# EQUALITY OF OPPORTUNITY, HETEROGENEITY AND POVERTY

**by**

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Abstract

Paper [I] studies equality of opportunity in Sweden. The distinction between circumstances that constrain an individual's opportunities and the individual choices also affecting a particular outcome is the main idea of theories of equality of opportunity. In this study, equality of opportunity is analyzed for Swedish data using a large set of variables indicating different circumstances likely to affect an individual's opportunities. A semiparametric model is estimated to allow for a possible nonlinear relation between parental income and the income of the adult child. The reason is a hypothesis that a constrained investment behavior would make the relationship nonlinear. The results indicate significant inequality of opportunities. However, they do not indicate a nonlinear relationship between parental income and the income of the adult child. Thus, the hypothesis that low income families will have a constrained investment behavior in human capital formation is brought into question as the explanation of intergenerational income correlation in Sweden.

Paper [II] focuses on the persistence of poverty in Sweden. The purpose is to distinguish between two different reasons why poverty could persist on an individual level. By using a sample of identical twins, this study takes advantage of the similarity within pairs of twins to separate family specific heterogeneity from true state dependence, where the experience of poverty leads to a higher risk of future poverty. The results, based on a four variate probit model, show the importance of true state dependence in poverty. When using the information on whether an individual received social assistance as a measure of poverty, family specific heterogeneity explains between 24 and 31 percent of the poverty persistence in the sample.

Paper [III] analyzes the consequences of unemployment for a Swedish sample of couples. The purpose is to estimate the possible income replacement that a spouse can provide. Unemployment can also affect the probability that the couples split up. Since not all couples remain in the analysis, a potential selection problem can occur. To deal with this problem, and also to take care of unobserved heterogeneity, a sample selection model for panel data is estimated. The results indicate that it is necessary to take into account the selection problem. A period in unemployment is found to be correlated with a higher female income only in the case of men who earned a fairly high income before becoming unemployed. Women who earned a fairly low income and were subject to a long period of unemployment are found to be compensated by a higher male income.

**Keywords:** equality of opportunity, semiparametric, poverty, heterogeneity, state dependence, twins, unemployment, divorce, spousal response, selection and panel data

# Acknowledgement

Sometimes when there is time to reflect about the path of life, certain moments in the past seem to be crucial for who you are and what you do today. My father used to tell me that one of those moments for me was when I, in the fourth grade, started to play chess and found out that I did it quite well. Maybe it is true, but I doubt that it was the only important thing for me at that age. At that time, I was not very good in the Swedish language. In particular I had problems with reading. I read very slowly and had a tendency to be impatient and guess rather than actually read. For this reason, during the class in Swedish, I was one among five or six pupils who got special teaching in a smaller group, separately from the ordinary class. When I started in this group, and it was evident for my parents that I did not read that well, I and my father also started to read books together. I read out loud for a while, and then my father continued. The books happened to involve football, and it helped. Quite quickly I started to improve my reading. Now, to be fair, I have to say that I still do not enjoy reading out loud and I still read fairly slowly. Improving my reading was, however, not the only thing that I learnt. I realized that if I spend some time I will learn. If I put in some effort, I will understand. Today, I have to say that I was lucky to get special teaching. I was lucky that the educational system had the resources to support those who did not learn quickly. I was lucky that my parents supported me. I was lucky to be given the opportunity. And I am lucky that I took it.

For me, that was one crucial moment in the past that shaped the way I think. If I do not know today, or if I do not understand today, I can put in some effort, and I will understand tomorrow. I see opportunities. For those who provide me with the opportunities, I am thankful, but I always remember to give myself credit. In this way I am always aware that I can learn.

Starting as a Ph.D. student at the Department of Economics was an important opportunity for me. Apart from learning in an incredible atmosphere, I had the opportunity to do research in more or less whatever I wanted within the field of Economics. While reading the relevant literature, I started to sketch out my ideas. I began with a naïve and innocent mind that, surely it cannot be that expensive to buy the data set that I would need. When I later realized that it was far more expensive than I initially thought, I went to my supervisor Karl-Gustaf Löfgren, and quite embarrassed explained what it would cost. He said something about peanuts, and that a good project will always be funded. I was encouraged, but I still had doubts. The short story is that we did get the project financed, and this thesis is the result. However, if I were only to tell you the short story, you would miss out on some important parts.

