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Education return and financing: Donated affluence as consequence of tuition free study programs in Germany

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Education Return and Financing:

Donated Affluence as Consequence of Tuition Free Study Programs in Germany

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Diskussionsbeitrag 55
Potsdam 2008

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Education Return and Financing:
Donated Affluence as Consequence of Tuition Free Study Programs in Germany

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Abstract:
The paper sheds some light on the education returns in Germany in the post war period. After describing higher education in Germany the current stand of higher education financing within the single states is presented. In six states tuition fees will be introduced in 2007/08 and discussions are going on in even some more. In the second part of the paper an empirical analysis is done using longitudinal data from the German social pension system. The analysis over the whole lifecycle renders results which proof that the higher education advantages are quite remarkable and might be a justification for more intensified financing by tuition fees. But all this has to be embedded into an encompassing strategy of tax and social policy, especially to prevent a strengthened process of social selection, which would be counterproductive for an increased and highly qualified human capital in Germany.

Keywords:
Education return, tuition fees, tertiary education, vocational education, human capital, lifetime income, income contingent loans

JEL codes:
D1, D14, H81, I21, I22, I28, J13, J24,J26

I. Introduction

Despite of a more then 35 years lasting tradition of tuition free studies in Germany, discussions on introducing tuitions fees for university study programs have gained in public interest and caused harsh disputes on the pros and cons of a tuition free education.[1] While the proponents point out the advantages of free access to university education and a higher participation of students from low income families, opponents lay stress on dubious impacts on education demand as well as on questionable distributive effects of tuition free study programs.[2] But especially the deficits in many state budgets have boosted the re-implementation of tuition fees, particularly more heavily influenced by pressures of the ministers of finance than as a consequence of a careful strategy for a sustainable higher education financing.

[1] For an overview see Petersen (2006) and Kirchner (2007).
[2] See Grüske (1994, 1997).

But short and middle termed budgetary problems should not dominate necessary structural decisions to be made in the German education policy: While higher education is generally defined as a pubic good and financed from the budgets via tax revenue, up to now preschool education has to be financed predominantly by the families, thus causing high burdens on low income families and being one of the main obstacles against equal opportunities for all children. Because of the tremendous demographic challenges in Germany structural changes in education financing are inevitable to mobilize the last educational reserves, avoiding the current problem of structural unemployment because of an increasing mismatch in between skilled and unskilled labour force on various labour markets. The only resource Germany has had and will have in an intensifying international competition is a high qualified human capital, which has to be secured via efficient private decision making but also by state interventions, which do have positive impacts on the educational perspectives and the lifetime incomes of individuals as well as families.

Therefore, in this paper the problems of the education returns within the current generations are addressed, which have been connected with university education in post-war Germany. Such an ex-post analysis only draws a very rough picture on future trends but if we assume that higher education will become even more important in the future, at least some tentative and careful recommendations are possible. Part II gives a short overview on the structure of the German university education and the plans to introduce tuition fees in some of the member states. Some ideas on a postponed financing of tuition fees have been developed, which might come close to income contingent loans being discussed in the international literature in the last two decades.[3] In part III a concise description of the methods and the used data set is presented, while in part IV the most important empirical findings are listed. Part V summarizes the results.

II. University Education and Tuition Fees in Germany

Before the situation in Germany is described in more detail, an overview on the basic system of tertiary education will be given, which concentrates on university education.[4] In a second step the already implemented and the planned tuition systems within the single member states are presented.

II.1. Basic Structure of Tertiary Education

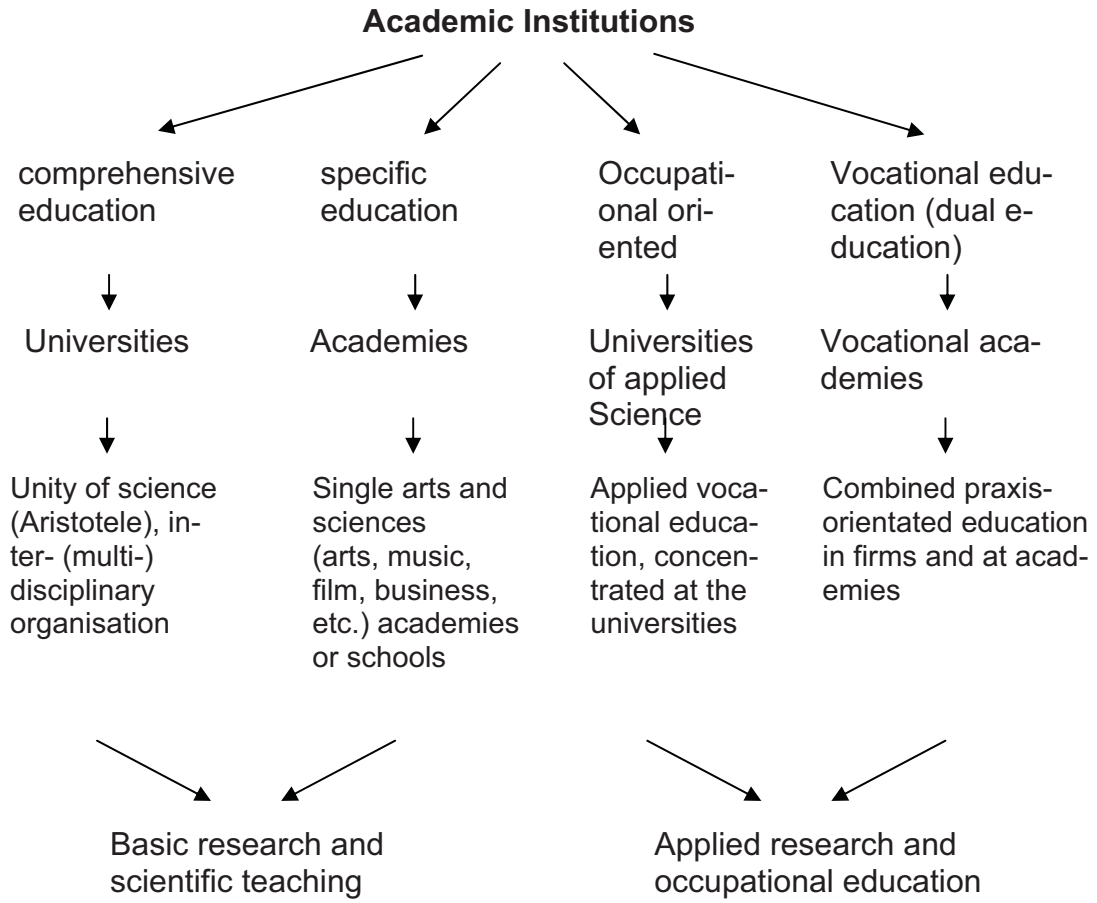
In Germany the universities are the top tertiary education institutions while all the other tertiary education units (academies with specific scope, universities of applied science, occupational academies) are subordinated (see figure 1). Only universities

[3] For details see Chapman (1997, 2002, 2005, 2006a, 2006b) and Kirchner (2007).

[4] Quite similar arguments can also be made for the other educational institutions listed in figure 1. Regarding the vocational education (named in Germany also dual occupational education), which has important relevance for the young generation as well as high international reputation, this education programs are usually not taken into consideration if international comparisons of national freshman ratios. Among 25 selected OECD countries German has in 2005 only the 25th rank (35 % of the young generation in 2005; see Statistisches Bundesamt (2005, p. 41). If at least the qualified vocational education programs would be added, Germany would easily reach the 9th rank of the USA (63 %) or even the 8th of Australia (68 %). In such programs the level of education is often much higher than in most of the BA-programs at US universities.

are allowed to have post-graduate education like PhD programs and especially habilitation procedures (including the junior professors with and without tenure track), in which the next academic generation is educated. Therefore the universities were responsible for quality assurance, which as consequence of the Bologna process has recently been shifted to external accreditation agencies.[5] In the tradition of Humboldt a university represents the collectivity of teaching and learning, while the interaction of research and teaching secures the quality of the education programs, respectively. Freedom of science and teaching[6] determines the democratic frame – university as a "republic of the scientists" in the sense of Kant – and therefore the "democratic group university". This has been altered by many novels of the university laws within the member states of the Federal Republic of Germany in recent years in favour of a model in which the university management has been "professionalised", the latter just meaning a purely steering by introducing simple business methods predominately following microeconomic calculus and controlling measures – as though university management is just a common business for profit maximizing and applying short termed user pays concepts.

