Welcome Note: Welcome to the presentation of my work in progress, which is titled”Parental Education and Offspring’s Mental Health”, which is joint work with Daniel Schnitzlein.

In a nutshell: Let me give you a brief overview about what you are going to hear in the next 30 minutes. We are interested in the effect of parental education on the mental health of the offspring.

But conventional OLS estimates are very likely plagued by endogeneity. For instance, unobserved characteristics may jointly determine parental education and the offspring’s mental health or classical measurement error in schooling may attenuate our estimates towards zero.

Fortunately, we are able to exploit exogenous variation in education which we argue is completely unrelated to the mental health of the offspring. This exogenous variation is caused by a compulsory schooling law reform which increased mandatory schooling from eight to nine years in Germany.

Contrary to theoretical considerations, we can reject that parental education may have positive effects on the offspring’s mental health. Further, we find negative effects of maternal education on the offspring’s mental health.

Slide 1: But why should we matter? The estimated costs of mental illnesses increased from approximately 25 billion Euro in 2002 to approximately 34 billion Euro in 2012. This does not include indirect costs due to presentism.

In addition, mental illnesses dramatically decreases the active labor force due to early retirements because of mental health problems and sick leaves.

Besides that, mental health problems are estimated to decrease average life expectancy by 10 years. Lastly, 30 percentage of the population are affected by symptoms of mental illnesses per year.

In conclusion, policy measures that are able to alleviate the strain of mental illnesses will have large monetary and non-monetary payoffs.

Slide 2: At the same time, I came across a literature which was centered on the effect of parental education on the offspring’s health capital. But the literature was centered on physical health only.

Currie and Moretti and McCrary and Royer estimated the causal effect of maternal education on infant health in the US. Lindeboom et al. as well as Lundborg et al. estimated the causal effect of parental education on the children’s physical health in adolescence. Chou et al. and Rawlings investigated the same relation in less developed countries such as Taiwan and China. But none of them investigated the causal effect of education on the offspring’s mental health.

Slide 3: Theoretical considerations on why parental education should benefit the offspring’s health distinguish the channels in direct and indirect effects.

Indirect effects comprise increased earning capacities. Increased earnings could enhance the offspring’s mental health by higher availability of medical care, better environment and decreased financial worries of the parents.

These effects are amplified through positive assortative mating pattern which enhances the household budget constraint.

Slide 4: In addition, increased parental education enhances the offspring’s mental health through behavioral responses.

For instance, higher educated parents are hypothesized to be more efficient producers of health. More precisely, we can distinguish between allocative and productive efficiency.

Allocative efficiency refers to the individual’s ability to choose a better mix of health inputs.

Productive efficiency refers to the individual’s capability to accrue higher health returns from a given mix of health inputs.

In addition, higher educated parents may trade off quality for quantity of children. According to Becker and Lewis, children are a product of quality and quantity of children. Improved labor market opportunities increases the opportunity costs of home production. Thus, higher educated parents trade off quantity of children for quality of children. Lastly, higher education could results in more stable marriages.

Slide 5: The empirical relation between parental education and the offspring’ mental health may be plagued by endogeneity problems resulting in inconsistent OLS coefficient estimates.

For instance, unobserved factors that are transmitted across generations and which jointly determine education and mental health could bias our coefficient estimates of a regression of offspring’s mental health on parental education.

Moreover, classical measurement error in education could attenuate our OLS estimates towards zero.

Fortunately, we are able to exploit exogenous variation in parental education which is completely unrelated to the offspring’s mental health.

In the 1950’s, a CSL reform in Germany prolonged compulsory schooling from eight to nine years.

Slide 6: Let me give you a brief overview about the educational system in Germany.

At the age of six, children start to go tot he elementary school which comprises four years of schooling.

After elementary school, tracking starts. Thus, children are allocated to three different school tracks: The basic school track, the intermediate school track and the academic school track. Most important, which child is allocated to which school track depends on the child’s grades in the elementary school.

Children with the worst grades are allocated to the basic school track which comprises four to five additional years of schooling. It prepares for a vocational education.

The intermediate track encompasses children with grades from the middle range. It comprises six additional years of schooling, encompasses a more academic curriculum than the basic school track and prepares for vocational education and apprenticeships afterwards.

The academic track encompasses nine additional years of schooling and prepares the children for the entrance to universities.

Slide 7: Now let me give you more details to the CSL reform in Germany.

In Germany, education policy is performed on the state level. This also encompasses the number of compulsory years of schooling. Consequently, the CSL reform was not performed simultaneously in all German states, but have been implemented staggered.

In this table, you see ten of elven states which belonged to Germany before the reunion of Wet- and East Germany. Berlin is not included sine we cannot distinguish between parents who went to school in East Germany and West Germany for Berlin.

The second column displays the years in which the first cohort was supposed to graduate after at least nine years instead of eight years. The third column includes the birth year of the first cohort which was affected by the CSL reform.

For instance, Hamburg was the first state implementing the CSL reform in 1949. The first birth cohort affected by the reform were those born in 1934.

As you can see, the CSL reform was implemented in a staggered fashion, allowing for exogenous variation in education across time and space.

Slide 8: The data on which our study is based is he German Socio Economic Panel.

This is an annual panel which has been first administered in 1984. It includes more than 11.000 households and 30.000 persons in Germany. These individuals provide information on household composition, occupational biographies and health, among others.

Most important, the children in each household are surveyed first in the year in which they become seventeen and are surveyed thereafter each year. Moreover, if these children leave the household, they still surveyed thereafter. This allows us to link information offspring and their parents.

Slide 9: The equation of interest is equation (1). Equation (1) displays the offspring’s mental health as a function of parental education, and a second order polynomial in age to control for age patterns. In addition, we also include a vector which includes parental cohort indicators, indicators for the parental state of schooling and current wave indicators.