You would miss all those who gave me opportunities. I have already mentioned my supervisor, Karl-Gustaf Löfgren, whose support and encouragement, apart from his knowledge of Economics, have been invaluable. He also helped me in establishing the contact with CEMFI in Madrid where I stayed for 3.5 months. It was a time when I enjoyed the supervision of Samuel Bentolila and Manuel Arellano, and without doubt, a period when I learnt a lot. It was an opportunity and I want to thank everyone at CEMFI for making me feel as if I was in my home department. The Swedish Council for Working Life and Social Research financially supported my visit at CEMFI, and to everybody who gave me the opportunity to go to Madrid I will be grateful for a lifetime. If I had not been given the opportunity to go to Madrid, I would not have gone to Barcelona on my summer vacation, and I would never have met my true love, Marta. Sometimes life works in a mysterious way, and I am grateful that I always follow my intuitions.

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There is also a group of individuals who were Ph.D. students when I started, but who are now doctors that I would like to mention. Anders Stenberg, now at SOFI, Stockholm, actually had his office just beside mine, which was very convenient for questions relating to both Economics and football. We are both free spirits, and I guess that is why we are both ready to leave the Department of Economics, even though we have enjoyed our time here. You will always bring your positive spirit with you. Linda Andersson conveniently had her office next door (on the other side).

Learning the foundations of Spanish did pay off quite well for me. I will knock on your door once in a while to have some conversations in Spanish in the future too!

There is a group of fellow Ph.D. students who still have to work some more before completing their theses; Erik Norlin, Dick Svedin, Carina Selander, Ola Simonsen, Linda Holmlund, Torbjörn Dalin, Magdalena Norberg-Schönfeldt and Mattias Ankarhem. Keep your spirits up, and Mattias, I am not sure if you will actually defend your thesis before I defend mine!

Dick Svedin, Erik Norlin and I started the Ph.D. studies at the same time, and Carina Selander the year after, so I cannot resist mentioning them separately. Dick, keep working, it will pay off. Erik Norlin and I, in fact even started the graduate studies at the same time. Since the start, I have enjoyed a lot (!) of discussions in Economics (and sports!). We have over the years turned over a lot of stones in Economics in the search for a true understanding. It has surely been a valuable and enjoyable time! During the years, I have also attended different courses with Erik and Carina, and I have to say that those courses where it was possible to cooperate with you were the ones I've enjoyed the most. Thanks!