Figure 1: Tertiary Education (German Model)



[5] This means that besides the ongoing control by the state ministries of education an additional control mechanism has been implemented, which very likely will strengthen the bureaucratic elements instead of securing more efficiency. Additionally the question arises who is going to evaluate all the new evaluators, which are predominately inventing additional costs. For details see Petersen (2007).

[6] Art. 5 No 3 of the German Constitution (Grundgesetz) as part of human rights secures this freedom: "Art and science, research and teaching are free. Freedom of teaching does not absolve from loyalty to the constitution".

Regarding research one has to differentiate in between basic and applied research, regarding teaching the transfer of academic knowledge and occupational skills has to be taken into consideration, the former more directed to the academics of the next generation, the latter to students aiming for a direct career at the labour markets. Basic research as well as the education of the future academics can hardly be financed privately so that in those fields public regulation or even intervention might be justified. Here the characteristics of public goods apply. As far as pure occupational skills are in the focus of tertiary education, this kind of human capital formation has usually led in the past (see part IV below) and hopefully will lead in the future to a personal income advantage on the labour markets whereas the future risks and insecurities within the labour markets have to be taken into consideration. Hence, in general occupational education does lead to an individual advantage in form of an increased income flow in the future; therefore, the increased human capital can be measured as the discounted future income flow (present value concept). Consequently the occupational education is principally marketable, while marketability may be influenced by the day-to-day risks in the lifespan.

Market failure in basic research and scientific education do justify state interventions into the markets for tertiary education what does not mean the implementation of a state monopoly as it still is dominating in Germany. Competition with private schools and even universities is of utmost relevance to prevent state universities from resting themselves because of their convenient position (in quasi-natural monopolies). But instead of concentrating research and scientific education at the universities and sending students to the universities of applied sciences where they would get a practical oriented education leading directly into the labour markets, the majority of the students has been channelled into the universities because here the per capita educational costs were lower than within the universities of applied science. This obviously has contributed to quality erosions within the universities study programs.

In fact in Germany currently (2005/2006) 103 universities, 64 academies for specific education and 202 universities of applied science (including the state universities of applied science for their employees) do exist. While in pure numbers the universities of applied science are clearly dominating, the numbers of enrolled students are totally converse: from 1,96 Mio. Mio. students 1,4 Mill. (71.5 %) study at universities while only 0,56 Mill. (28.5 %) are enrolled at universities of applied science.[7] This excess burden on the universities, which strongly increased during the last two decades, has forced many university professors to reduce their research work so that many of them do not any longer fulfil the demand of excellence. With regard to international research standards, German universities have lost in competitiveness and reputation. Parallel budgetary cuts have also created additional negative incentives for research and partly for teaching, too.

[7] See Statistisches Bundesamt (2005) and Petersen (2006).

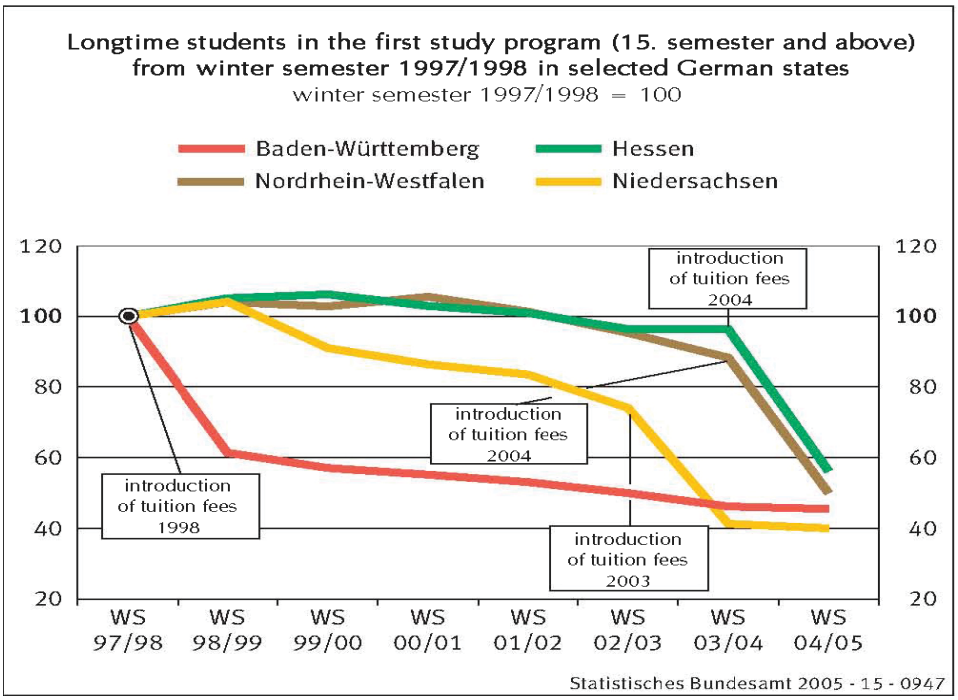
II.2. Existing and Planned Tuition Fees in Germany

For a systematic change in education financing initially the cost components have to be determined, which should not be financed by general tax revenue but by individual tuition fees. Costs for basic research and scientific education would have to be isolated because those do have predominately the character of public goods. In view of the limited knowledge from business administration regarding combined production, obviously the fixed costs will prevent any definite separation so that political decision making is necessary. In the justifications and consultations connected with the re-introduction of the tuition fees in some German states, rational explanations and justifications are badly missing. The tuition fee laws are more determined by ideological reasoning, while facts on the subject (who has to pay), object (for what has one to pay) and tariffs (how much is the fee burden) are only defined in a very imprecise manner – breaching traditional rules as for instance have been set by Adam Smith for taxation.

Figure 2: Tuition Fees in the German States for Long Time Students and Students in the Second Study Program

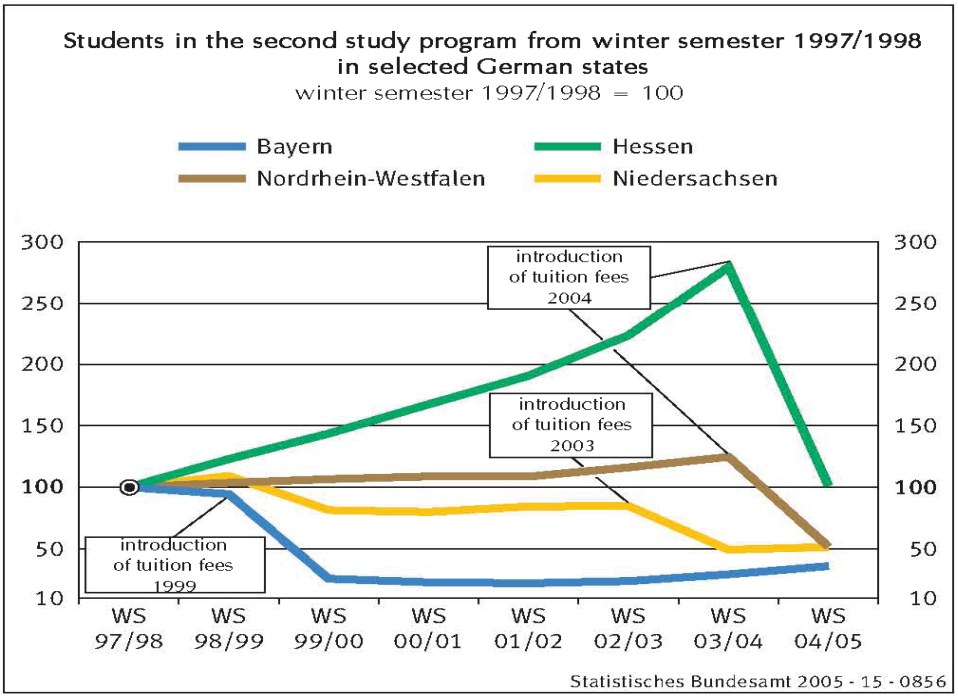
Before general tuition fees have been implemented, some German states started already in 1998/99 in inventing fees for long time students (some terms above the normal study time, which is nine terms in average) and/or students in a second study program. How those fees are spread in Germany is shown in figure 2. Such fees have had some impacts on the study behaviour. Especially the fees for long time students in Baden-Württemberg, Hessen, Nordrhein-Westfalen and Niedersachsen have led to a clear drop in the number of long term students, which already in the period of the discussions of that change have had a slightly reducing impact (see figure 3).

