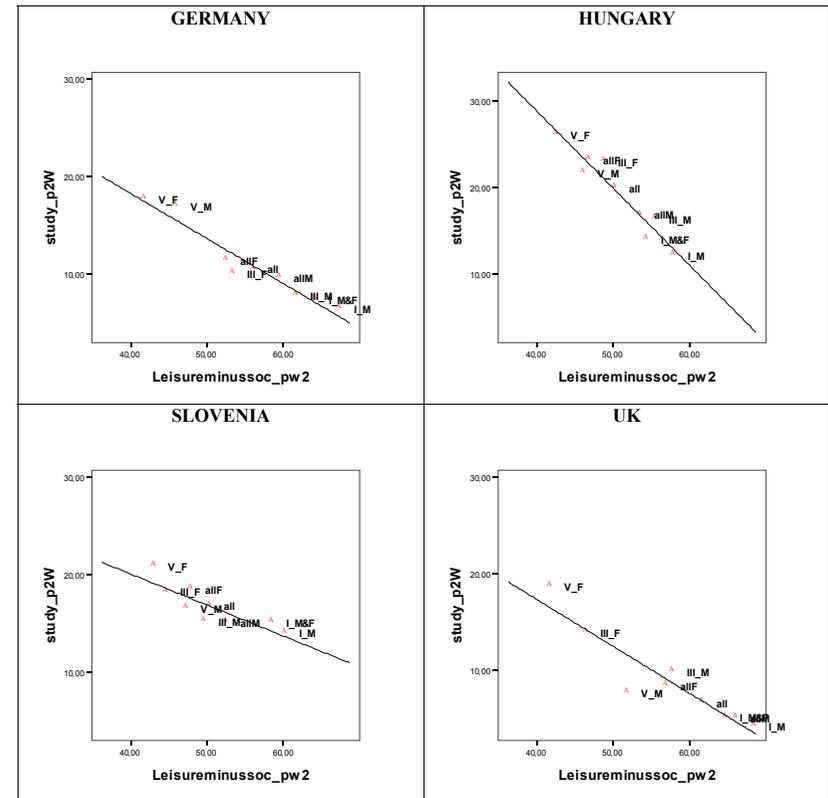
(*) non-committed time extended (day)=1440-School Time -Work Time Extended (Work + Domestic)
Key: F=Female; M=Male; Education Level: I=Primary (ISCED 1-2); III=Secondary (ISCED 3-4); V= Tertiary (ISCED 5+)

Figure 7 - Study after School and Leisure (excluding Socialization)
(as percentage of non-committed time extended *)
by Education Level (ISCED) and Country



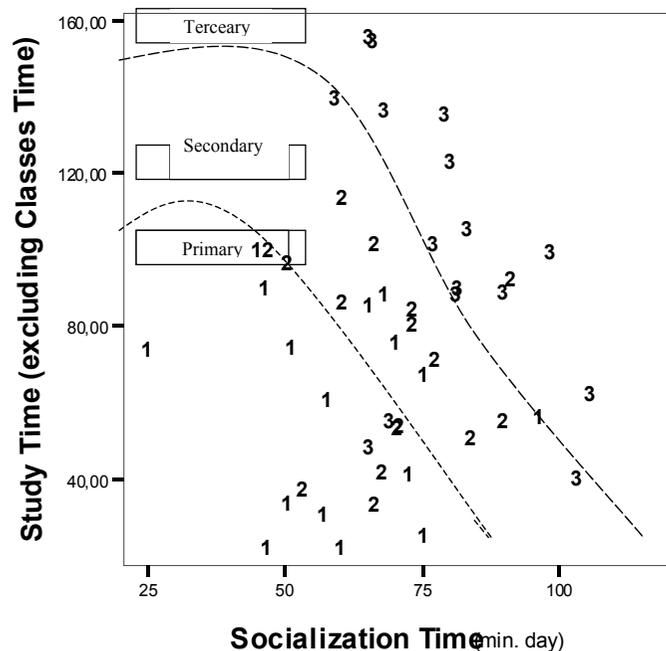
(*) non-committed time extended (day)=1440-School Time -Work Time Extended (Work + Domestic)
Key: F=Female; M=Male; Education Level: I=Primary (ISCED 1-2); III=Secondary (ISCED 3-4); V= Tertiary (ISCED 5+)