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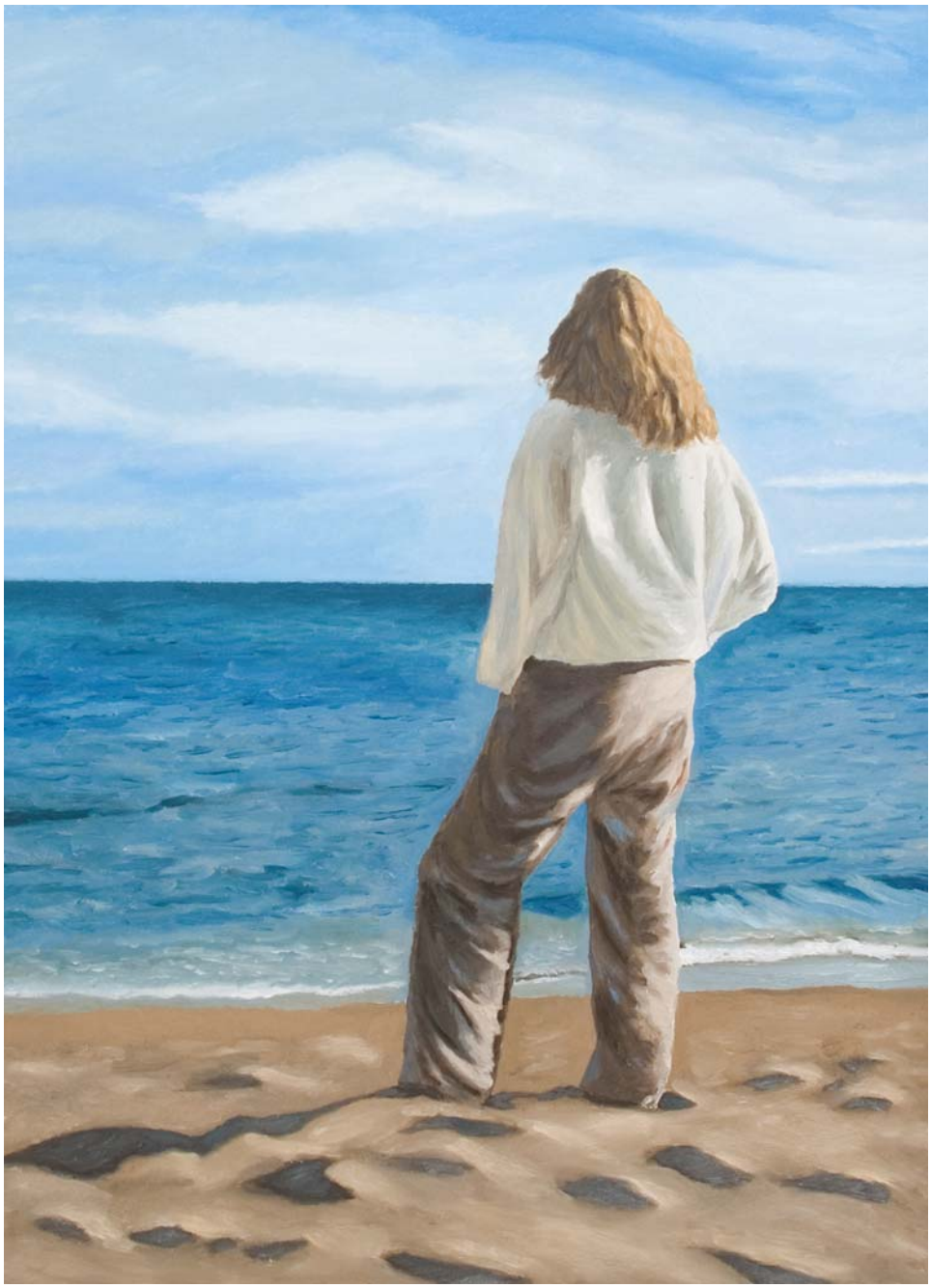
I cannot repay you with opportunities, but I will say thank you. If I could repay you with opportunities, I would, but my intention is instead to, when ever I can, provide opportunities to those who come after me. The reason

is that I believe in a society where opportunities are provided, not because someone expects a favour in the future, but because of a genuine interest to support others. I am sure that this is the case for the Department of Economics and that is why it is a wonderful place to work.

When I have written so much about opportunities, I also have to remind you that opportunities are not only, or even mostly, about earning money, as it may seem from the first article in this thesis. For me, opportunities are about being able to do something in life that I enjoy. It is an opportunity to watch the waves or enjoy the sunshine. It is an opportunity to share dreams and hopes and to have a cup of coffee with the one I love. The latter is an opportunity that I intend to enjoy whenever possible.

I will end this freely written acknowledgement with an advice. With one exception, do not listen to those who are telling you that you are wasting an opportunity. The exception is, if you tell it to yourself, because only you know what an opportunity is for you.



***Autorretrato, 2004***
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This thesis consists of a summary and the following three papers:

[I] William Nilsson (2005), Opportunities, Preferences and Incomes, *Umeå Economic Studies* 649.

[II] William Nilsson (2005), Heterogeneity or True State Dependence in Poverty – The tale told by twins, *Umeå Economic Studies* 650.

[III] William Nilsson (2005), Unemployment, Splitting Up, and Spousal Income Replacement, *Umeå Economic Studies* 651.