Figure 3: Impact on Long Time Students



Similar trends can be observed with regard to the student numbers studying in a second study program; the severest changes have taken place just after the implementation while in Bayern since the introduction of tuition fees a slight increase can be observed (figure 4).

Figure 4: Impact on Students in the Second Study Program



The „tuition fee laws“ to introduce tuition fees for all students or for students in the first semester were implemented in 2006/07 (see figure 5). The law titles were affected by ideological formulations: for instance the “law to secure justice in financing the universities” in Nordrhein-Westfalen (NRW). In § 2 of Article 2 in the “law to impose tuition fees and university duties” the tuition fees are described as following: “The universities are legimitated by a tuition fee by law to raise tuition fees for students in the study programs in which they are enrolled to raise for each semester a study contribution up to 500 Euro. By determining the amount of the study contribution the universities are obliged to relate that amount to the targets, which will contribute to an efficient and high quality study program, sharpening the profile of the university and increasing the competition in between the universities”. This amount of 500 Euros was mentioned in a verdict of the German Constitutional Court in 2005 as maximum burden to be imposed on the students.

The *contribution base* is to be enrolled at a NRW-university and neither connected with a specific study program nor to concrete cost elements (or income advantages as it is the case in Australia). How the revenue has internally to be used by the universities (e.g. related to the number of students or the former budgetary structures) is not regulated. *Contribution subject* is the student what again is quite imprecise because normally he/she has no own income or property so the parents/families have to pay, which is enforced by the German maintenance obligation of the Civil law. Exeptions are only possible if the postponed financing (via loans) is a functioning alternative. The *contribution schedule* is a lump sum payment, which can be compared to a lump sum tax. The redistributive impact is quite similar, the lower income brackets are more heavily burdened.

For social cushioning the redistributive impacts of such a contribution scheme the third part of the respective law in NRW regulates the postponed financing by loans and the fourth part the cost coverage in case of loan default. The politicians in NRW

intended to release the banks from the loan default risk to affect the effective interest rate being hold on a moderate level. According to § 17 of the “Studienbeitrags- und Hochschulabgabengesetz – StBAG” the NRW universities are obliged to pay 23 % of their tuition fee revenue into an equalisation funds organized by the NRW-Bank, which is a public bank of the state.The universities do get 385,00 Euro, while 115,00 Euro are paid into the funds to cover for the costs of loan defaults.

Obviously such a solution is far way from strengthening competition neither in between the involved banks nor in between the universities. The NRW universities have already reacted as cartels usually react: all universities and universities of applied science in NRW have introduced the highest possible contribution rate. Old concerns have been changed in a moment’s notice and suddenly the proponents of tuition fees are dominating. The tuition fee multiplied by the number of students renders a promising amount of revenue especially for universities concentrating on the huge faculties (economics and business as well as law) and without expensive medical schools. In fact only 77 % of tuition fee revenues will strengthen the budgets of the universities and questions arise if really the faculties with the large student numbers do profit. Currently the internal distribution within the single universities is still unclear – distributive battles are more than likely. With the remaining 23 % the students are financing the loan default – that means at least partially they are financing with their present tuition fees the reduced capital costs of the loan system. A new redistributive wheel has been put into operation, which at least partly might be directed in favour of the bad risks. Figure 5 gives a brief overview on the different situations within the German federal states.

Figure 5: Tuition Fees in the German States (2006/07)

State	Tuition fees 1. semester	Long time tuition fees	Administrative fees etc.
Baden-Württemberg	Introduction SuS 07	Study deposit 511,29 Euro after normal study period	Administrative fee 40 Euro/Sem.
Bayern	General tuition fees SuS 07	500 Euro/sem. after normal study period	Administrative fee 50 Euro/Sem.
Berlin			Enrollment fee 51,13 Euro/Sem.
Brandenburg			Enrollment fee 50 Euro/Sem.
Bremen		Study account with study deposit (until 14. Semester)	Administrative fee 50 Euro/Sem.
Hamburg	Introduction 1. sem. WS06/07, general SuS 07	Study deposit 500 Euro/sem. after normal study period	
Hessen	Art. 59 LandesVerf tuition free education, changes to come	Study deposit 500 Euro/sem. after normal study period	Administrative fee 50 Euro/Sem.
Mecklenburg-Vorpommern			
Niedersachsen	Introduction 1. sem. WS 06/07, general SuS 07	Study deposit 500 Euro/sem. after normal study period	Administrative fee 75 Euro/Sem.
Nordrhein-Westfalen	Introduction 1. sem. WS 06/07, general SuS 07	Study account 650 Euro/Sem., after 1,5 x Norman study period	
Rheinland-Pfalz	Benefit equalisation scheme proposed	Study deposit 500 Euro/sem. after normal study period	
Saarland	Introduction WS 07/08	Study deposit 500 Euro/sem. after normal study period .	
Sachsen	Proposal of a loan and tuition fee model (Milbradt)		
Sachsen-Anhalt		500 Euro/sem. after normal study period	
Schleswig-Holstein			
Thüringen		500 Euro/Sem. after normal study period	

SuS = Summer semester, WS = Winter semester.
Source: Deutsches Studentenwerk (http://www.studentenwerke.de/main/default.asp?id= 03203, 20.01.2006).

III. Data and Methods Used

For the determination of the education returns the lifetime income profiles of employees with different educations and job careers have to be compared. For the analysis of such differences in lifetime income the data of the research data centre of the German social pension system is used.[8] In III.1. a brief description of the data set is given and some basic results are presented. Part III.2. concentrates on a concise summary of the calculations of the labour income and the determination of the education returns.

III.1. Data and Reward Points

The scientific use file "Vollendete Versichertenleben 2004 (VVL2004)" (completed insurance life cycles) is a longitudinal data file with panel characteristics.[9] This file is the first one in Germany, which represents the complete biography of employees with different qualities of education. The data file is based on the reward points within the German pension formula, which can easily be transformed into wage figures. Because the reward points are defined in relation to each annual average wage, the real wage position within the wage distribution is defined and therefore the impact of inflation neutralised. The data have been extracted from the individual pension accounts, which contain the exact monthly wages as well as the employment situation over the whole life cycle. For the following analyses the data set was separated for male and female employees and different education levels. Table 1 shows the number of cases within the single groups.

Table 1: Number of Cases in the SUFVVL 2004

	Male	Female	Total
Lowest level of education with the lowest school leaving certificate without vocational education (*education level 1*)	*593*	*1125*	*1718*
Lowest level of education with the lowest school leaving certificate with vocational education [1] (*education level 2*)	*3508*	*3215*	*6723*
Abitur without vocational education (*education level 3)*	*27*	*23*	*50*
Abitur with vocational education [1] (*education level 4*)	*94*	*70*	*164*
University of applied science[2] (*education level 5*)	*366*	*49*	*415*
University (*education level 6*)	*309*	*90*	*399*
Total	*4897*	*4572*	*9469*

[1] completed vocational training („Lehre" or „Anlernen"), certificate of a vocational/technical school.
[2] former denotation: „höhere Fachschule"

Source: FDZ-RV – SUFVVL2004, own calculations.