Figure 7 (cont.) - Study after School and Leisure (excluding Socialization)
(as percentage of non-committed time extended *)
by Education Level (ISCED) and Country



(*) non-committed time extended (day)=1440-School Time -Work Time Extended (Work + Domestic)
Key: F=Female; M=Male; Education Level: I=Primary (ISCED 1-2); III=Secondary (ISCED 3-4); V= Tertiary (ISCED 5+)

**Figure 8 - Study after School and Socialization
by Education Level (ISCED) and Country
(diary minutes)**



**Table 1 – Descriptives
Student (until 27 years old) by country
Source :MTUS' microdata**

Study Time ^(a)				
Country	Mean	Std. D	Min	Max
Canada	101,35	149,836	0	1230
France	81,30	121,042	0	690
Netherlands	62,69	53,053	0	321
Norway	65,39	108,331	0	510
UK	115,53	156,988	0	660
Italy	74,32	102,213	0	750
Germany	4,65	30,054	0	620
Austria	72,20	84,701	0	810
South Africa	50,45	79,944	0	660
Slovenia	80,02	109,638	0	690
Total	62,15	98,560	0	1230

(a) Classes time not included

School/classes Time				
Country	Mean	Std. D	Min	Max
Canada	186,84	195,150	0	880
France	160,65	199,788	0	810
Netherlands	202,33	88,714	0	619
Norway	146,56	178,073	0	630
UK	179,21	189,618	0	570
Italy	119,73	148,406	0	630
Germany	235,31	192,954	0	855
Austria	216,85	187,566	0	735
South Africa	185,30	159,165	0	540
Slovenia	89,06	147,712	0	980
Total	160,34	176,889	0	980

Socializing Time ^(a)				
Country	Mean	Std. D	Min	Max
Canada	122,8190	151,49279	,00	755,00
France	73,4718	110,63931	,00	660,00
Netherlands	107,5077	81,54580	,00	465,00
Norway	157,5843	139,70995	,00	660,00
UK	96,8421	151,60048	,00	690,00
Italy	62,2309	89,61652	,00	885,00
Germany	90,2669	115,44626	,00	885,00
Austria	58,0610	100,71554	,00	960,00
South Africa	91,6599	114,02737	,00	750,00
Slovenia	103,6956	127,39440	,00	900,00
Total	77,8590	108,75928	,00	960,00

(a) Socialization time components see on text.

**Table 1 –(cont) Descriptives
Student (until 27 years old) by country**

Free Time ^(a)				
Country	Mean	Std. D	Min	Max
Canada	489,9401	211,25166	,00	1325,00
France	409,8633	189,17341	,00	1060,00
Netherlands	429,7482	97,00419	96,43	726,43
Norway	515,6966	193,14715	,00	1440,00
UK	492,1053	204,16850	,00	975,00
Italy	520,3364	139,11944	,00	1080,00
Germany	390,3799	182,00532	,00	1190,00
Austria	408,1969	170,65251	,00	1215,00
South Africa	378,9069	180,69017	,00	1050,00
Slovenia	519,8982	185,90574	,00	1380,00
Total	465,0482	176,50053	,00	1440,00

^(a)Free time components see on text

Reading Books				
Country	Mean	Std. D	Min	Max
Canada	8,0891	30,79435	,00	275,00
France	13,6523	35,74927	,00	360,00
Netherlands	8,2991	17,42141	,00	124,29
Norway	9,9101	32,94468	,00	300,00
UK	,0000	,00000	,00	,00
Italy	4,0941	19,22056	,00	300,00
Germany	7,6833	25,11902	,00	335,00
Austria	4,3503	21,60907	,00	330,00
South Africa	5,1012	24,42632	,00	330,00
Slovenia	12,0798	34,52960	,00	360,00
Total	6,7675	25,32701	,00	360,00