The superscript C indicates refers to the offspring and the superscript P refers to the parents. We look at the mental health outcomes for all offspring, daughters and sons, seperately.

We include maternal and paternal education separately to increase the efficiency of our estimates.

Noteworthy, without further controls, the coefficient on paternal education than corresponds to the gross effect of parental education on the offspring’s mental health.

Because we suspect OLS results to be inconsistent, we will focus on our IV estimates. Consequently, we will instrument parental education by an indicator which depicts whether the respective parent was exposed to the reform or not.

This indicator is based on where the respective parent went to school and when the parent was born. Unfortunately, no survey in Germany comprises information on where the individual went to school.

In line with Pischke and von Wachter, we proxy the parental state of schooling by which state they were surveyed first.

Slide 10: Our principal measure of Mental health is the Mental Component Summary Score.

It is based on the SF-12 questionnaire which is administered in the GSOEP biannualy since 2002. The SF-12 questionnaire comprises twelve health related questions. These questions refer to the physical and mental health of the respondents in the 30 days preceding the interview.

Then, the MCS is extracted by means of factor analysis. The MCS is a continuous measure ranging from 0 to 100 with 100 reflecting the highest mental health. The MCS score has been standardized to have mean 50 and standard deviation ten in the 2004 GSOEP population.

The MCS score is a well-established measure for Mental Health in the epidemiological literature.

Slide 11: In addition, we also use the offspring’s life satisfaction as mental health outcome.

Life satisfaction is inferred by the answer to the question „How satisfied are you at the present with your life as a whole?“ Answers to this questions are given on an 11-point Likert scale ranging from 0 „completely dissatisfied“ to 10 „completely satisfied“.

Moreover, we also construct an indicator for depressions based on the MCS score. Vilagut et al. (2013) have shown that an MCS score below the threshold of 45.6 has high predictive power for the occurrence of a thirty day depression. Thus, we construct an indicator for depression being equal to one if the offspring scores below 45.6 in the MCS score.

Slide 12: We restrict our sample to parent offspring pairs for which we have observations on the outcome for the years 2002 to 2015.

We keep observations if we have information on at least one parent.

We keep observations which parents were born within a ten year window surrounding the year in which those individuals were born who were affected first.

To increase precision of our estimates, we also construct also a complier sample of parent offspring pairs whose parents went to school for at mist ten years.

Slide 13: This summary table includes all observations for parent offspring pairs for which we can infer parental information of at least one parent, being born in the ten years window surrounding the birth year of the cohort which was affected first.

For instance, the MCS score matches the population average and standard deviation of the 2004 population quite good.

Most striking, the share of individuals who suffer from a depression matches quite good wat we observe in the European population according to the WHO.

Half of the offspring is female and of age 26 on average.

Fifty percent of the fathers were exposed to the reform and roughly 70 percent of the mothers were exposed to the reform.

This can be explained by the fact that mothers tend to be younger, as depicted in the last two rows.

Slide 14: Let us now turn to the results. These two tables depict the association between parental education and the offspring’s mental health.

Maternal education is associated with the offspring’s mental health. More precisely, maternal education is positively correlated with the offspring’s life satisfaction and negatively correlated with the offspring’s MCS score.

Paternal education is positively correlated with the offspring’s life satisfaction.

But noteworthy, these coefficients are very likely to be inconsistent. Thus, we will focus now on our 2SLS estimates.

Slide 15: These two tables present our 2SLS results.

In the third row of these tables, you can infer the F-statistic for joint significance of the First Stage. In the first table, the F-statistic is always about ten. Thus, we can be assured that we do not have a weak instrument. The fourth row depicts the coefficient of our instrument. Clearly, we can reject the hypothesis that the coefficient of our instrument in the first stage is equal to zero. The coefficients lie in between what we observe in other studies.

In contrast, the F-statistic for the first stage for fathers is below the threshold of ten. Moreover, the coefficient of the instrument in the first stage is statistically indistinguishable from zero. Consequently, our estimates are imprecise and our coefficient estimates inflated. But if we focus on our complier sample, the F-statistic of the first stage increases above ten and the first stage coefficient of our instrument becomes distinguishable from zero in statistical terms.

Turning to our results, we can see that maternal education has a negative effect on the MCS score in the complier sample. Although, it is significant on a ten percent level of significance only. Thus, I would not but too much emphasize on that.

Paternal education has a negative effect on the offspring’s mental health. More precisely, paternal education has a negative effect on the MCS score and a positive effect on being classified as depressed in the complier sample. The respective effects are significant on a five percent level of significance. The relative effect sizes are 4.1 percent for the MCS score and 30 percent for the being diagnosed depressive. Especially the last effect size should be viewed with caution.

Slide 16: Let us now turn to gender differences. These two tables depict the causal effect of maternal education on the daughter’s and son’s mental health. Clearly, we can see that maternal education has no effect on the mental health of the daughter.

On the contrary, maternal education has a negative effect on the son’s life satisfaction. A one year increase in maternal education decreases the offspring’s life satisfaction by approximately by 0.21 of a standard deviation or 4.6 percent. But the coefficients are statistically significant only at a ten percent level of significance.

Slide 17: Turning to the effect of paternal education, we can clearly see that the previously detected effect is driven by the relation between paternal education and the son’s mental health.

While there exists no causal effect of paternal education on the daughter’s mental health, we can see that paternal education has a negative effect on the son’s MCS score in the complier sample. A one year increase in paternal education decreases the son’s MCS score by 0.329 of a standard deviation or six percent. In addition, a one year increase in paternal education increases the likelihood to be classified as depressive by 0.299 of a standard deviation or 47 percent. But the coefficients are significant at a ten percent level of significance only.