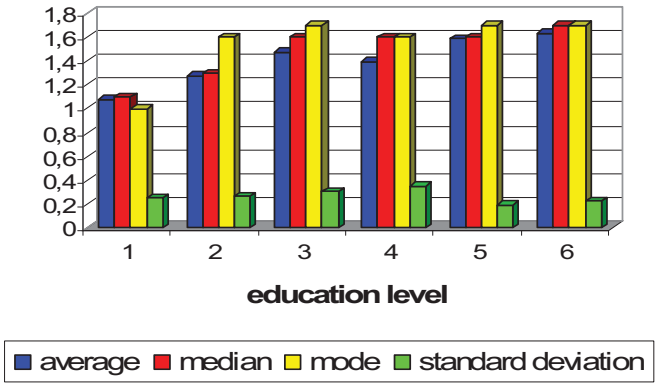
In table 1 the terms for the school system are translated due to the German characteristics. Level 1 is the lowest level of education with the lowest school leaving certifi-

[8] For the limits of such analysis see Kirchner (2007, pp. 171).
[9] For detail see Himmelreicher (2006).

cate (or even without) and without any vocational education (low skilled employees). The second educational level on the same school level has completed a vocational education, the third level has an abitur without vocational education, the fourth an abitur with vocational education, the fifth a degree from a university of applied science and the sixth a university degree. These education levels 1 to 6 are used in all the following figures and tables.

Due to size restriction only one example of several analytical approaches is demonstrated here. Obviously the lifetime income and the derived individual pension entitlement depend on the annual income and the number of contribution years – unemployment in the single years left aside. Usually (especially in West-Germany) male employees do have longer work careers than female employees. Beyond that there are still gender differences with regard to the monthly and annual wages. Figure 6 shows the reward points per year of fulltime work (male).

Figure 6: Reward Points per Year of Fulltime Work (Male)



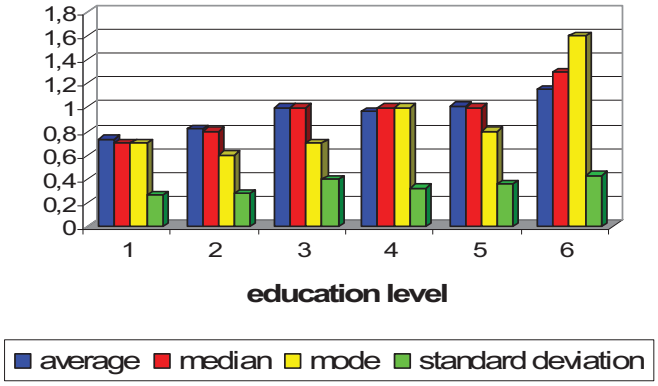
Source: FDZ-RV – SUFVVL2004, own calculations.

The results demonstrate that with increasing level of education the monthly reward points are increasing; while the first level almost earns the average wage (reward point 1.0) the fifth and sixth level earn about 1.6 times as much. Male with university education have a mean value of 1.63 and with education at universities of applied science with 1.59. In the lowest levels a vocational education increases the mean values from about 1.0 (level 1) to 1.2 (level 2). Surprisingly the male with abitur but without vocational education do have higher reward points (1.5) than male with abitur and vocational education (1.4). This might be explained by the fact that among the former group are a large number of university drop outs without university degree who have been quite successful in their job careers.[10]

With regard to the female similar trends can be observed: the reward points are increasing with a higher education level. But the level of reward points is much lower as in case of the male (see figure 7).

[10] Even in the public sector in the past such people have been comparatively successful. That might change in the future because of the strongly increasing numbers of employees with university degrees.

Figure 7: Reward Points per Year of Fulltime Work (Female)

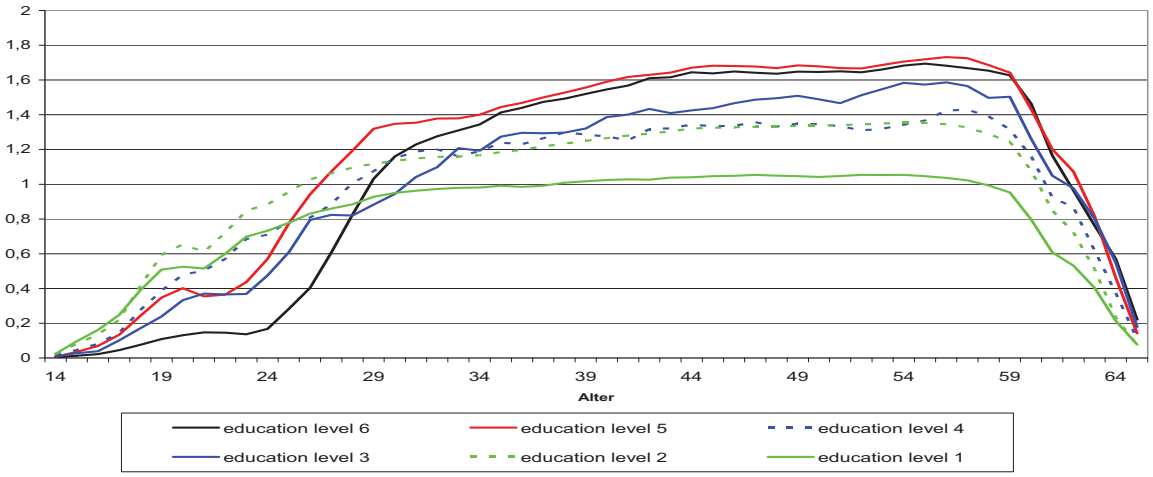


Source: FDZ-RV – SUFVVL2004, own calculations.

Figure 7 demonstrates that female can reach the average reward points only with abitur; without abitur they earn 0.7 (education level 1) or 0.8 (education level 2) reward points. Female with university degree have earned 1.15 reward points; that is much less (0.48) than the reward points of male in the same group.[11]

The development of the reward points over the lifetime is shown in the following two figures; hence, the reward point patterns take into consideration times of vocational education, minor employment, self-employment and times of employment with obligatory social insurance. For this purpose distorting impacts like home care of relatives, child education and unemployment have been eliminated. In figure 8 the relative income patterns for male are presented.

Figure 8: Reward Point Patterns for Male in the Lifecycle



Source: FDZ-RV – SUFVVL2004, own calculations.

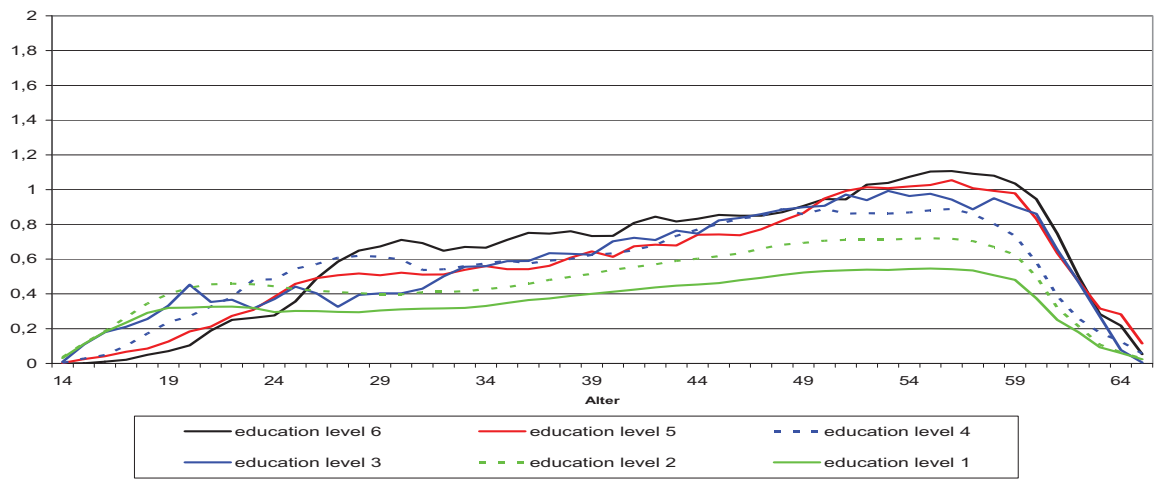
[11] One has to bear in mind that this group has started the job career in the late 1950ties. In the meantime the wage differences in between male and female have declined but not jet been equalised.