Sleep Time				
Country	Mean	Std. D	Min	Max
Canada	514,9620	128,87746	105,00	1005,00
France	561,3614	109,17712	70,00	1020,00
Netherlands	547,6876	62,89315	364,29	1026,43
Norway	512,2686	100,98379	45,00	840,00
UK	550,7895	169,67613	330,00	1440,00
Italy	597,1544	109,94127	15,00	1405,00
Germany	548,8643	101,52364	70,00	1330,00
Austria	575,9254	100,55275	120,00	1440,00
South Africa	556,7611	111,18664	60,00	1200,00
Slovenia	563,1950	130,19845	30,00	1370,00
Total	572,3123	112,06949	15,00	1440,00

Paid Work Time				
Country	Mean	Std. D	Min	Max
Canada	52,07	138,262	0	680
France	36,20	106,482	0	810
Netherlands	20,82	55,587	0	381
Norway	15,84	74,381	0	720
UK	81,32	135,147	0	540
Italy	6,01	45,143	0	690
Germany	19,29	91,017	0	810
Austria	1,09	8,515	0	135
South Africa	11,50	59,154	0	630
Slovenia	30,38	116,387	0	1140
Total	15,13	76,144	0	1140

Education Levels (1;2;3)				
Country	Mean	Std. D	Min	Max
Canada	1,9169	,97162	1,00	3,00
France	2,1159	,72597	1,00	3,00
Netherlands	1,9640	,76971	1,00	3,00
Norway	1,7529	,65194	1,00	3,00
UK	1,7895	,92073	1,00	3,00
Italy	1,0877	,28681	1,00	3,00
Germany	1,6314	,75369	1,00	3,00
Austria	1,1283	,33839	1,00	3,00
South Africa	1,1374	,45375	1,00	3,00
Slovenia	1,3264	,50252	1,00	3,00
Total	1,3599	,62882	1,00	3,00

Age (Max. 27 years) and Sex (1=Male; 2= Female)					
Country	Age			Sex	
	Mean	Std. Deviation	Minimum	Mean	Std. Deviation
Canada	18,71	3,251	15	1,48	,500
France	18,54	2,866	15	1,51	,500
Netherlands	17,13	3,841	12	1,50	,501
Norway	19,84	2,896	16	1,52	,500
UK	18,19	2,546	16	1,44	,501
Italy	11,55	5,314	3	1,50	,500
Germany	16,27	3,821	13	1,48	,500
Austria	14,53	3,761	10	1,50	,500
South Africa	16,15	3,737	10	1,48	,500
Slovenia	17,29	4,169	9	1,53	,499
Total	14,66	5,176	3	1,50	,500

Figure 9– Study Time and Socialization Time
Country Means (MTUS)

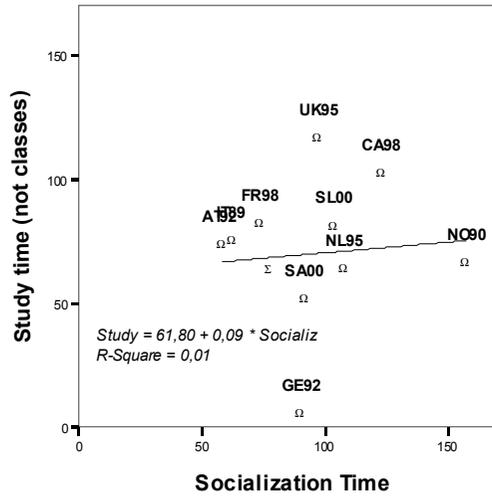


Figure 10– Study Time and Classes Time
Country Means (MTUS)

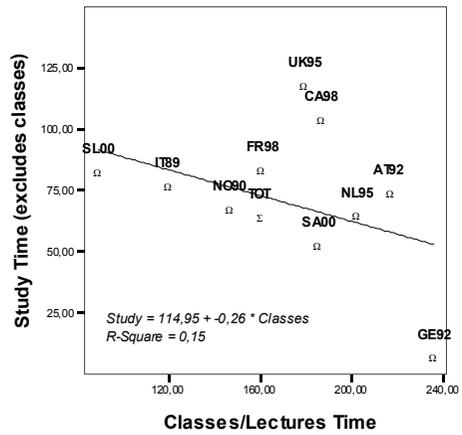
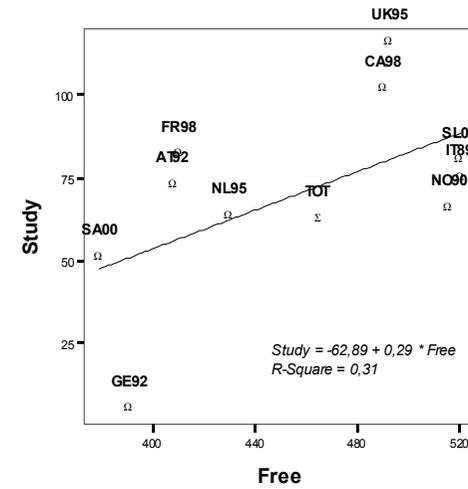


Figure 11– Study Time and Classes Time
Country Means (MTUS)



**Table 2 – Probit Regression
Slovenia Students
(Socializing and Study Extreme Groups)**

Probit regression	Number of obs=	344			
LR chi2(4)	=	86.44			
Prob > chi2	=	0.0000			
Log likelihood = -192.13805	Pseudo R2	=	0.1836		
studylessa~s	Coef.	Std. Err.	z	P>z	[95% Conf. Interval]
Female_YN	.6136819	.1490959	4.12	0.000	.3214593 .9059046
IncomeG_m	.1870043	.1160878	1.61	0.107	-.0405236 .4145322
dayweekend	.5778263	.1509864	3.83	0.000	.2818985 .8737542
AGE2	.1359681	.0214635	6.33	0.000	.0939005 .1780358
_cons	-3.45349	.4549088	-7.59	0.000	-4.345095 -2.561885

Marginal Effects

variable	dy/dx	Std. Err.	z	P>z	[95% C.I.]	X
Female~N*	.2350103	.05511	4.26	0.000	.126994 .343027	.52907
Income~m	.0729655	.04529	1.61	0.107	-.015803 .161735	2.18605
daywee~d*	.2245275	.05755	3.90	0.000	.111728 .337326	.412791
AGE2	.0530522	.00834	6.36	0.000	.036703 .069401	16.7006

**Table 3 – Descriptives
Austria Students**

Variable	Obs	Mean	Std. Dev.	Min	Max
studyandsoc1	381	.4015748	.4908614	0	1
freetime	805	441.354	150.1087	90	900
socializing	805	113.9068	95.06013	15	630
AV33	805	93.95031	85.29717	0	585
AV4	805	239.8323	155.2612	0	630
TOTTIME	805	1440	0	1440	1440
EDUC	805	239.8323	155.2612	0	630
STUDENT	805	1	0	1	1
AGE2	805	15.00373	3.892043	10	27
SEX	805	1.565217	.4960366	1	2
Educ_cat	805	1.149068	.3563772	1	2

**Table 4 – Probit Results
Austria Students
(Socializing and Study Extreme Groups)**

Probit regression Number of obs = 381
 LR chi2(4) = 152.03
 Prob > chi2 = 0.0000
 Log likelihood = -180.64173 Pseudo R2 = 0.2962

studyandsoc1	Coef.	Std. Err.	z	P>z	[95% Conf. Interval]
freetime	.0040226	.0005368	7.49	0.000	.0029706 .0050747
AGE2	.1541393	.027303	5.65	0.000	.1006264 .2076522
Educ_cat	-.2622723	.2938278	-0.89	0.372	-.8381641 .3136195
SEX	.1885635	.1544354	1.22	0.222	-.1141244 .4912514
_cons	-4.395932	.4546553	-9.67	0.000	-5.28704 -3.504824