As easily can be seen, the university graduates (education level 6) do earn much less than all the other groups in the first years of working life. In this period the male with education level 1 and 2, respectively, have the highest income positions. During the course of the following years the university graduates catch up und pass the other education levels, excluded the graduates from the universities of applied science (education level 6). The latter do have almost without any exceptions higher reward points than the university graduates. The reason might be that the graduates from universities of applied science are far more technical orientated, which has been of utmost relevance in the first phase of reconstructing industry and infrastructure in Germany after World War II. The absolutely lowest level of reward points have male of education level 1. Over the whole life cycle in average they reach only in very few years the average wage within the social insurance scheme (reward points 1.0) or exceed it slightly. The above underlined relevance of occupational education is also demonstrated in this figure. With a complete occupational/technical education, male have earned in between the age of 35 and 60 clearly more than 1.2 reward points.

Furthermore it is obvious that for all levels of education the average reward points curves do strongly decrease at the age of 59/60 because early retirement plans have played an important role for the cohorts of employees being under consideration. This is underlined by the fact that within the data set 45 % of the male retired before the age of 63 without any significant differences in between the education levels.

The following figure 9 presents the development of the reward points for the female. Here the same trends are shown like in figure 7 which demonstrates that female do have much less reward points even over the whole lifespan than male. Regarding the education levels the patterns for female are principally similar to those of the male. The value of the reward points is increasing with higher education levels and in the first age segments the lower education levels do have higher reward points predominantly caused by the earlier entry into the working live.

Figure 9: Reward Point Patterns for Female in the Lifecycle



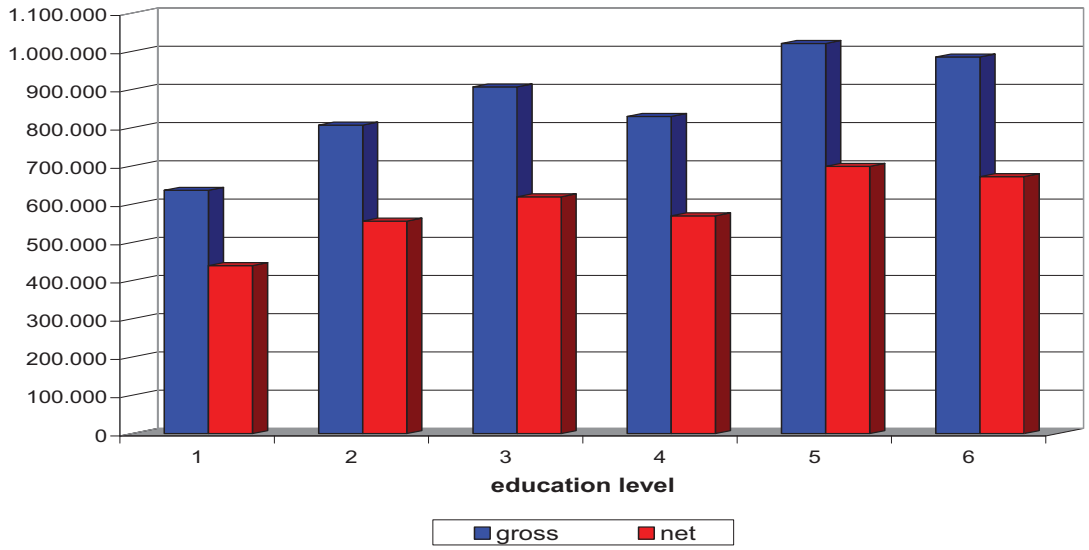
Source: FDZ-RV – SUFVVL2004, own calculations.

A common feature is that as in case of the male the female within the lowest education levels have the lowest wages. They do not earn more than 0.6 reward points and in level two the female almost never exceed 0.7 in their whole lifespan. Contrary to the male the female with university education (level 6) have nearly over the most years of the lifecycle (from the age of 28 to 62) had the highest reward points, clearly higher than the female graduates from the universities of applied science. However, only the two highest education levels are able to exceed the value of 1.0. Having university graduates in mind, male exceed this value in the age of 29, while female reach that value only in an age of about 51. That also demonstrates that the career profiles in this age cohort are quite different for male and female, the latter having massive disadvantages because of their multiple responsibilities within the families. Additionally the data set proofs that in the average of all education levels female retire predominantly in the age of 62, while the female with university degree have the longest working period (retirement with 62.5).

III.2. Labour Income and Education Returns

The reward points can be transformed by the average gross and net annual wages for all compulsory insured within the social pension system into annual Euro amounts. The lifetime income is than calculated from the end of the age of 14 until the retirement. Figure 10 shows for the lifetime gross and net income the same characteristics as the reward points (see figure 6 above). Principally lifetime income is increasing with increasing education level (exception level 6 compared to level 5 as discussed above).

Figure 10: Estimated Lifetime Income for Male (Gross and Net, in Euro)



Source: FDZ-RV – SUFVVL2004, own calculations.

The graduates from universities as well as universities of applied science in the average have earned about 1 Mio. Euro as compulsory insured lifetime income. In this context it has to be mentioned that in Germany a upper limit within the social pension insurance does exist, which practically cuts the income of this groups, which effectively are often much higher than this income limit. Therefore the effective income

differences are in reality much higher than shown in the graphs above. The graphs also demonstrate that the trends are similar with regard to the net lifetime income but progression within the income tax system reduces the net differences in between the different levels of education.

Table 2 gives information on a pairwise comparison of the different education levels with regard to gross and net lifetime income, where the lifetime income of level B is subtracted from lifetime income of level A. A vocational education then renders compared to the same school level but without a vocational education in a lifetime income difference of 170,351 Euro gross and 116,537 Euro net. A university graduate earns 102,684 Euros net (155,702 Euro gross) more than a male with abitur and completed vocational education (for graduates from universities of applied science the difference is with 129,659 Euros net and 191,146 Euros gross even higher). In total the university education leads to a substantially higher income flow over the whole lifespan, especially compared to the lowest education levels. However, the latter are financing with their direct and indirect taxes the tuition free education of the higher education levels.

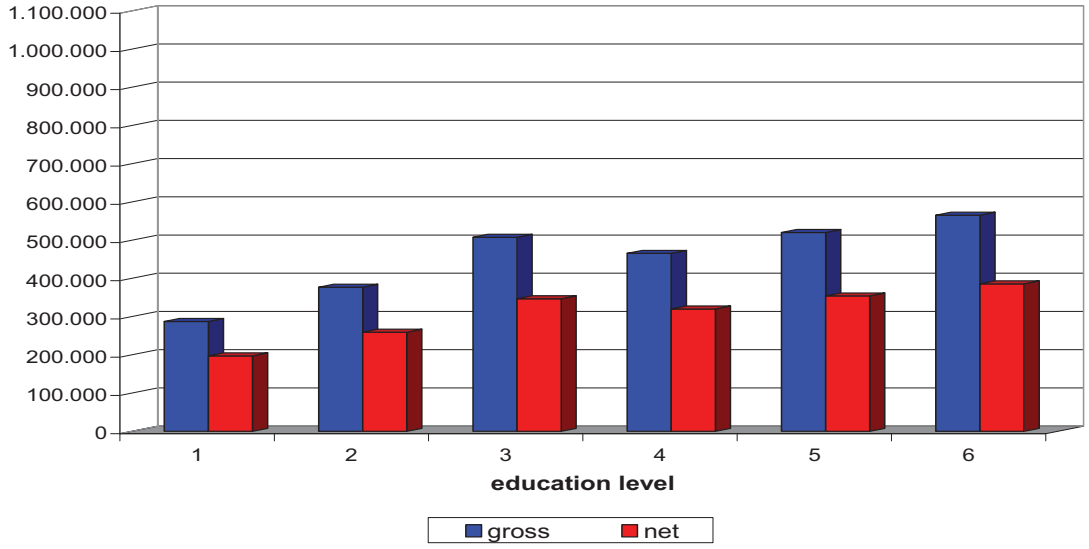
Table 2: Differences in Lifetime Wages of Male for Different Education Levels (Euro)

A	Differences in lifetime wages from B compared with A		B
	gross	net	
Lowest level of education with the lowest school leaving certificate without vocational education (1)	*+170.351*	*+116.537*	Lowest level of education with the lowest school leaving certificate without vocational education (2)
Abitur without vocational education (3)	*-77.492*	*-50.231*	Abitur with vocational education (4)
Lowest level of education with the lowest school leaving certificate without vocational education (1)	*+270.529*	*+180.278*	Abitur without vocational education (3)
Lowest level of education with the lowest school leaving certificate without vocational education (2)	*+22.686*	*+13.511*	Abitur with vocational education (4)
Abitur without vocational education (3)	*+113.654*	*+79.428*	University of applied science (5)
Abitur without vocational education (3)	*+78.209*	*+52.453*	University (6)
Abitur with vocational education (4)	*+191.146*	*+129.659*	University of applied science (5)
Abitur with vocational education (4)	*+155.702*	*+102.684*	University (6)

Source: FDZ-RV – SUFVVL2004, own calculations.