Marginal effects after probit
 y = Pr(studyandsoc1) (predict)
 = .38023541

variable	dy/dx	Std. Err.	z	P>z	[95% C.I.]	X
freetime	.0015319	.0002	7.47	0.000	.00113 .001934	444.094
AGE2	.0587005	.01042	5.63	0.000	.038271 .07913	15.0184
Educ_cat	-.0998805	.1118	-0.89	0.372	-.318996 .119235	1.1601
SEX	.0718101	.05875	1.22	0.222	-.04333 .18695	1.55906

**Table 5 – Probit Results
Austria Students
Socialize
(upper median=1; less median=0)**

Probit socialize_med
 Probit regression Number of obs = 805
 LR chi2(3) = 95.11
 Prob > chi2 = 0.0000
 Log likelihood = -503.81864 Pseudo R2 = 0.0863
 Marginal effects after probit
 y = Pr(socialize_med) (predict)
 = .43163343

variable	dy/dx	Std. Err.	z	P>z	[95% C.I.]	X
AGE2	.0177512	.00472	3.76	0.000	.008494 .027008	15.0037
SEX	.0305727	.03662	0.83	0.404	-.041203 .102349	1.56522
freetime	.0010063	.00013	7.86	0.000	.000755 .001257	441.354

Table 7 (cont) - Total Study Time excluding regular classes^{a)} by Country
Students 15 and 16 years old, 2003
 (Weekly time^{b)}: mean and std; time female/time male; % of female students in total)

Country		Mean	StD	Country		Mean	StD
France	% Fem	48,9		Spain	% Fem	49,7	
	TFem/Tmal	1,3			TFem/Tmal	1,4	
	N	2608	8,07 5,54		N	6927	10,99 7,70
Germany	% Fem	49,2		Sweden	% Fem	48,0	
	TFem/Tmal	1,3			TFem/Tmal	1,4	
	N	2829	8,40 6,35		N	3053	4,94 4,61
Greece	% Fem	49,8		Switzerland	% Fem	44,2	
	TFem/Tmal	1,2			TFem/Tmal	1,2	
	N	2149	19,05 11,77		N	4860	5,85 4,84
Hong Kong	% Fem	53,5		Thailand	% Fem	56,3	
	TFem/Tmal	1,3			TFem/Tmal	1,3	
	N	2024	11,18 8,86		N	5229	10,87 8,19
Hungary	% Fem	43,7		Turkey	% Fem	35,4	
	TFem/Tmal	1,3			TFem/Tmal	1,1	
	N	2819	13,58 8,59		N	883	17,26 11,70
Iceland	% Fem	48,2		UK	% Fem	49,2	
	TFem/Tmal	1,2			TFem/Tmal	1,3	
	N	2853	6,86 5,72		N	6406	8,73 7,03
Ireland	% Fem	47,4		US	% Fem	49,1	
	TFem/Tmal	1,2			TFem/Tmal	1,2	
	N	1921	10,40 8,06		N	3458	9,74 9,79
Italy	% Fem	49,8		Uruguay	% Fem	42,3	
	TFem/Tmal	1,4			TFem/Tmal	1,4	
	N	8510	12,80 8,59		N	2116	10,44 8,30
Japan	% Fem	48,4		<i>Total</i>	% Fem	48,5	
	TFem/Tmal	1,2			TFem/Tmal	1,3	
	N	3497	7,93 8,96		N	139071	9,51 8,60
Korea	% Fem	39,5					
	TFem/Tmal	1,0					
	N	3243	17,70 13,51				