The lifetime incomes of the female are transformed in the same way as for the male. The difference for female with university degree and female of the lowest education level 1 is about 280,000 Euro gross. Female university graduates therefore got almost twice as much lifetime income than female of level 1. Opposite to the male the university graduates do have the highest lifetime income (565,743 Euro compared to 520,315 Euro of graduates from the universities of applied science).

Figure 11: Estimated Lifetime Income for Female (Gross and Net, in Euro)



Source: FDZ-RV – SUFVVL2004, own calculations.

Table 3 again gives information for pairwise comparisons of the different education levels for female.

Table 3: Differences in Lifetime Wages of Female for Different Education Levels (Euro)

A	Differences in lifetime wages from B compared with A		B
	gross	net	
Lowest level of education with the lowest school leaving certificate without vocational education (1)	*+89,679*	*+61,767*	Lowest level of education with the lowest school leaving certificate without vocational education (2)
Abitur without vocational education (3)	*-42,036*	*-26,633*	Abitur with vocational education (4)
Lowest level of education with the lowest school leaving certificate without vocational education (1)	*+220,312*	*+148,968*	Abitur without vocational education (3)
Lowest level of education with the lowest school leaving certificate without vocational education (2)	*+88,597*	*+60,567*	Abitur with vocational education (4)
Abitur without vocational education (3)	*+12,384*	*+7,397*	University of applied science (5)
Abitur without vocational education (3)	*+57,813*	*+39,007*	University (6)
Abitur with vocational education (4)	*+54,420*	*+34,031*	University of applied science (5)
Abitur with vocational education (4)	*+99,848*	*+65,640*	University (6)

Source: FDZ-RV – SUFRTZN04XVSBB, own calculations.

Summarising the results it has become obvious that female of this cohort (retirees of 2004) have earned much less than male even in a lifetime perspective. It has to be mentioned that in many cases university graduates were not employed in jobs being eligible for the social pension insurance. Many self-employed people with comparatively high lifetime incomes and the public employees ("Beamte") are not included into this data set. Therefore, the income differences in favour of the high education groups are very likely heavily underestimated. As already mentioned above, in the following cohorts equal opportunities for women have been strongly improved so that the male/female difference will decline. But the employment situation for low skilled work due to increasing global competition was dramatically worsened in the last two decades as the unemployment rations demonstrate; therefore, the income differences in between the education levels might increase over time so that future analyses of those trends are of utmost relevance.

For the estimation of education returns in the literature different methods are used;[12] the Mincer method is a well known one, which is based on regression analysis. The basic shortcoming is that this estimation assumes an equal return for each year of education independent from the level and kind of education. Thus, a longer education would yield in higher returns from education. An alternative is the estimation of the internal interest rate, in which the returns and costs for each year are determined. Hence, it is possible to differentiate in between different levels and kinds of education. The internal interest rate is calculated in accordance to the standard approach of the present value concept. The disadvantage of this concept is that data are necessary, which are partly available only in the future or the income effects of educational measures have to be determined in advance. Therefore Ammermüller/Dohmen have developed the "short-cut method", which is based on the internal interest rate but implies an easy approximation: the income of a superior education level is subtracted from an income of an inferior education level and divided by the income of the inferior education level. This simplified rule is used for the following comparisons.

III. Education Returns, Opportunity Costs and Capital Formation

In the following chapter the lifetime wages are discounted on the entry into the retirement age and the education returns for the discounted and undiscounted lifetime wages determined (IV.1.). In Germany it is often argued that the period used for the study program is connected with high losses in form of market income. This opportunity costs argument is discussed in IV.2. Additionally it has to be taken into consideration, that higher lifetime incomes are also often connected with a higher saving capacity. Therefore in chapter IV.3. it is analysed if the higher education levels do have a systematically higher amount of capital, which beside the higher wages would also increase their total lifetime income (wages plus capital income).

IV.1. Education Returns

The average gross lifetime wage of male with university degree (level 6) was 18.8 % higher than of male with abitur and vocational education (level 4). The graduates from university of applied science had a wage advantage of about 23 % (4.2 percentage points more than university graduates). These estimations do not take into consideration that the wage were generated at different times in the past. Therefore it is necessary to discount the wage flows. As discount rate an interest rate without high risk was chosen.[13] The on the year 2004 discounted wage flows for male are presented in table 4.

[12] See Mincer (1974), Ammermüller/Dohmen (2004) und Kirchner (2007).
[13] The interest rate for saving deposits with four years duration has been chosen, which in between 1970 and 2003 was 6.19 %; see Kirchner (2007).

Table 4: Discounted Gross Lifetime Wages of Male (Euro)

Education level	Discounted gross lifetime wages
Lowest level of education with the lowest school leaving certificate without vocational education (1)	*2.170.175*
Lowest level of education with the lowest school leaving certificate with vocational education (2)	*2.693.610*
Abitur without vocational education (3)	*2.735.528*
Abitur with vocational education (4)	*2.661.001*
University of applied science (5)	*3.170.087*
University (6)	*2.904.114*

Source: FDZ-RV – SUFRTZN04XVSBB, own calculations.

The discounting method obviously has an impact on the education returns. As consequence the rate of return for university graduates (level 6) compared to male with abitur and vocational education (level 4) is less than half as much (9.1 %). The reason is that the latter do have a wage flow, which in the first period of the lifespan is much higher than that of the university graduates (see figure 8 above) and therefore are more “profiting” from the discounting method. The rate of return of the graduates from the universities of applied science is reduces from 23 % to 19.1 %. The lower reduction compared to the university graduates can be explained with the earlier entrance of them into working life. Because of those methodological differences in table 5 the rate of returns for the undiscounted and the discounted wage flows are presented.

Table 5: Education Returns Male (percent)

A	Education returns from B compared with A		B
	not discounted	discounted	
Lowest level of education with the lowest school leaving certificate without vocational education (1)	*26,8*	*24,1*	Lowest level of education with the lowest school leaving certificate without vocational education (2)
Abitur without vocational education (3)	*-8,5*	*-2,7*	Abitur with vocational education (4)
Lowest level of education with the lowest school leaving certificate without vocational education (1)	*42,5*	*26,1*	Abitur without vocational education (3)
Lowest level of education with the lowest school leaving certificate without vocational education (2)	*2,8*	*-1,2*	Abitur with vocational education (4)
Abitur without vocational education (3)	*12,5*	*15,9*	University of applied science (5)
Abitur without vocational education (3)	*8,6*	*6,2*	University (6)
Abitur with vocational education (4)	*23,0*	*19,1*	University of applied science (5)
Abitur with vocational education (4)	*18,8*	*9,1*	University (6)

Source: FDZ-RV – SUFRTZN04XVSBB, own calculations.

In the following table 6 the gross lifetime wages of the female are show, again discounted on the entry into their respective retirement age and for the different education levels.

Table 6: Discounted Gross Lifetime Wages of Female (in Euro)

Education level	Discounted gross lifetime wages
Lowest level of education with the lowest school leaving certificate without vocational education (1)	*952.289*
Lowest level of education with the lowest school leaving certificate with vocational education (2)	*1.250.272*
Abitur without vocational education (3)	*1.538.434*
Abitur with vocational education (4)	*1.498.542*
University of applied science (5)	*1.508.280*
University (6)	*1.675.931*

Source: FDZ-RV – SUFRTZN04XVSBB, own calculations.

Also in this case similar differences within the rate of returns are estimated. Hence, the rate of return for the discounted lifetime wages is with 11.8 % by 9.6 percentage points lower than for the undiscounted income figures. And the comparison of the female with abitur and completed vocational education (level 4) shows that their lifetime income is slightly below that of the female graduated from the universities of applied science (level 5). In the undiscounted comparison the latter has been 11.7 % higher because of the fact that this discounting methods is weighting the former working life periods more strongly than the later. In both cases – for male and female – the discounting methods result in a decrease of the rates of return compared to the undiscounted figures. Table 7 gives an overview on the education returns for female.

Table 7: Education Returns Female (percent)

A	Education returns from B compared with A		B
	not discounted	discounted	
Lowest level of education with the lowest school leaving certificate without vocational education (1)	*31,2*	*31,3*	Lowest level of education with the lowest school leaving certificate without vocational education (2)
Abitur without vocational education (3)	*-8,3*	*-2,6*	Abitur with vocational education (4)
Lowest level of education with the lowest school leaving certificate without vocational education (1)	*76,6*	*61,6*	Abitur without vocational education (3)
Lowest level of education with the lowest school leaving certificate without vocational education (2)	*23,5*	*19,9*	Abitur with vocational education (4)
Abitur without vocational education (3)	*2,4*	*-2,0*	University of applied science (5)
Abitur without vocational education (3)	*11,4*	*8,9*	University (6)
Abitur with vocational education (4)	*11,7*	*0,7*	University of applied science (5)
Abitur with vocational education (4)	*21,4*	*11,8*	University (6)

Source: FDZ-RV – SUFRTZN04XVSBB, own calculations.

Using this data file has improved the estimations of education returns. All estimations having been made before are concentrating on average income figures only in one basic year or comparatively short periods of the lifespan. The long term effects of education have not been adequately incorporated. A critical point which still remains is that the data are historical and heavily dependent on the growth developments and the business cycles of the past. Additionally transfer payments (especially payments for students from low income families; BAföG = Bundesausbildungsförderungsgesetz) are also not taken into consideration. Beyond that the data set does not differentiate in between different study programs and subjects. Additional information remains necessary to justify a more sophisticated tuition fee system.

IV.2. Opportunity Costs

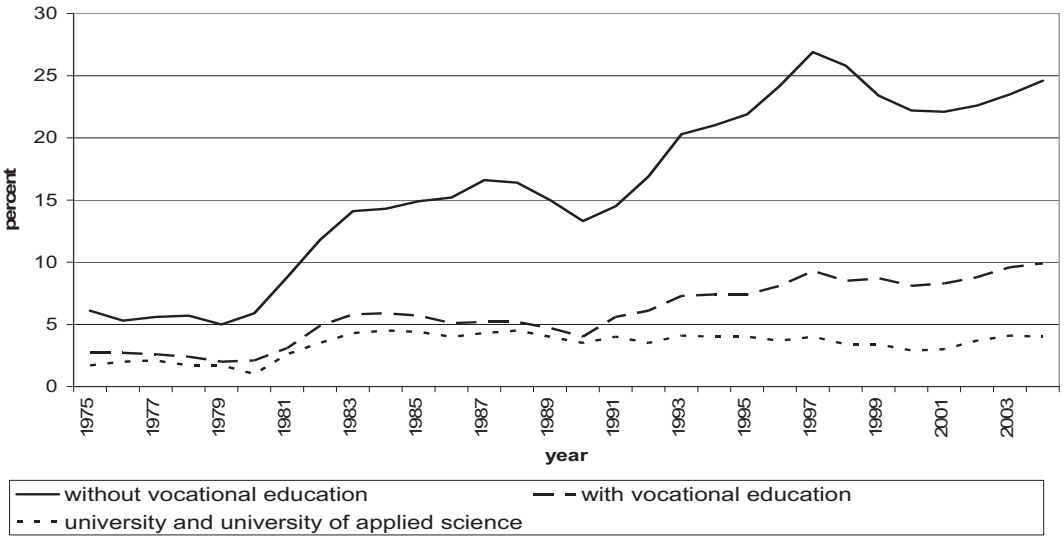
The opportunity costs argument is heavily dependent on the assumptions about the labour market chances for young people with abitur but without tertiary or occupational education. In a publication for the CHE (Centrum für Hochschulentwicklung der Bertelsmann Stiftung) Schuller et al. (2000) have estimated opportunity costs of 74,865 Euros for law students and of 273,785 Euros for social pedagogic students,

based on a study by Lüdecke/Beckmann (2000). Such figures obviously provoke the questions how the differences of almost 200,000 Euro can be explained and who with abitur and no occupational education does earn more than 250,000 Euro in the first five years of the working career?

If a bank assistant is taken into consideration, he/she would earn about 23,000 Euros (in 2005) in the first three years of occupational education and in the two years after about 37,500 Euros (in total roughly 60,500 Euro). From this amount one has to subtract the consumption expenses, which amount over a five years period to about 45,000 Euro.[14] These expenses are financed by the families via intra-family transfers and/or social transfers (like BaföG). Therefore the effective income advantage for a bank assistant is reduced to roughly 15,000 Euros. Figure 8 and 9 above demonstrate that even some students of universities and universities of applied science do at least part-time work, what additionally decreases the opportunity costs by some thousand Euros.

Beyond that the competition in the markets for unskilled labour and for occupational/technical education would be strongly increased if larger numbers of young people with abitur would be pushed into those labour markets. Many of the less qualified would be displaced and youth unemployment even increased because for low skilled workers the unemployment ratios are considerably higher than for people with occupational education or university graduates (see figure 12). Consequently the remuneration in these markets and the wages would likely more or less strongly be reduced and some would find no adequate jobs so that the opportunity costs would be almost zero or even born by other young people whose job chances would be jeopardised.

Figure 12: Unemployment Ratios for Different Qualification Levels



Source: *IAB*: Qualifikationsspezifische Arbeitslosenquoten, http://doku.iab.de/kurzber/2005/kb0905_anhang.pdf.

[14] The average expenses of a student's household are about 750 Euro a month; for details see Petersen (2006, pp. 13). Additionally it has been taken into consideration that students do get lots of real transfers in form of subsidised dwelling, reduced prices for meals in the students' union, reduced prices for local traffic, cheap health insurance premiums, etc. Those subsidies even increase the real monthly income and reduce the opportunity costs.

Moreover figure 8 and 9 above demonstrate that even some students of universities and universities of applied science do at least work part-time. The average income is roughly one third of the education levels 1 and 2 so that the opportunity costs are even more reduced. In total, the opportunity costs argument, which is often cited as justification for a higher income in the later working time period does obviously not fully and in many cases not at all compensate for the lifetime income advantages of higher education.