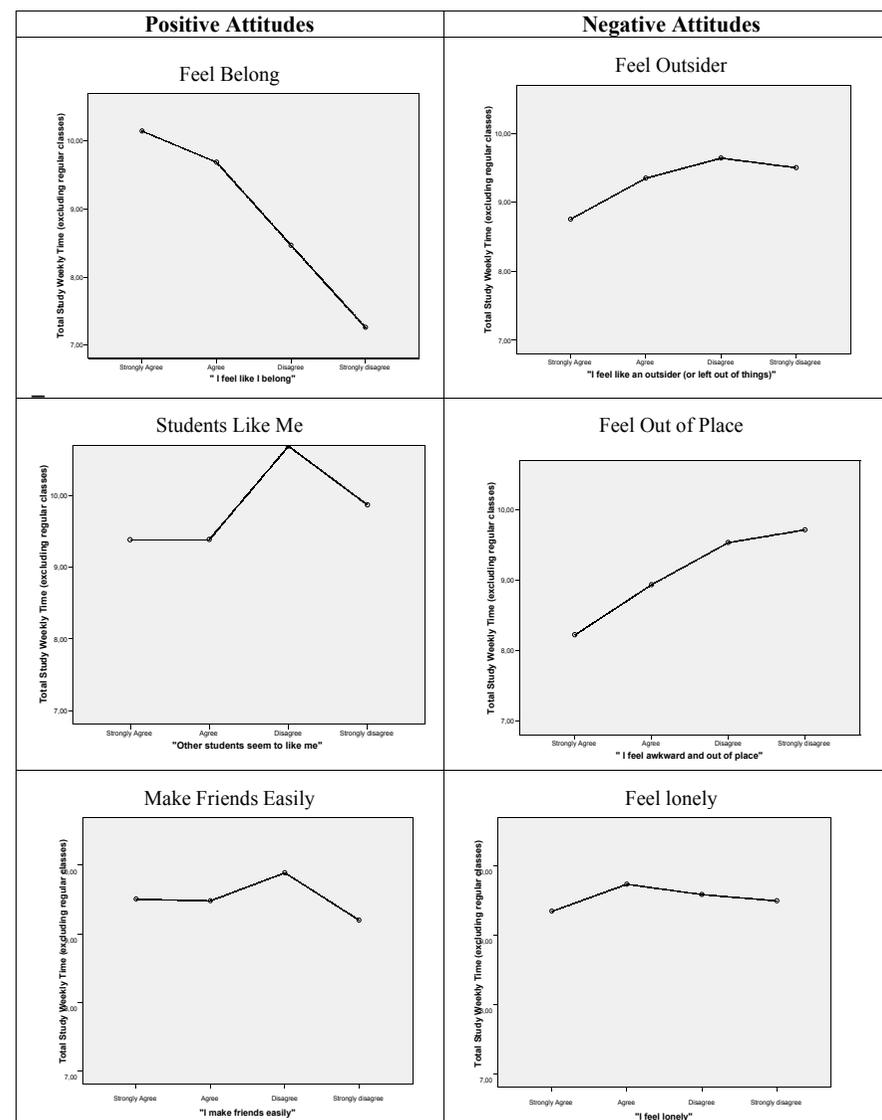
Source: PISA microdata, OECD (2003). See Appendix 3 for details.

^{a)} Total Study Time (excluding regular classes) = Homework or other study set by teachers + remedial classes at school + enrichment classes at school + work with a tutor + attending out-of-school classes + other study. (according Question29 from PISA-Student Questionnaire, 2003). Unit: hours per week.

^{b)} Weekly time includes time at the weekends too (OECD, 2003).

Note: data from Liechtenstein, Yugoslavia (former) and Macao not presented but included in total calculations.

Figure 12 – Total Study Weekly Time (excluding regular classes) and Attitudes related with School (“My School is a place where...”)