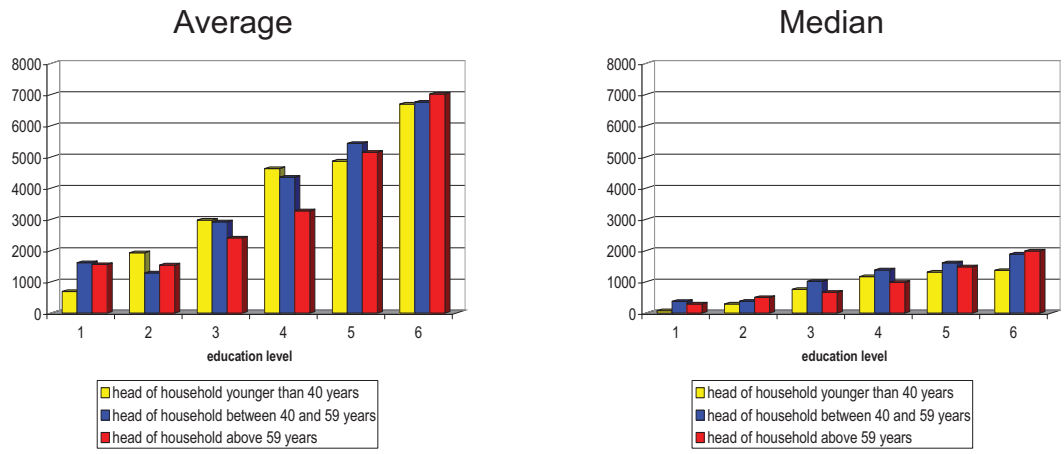
IV.3. Capital Formation

As already mentioned above, the lifetime income determines the ability to save and the level of capital income. In the following the stress is laid upon the relation in between the education level and accumulation of capital. For the following empirical analyses the data file of the German household budget survey 1998[15] is used. As in the analyses above the data are restricted to West Germany and divided into three age cohorts: head of household younger than 40 years, in between 40 and 59 years and above 59 years. The number of the education levels under consideration is equal to the statistic used above but the definitions are different: (1) no occupational education, (2) semi-skilled or traineeship, (3) completed occupational education, (4) master or occupational academy, (5) graduate from a university of applied science, (6) graduate from a university.

In figure 13 the expenses for capital formation are visualised. Private households, in which at least one household member has a university degree, spend the highest amount for capital formation, the second highest amount is spend by households with a graduate from universities of applied science. The median values demonstrate that the variance within the groups is quite high. Additionally it is obvious that the households with older heads do spend more of their income for capital formation than the younger households; in the first cohort at the begin of the working career other expenses like costs for founding a family and raising children, arranging a flat, expenses for durable consumption goods, etc. are dominating.

[15] The German Einkommens- und Verbrauchsstichprobe (EVS) is a household budget survey for the net income and consumption levels, including the property and wealth, within the private households. It is a sample of 0.2 % of all private households and has even quite a good quality regarding the corresponding national accounts statistics. For details see http://www.destatis.de/jetspeed/portal/cms/Sites/destatis/Internet/DE/Content/Publikationen/Qualitaetsberichte/WirtschaftsrechnungenZeitbudget/WirtschaftsrechnEVS,property=file.pdf. For a comparison with other statistics see Bork/Petersen (1997).

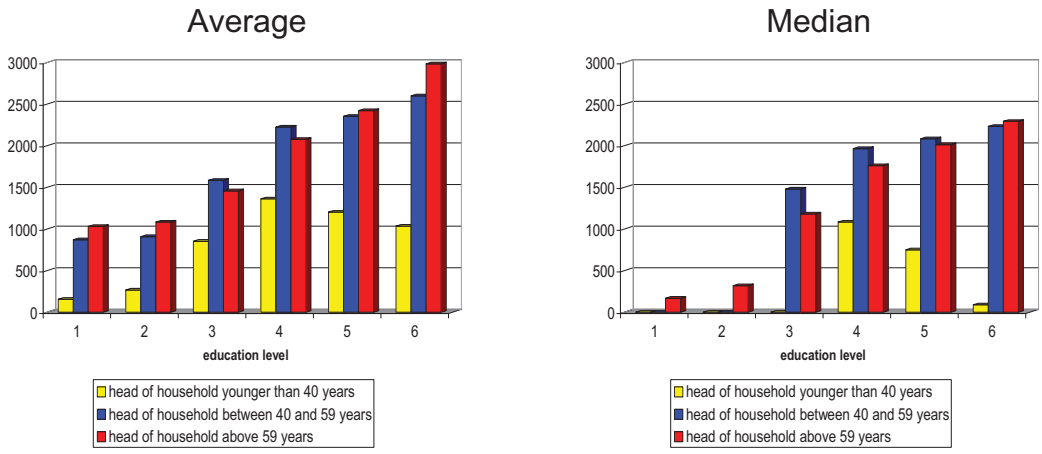
Figure 13: Expenses for Capital Formation of Private Households According to Age Cohorts and Educational Level per Quarter, West Germany (Euro)



Source: EVS-Data File 1998, own calculations.

Needless to say, that the differences in savings also determine the extent of capital income within the different private households. Consequently the younger households have less capital income than the older ones (see figure 14). It also becomes obvious that within the households of the youngest cohort not the highest education levels do have the highest capital income but the education level 4. This is caused by the fact that the expenses for capital formation in these education levels are higher but the accumulated capital is less due to the later entry into the working life. In the second and third age cohort this later entry is already overcompensated by the higher periodical savings.

Figure 14: Capital Income of Private Households According to Age Cohorts and Educational Level per Quarter, West Germany (Euro)



Source: EVS-Data File 1998, own calculations.

The medians in figure 14 also show that for the lowest qualification levels capital income does not play an important role. In contrast, households with academic persons have capital income of a quite remarkable extent. Therefore, capital formation and capital income are closely related to the education levels and have to be included

into the analysis if all the merits of higher education have to be taken into consideration.

IV. Conclusion

The paper has shed some light on the education returns of higher education at least for one cohort (entering the labour markets at the end of the 50ties, being retired in 2004) in the post war period in Germany. Because of the maturity of the German economic system and partial saturation in demands for standard commodities the same growth patterns as in the past cannot be projected for the future. But in a world of increasing competition because of an onward going globalisation it seems to be likely that high qualified human capital is for Germany the only remaining resource to keep up with the international developments. Therefore, it is more than likely that the education returns will not be strongly reduced in spite of the fact that the future lifecycles will be much less stable, more volatile, and more often interrupted by job rotation as well as temporary unemployment.

Regarding the methodological approaches of our empirical analysis some important questions remain: Which comparisons are the correct ones, using the raw or discounted data, using the method to discount on the entry in retirement or discounting on the time of the decision on the different education qualities? The latter method would be to determine the present value of the human capital or to estimate the internal interest rate. Which method is ever chosen, the estimations of the education return above have made quite clear that higher education renders a remarkable income advantage, which might justify that the students (or their families) should directly contribute to their education costs, even to make quite clear that such costs are involved and to prevent them from doing wrong decisions with regard to their future working life.

The estimations have also shown that the income tax progression reduces to a certain extent the income advantages of higher education. Vertical equity is directed to reduce income differences due to the ability-to-pay-principle but not to pay for specific public or merit goods. If we take the undiscounted net wage differences (see table 2 and 3 above) then a male graduated form a university (university of applied science) has an advantage of 102,684 Euros (129,659 Euros); for a female graduate the numbers are 65,640 Euro and 34,031 Euro respectively, all compared to the education level with abitur and completed occupational education. If we take the current study fees in some German states, which are about 5,000 Euro for a five years study program, at least for an average student (family) such burden is obviously bearable.

But these fundamental breach in the development patterns is likely only the first step into financing tertiary education more directly; and even currently we have to take into consideration that the participation in higher education programs of young people from the lower income groups is every thing else than satisfactory. During the last three decades the participation ratios have even been decreasing.[16] Therefore the current programs of the single states to improve the conditions for students from low income families by introducing loan default funds without introducing reliable credit systems are far away from any efficient solution. Securing a high quality of human

[16] For details see http://www.studentenwerke.de/pdf/aeusserung_hrg_8_12_2003.pdf.

capital in Germany is not only a task for the states but also for the federation. While the most existing credit programs include interest and amortisation, such burdens might have a discouraging effect on students form low income families. Therefore a target orientated income contingent loan program for this group of students organised by the federation could be the silver bullet to overcome the current malaise. If like in Australia such a higher education contribution scheme would be interest free and additionally targeted to students from the low income groups, then the social selection effects can be almost avoided. Apart from that some problems remain: Postponed financing of tuition fees increase the marginal burdens for young people, which are already currently enormously high in Germany. And this marginal burden increase takes place in a period of life where the decisions for forming a family and parenting are made, thus perhaps even worsening the income positions of young families with all the negative impacts on future demographic developments. Educational policy as well as tax and social policy often are antagonistic – politicians have an uneasy job and will have a much harder job in the future to find majorities for one ore the other political alternative, which explains that our traditional systems have become more and more rigid.

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