Appendix 1

Table 1-A1 – Student Concepts, by country

COUNTRY Survey year Age of Respondents	Student Concepts and Definitions	Number of diary days
Belgium 1998/2000 12-95	1) Reading books is included in Other reading. 2) Socializing with family is distributed along other aspects of social life. 3) Students are defined by 'main activity status'	2698
Estonia 1999/2000 10-	Students are defined by 'recent studies'.	2096
Finland 1999/2000 10-	Students are defined by 'recent studies'.	2976
France 1998/1999 15-	1) Walking the dog is included in Caring for pets. 2) Socializing with family is distributed along the other posts of social life. 3) Travel for shopping cannot be differentiated from Travel for leisure. 4) Students are defined by 'main activity status'	1750
Germany 2001/2000 na		9209
Hungary 1999/2000 15-84	Students are defined by 'main activity status'.	4476
Norway 2000/2001 9-79	1) Study total does not include Free time study and is therefore not available for comparison. Free time study was coded by the respective activity. 2) In Norway, socializing could be reported as the main activity if two simultaneous activities were reported. 3) Student is defined as spending at least 10 hours per week on education and less than 10 hours per week on employment.	406
Slovenia 2000/2001 10-	Students are defined by 'recent studies'.	2380
UK 2000/2001 8-	1) Students are 10-16 years old, who are all in full-time education, and also includes those over 16 who are classified as full-time students. 2) This table is based on the qualification for which students are studying. Those under 16 are taken to be in ISCED 1-2 3) ISCED levels are not usually used in the UK. The vast range of UK qualifications have been matched to these levels as closely as possible 4) The 'Travel Total' also includes 'Travel escorting to/from education' and travel where the purpose was not specified, which are not shown separately here.	3768
Sweden 2000/2001 20-84	Data not available because of the age limits of survey population 20-84, and the levels of education used.	

Source: Eurostat, Time Use Pocket Book,. Quoted from each country table footnotes.

Appendix 2

Full time students and school day sub-sample

The total data from MTUS was *a priori* filtered in order to ensure that only the students with no or little experience of employment would be considered. To this end, and after observing the data relative to each country, the age interval between 15 and 25 years was selected.²⁶

A second selection criterion, in addition to age, was time spent in class at school. Only those individuals in the sample who recorded a daily classroom time of at least 40 minutes in their diary were selected. The aim of this was to exclude from the analysis days on which the student had no classes either due to school holidays, or because of an official or national holiday or weekend.

A third aspect required consideration in the data filtering. The information available on the individuals declaring that they are students is incomplete in respect of the educational level at which they currently study. Only the level of education that they have completed is known. Consequently, the educational level inputted is the immediate level that which the student declared to have attained (i.e. who is student and completed the secondary is assumed to be at the tertiary). This information was then crossed with the normal age interval for each educational level, in order to eliminate anomalous cases (e.g. 15 years old person attending the 3rd level of education).

Lastly, all those who declared that they spent time engaged in a paid activity (work time) were also excluded from the sub-sample, independent of the duration of this activity.²⁷

Following this quadruple filtering of the data, the samples thereby obtained were considered representative of full-time students and their school day. Despite the fact that the category defined as 'lectures' may also include occupational training received on a short course – training – this category is ignored.

²⁶ For certain countries, as shown in *Table 1-A1*, information is collected for those aged older than 10 years. The youngest group of students is researched in a separate group.

²⁷ In a future research, I will analyze this group of students who divide their time between studying and working, the former being the main activity.

Appendix 3
PISA Data – Time Use Questions and attitudes

Q29²⁸ [The following question asks about the time you spend studying and doing different kinds of homework outside of your regular classes. This should include all of your studying and homework.]

On average, how many hours do you spend each week on the following?
[When answering include time at the weekend too]
hours per week

- a) Homework or other study set by your teachers
- b) Remedial classes at school
- c) Enrichment classes at school
- d) Work with a tutor
- e) Attending out-of-school classes
- f) Other study

Q27 My school is a place where: (Strongly agree; Agree; Disagree; Strongly disagree)

- a) I feel like an outsider (or left out of things)
- b) I make friends easily
- c) I feel like I belong
- d) I feel awkward and out of place
- e) Other students seem to like me
- f) I feel lonely

Q24- Thinking about what you have learned in school: To what extent do you agree with the following statements?

- ...
- b) School has been a waste of time (Strongly agree; Agree; Disagree; Strongly disagree)

²⁸ Exactly the same question is made only for Mathematics. (Q 33)