# Introduction

The main theme of this thesis is poverty and economic vulnerability. The focus is on how important the individual's background is for his/her economic position as an adult. In a situation of equality of opportunity the individual's background would not matter for his/her position later in life. Differences in, for example, income would instead be based on differences in preferences in the population. Sweden is often seen as an egalitarian country with small income differences. Public debate has, to a large extent, been focused on equality rather than equality of opportunity. Nevertheless, it is important to know whether the individual's background is important for his/her later situation in life.

A common way to study equality of opportunities is through intergenerational income correlation.[1] This means investigating whether the parent's income is highly correlated with the income of the adult child. A high correlation would suggest that the society is immobile and that equality of opportunity is unlikely to be present. Another measure that is frequently used is the correlation of income between adult siblings. The idea is that this measure also captures unobserved background factors affecting income. The reason is that siblings have very similar background experiences and, if these shared factors are important, then their later incomes should also be very similar.

Björklund & Jäntti (1997) compare intergenerational income correlation in Sweden and the United States and find that the correlation does not seem to be higher for the United States. Another study, Björklund *et al*. (2002), confirms this using the method based on the correlation of income for siblings. In fact, the Nordic countries are found to have lower "sibling correlation", and, accordingly, seem to have a higher social mobility.

A theoretical model, developed in Becker & Tomes (1986), suggests that the intergenerational income correlation is higher for low income parents. The reason is that low income families cannot invest optimally in the child's human capital due to an imperfect capital market. High income families have, on the other hand, sufficient money to invest optimally, and, thus, the income correlation will be lower. It is, however, possible that a constrained investment behavior in human capital formation is less pronounced in Sweden because of, for example, its public educational system without school fees or tuition charges.

In general, theories of equality study the distribution of an outcome, such as income, without taking into account how the outcome is reached. An important part of the theory of equality of opportunity is that individuals are different. If everybody were to have the same initial opportunities, an outcome would, by definition, be equality of opportunity. Different preferences can influence the outcome, even though individuals have the same initial opportunities. If, however, the outcome is affected by circumstances that the individual is unable to influence, the situation would not be labelled equality of opportunity. Ideally, we would like to compare individuals exerting the same effort in order to ascertain the importance of their background factors. The problem is that information is generally not available on the effort, the preferences, and all the choices made in life that affect the outcome, i.e. these will not have been observed. A practical way to deal with this problem is to identify the most important circumstances affecting the outcome that the individual is unable to influence. The differences in the outcome, existing after controlling for these circumstances, are labelled as effort and are assumed to be within the individual’s scope for choice. (Roemer, 1998, 2002).

[1]See, for example, Solon (1999).

O'Neill *et al*. (2000) introduce opportunity sets to be able to compare individuals exerting the same effort but who have different initial opportunities. The idea is to extract fathers with similar incomes and then rank their adult children according to their income. For example, individuals with parents in the 25, 50 and 75 percentile could be extracted. The individuals in each group would then be ranked with respect to their income. The same rank, for individuals with different opportunities, is assumed to illustrate the same amount of effort. Using the opportunity sets makes it easier to compare the income for individuals with the same rank. A drawback with this method is, however, that in situations where circumstances other than just the father's income affect the child's income, it gives too optimistic picture of the opportunities. That is, other circumstances constraining opportunities are ignored and too much of the differences in income is ascribed to differences in preferences.

Another branch of the economic literature focuses on low income earners and individuals who are poor. An important issue is to investigate which characteristics increase the risk of poverty. In the literature, it has also been found that those who are poor in one year are likely to remain in poverty the following year (see, for example, Stewart & Swaffield, 1999, Cappellari & Jenkins, 2004, and Biewen, 2004). Poverty seems to persist on an individual level. Two main reasons are used to explain this. Firstly, true state dependence refers to whether the experience of a state, in itself, influences the risk of remaining in that state. In the case of poverty, the experience of this state could, for example, influence the individual’s later health status or motivation. These factors could then influence the risk for remaining in poverty. Secondly, heterogeneity, such as in the individuals’ background, can be a reason for observing that poverty persists on an individual level. That is, some individuals have characteristics that make the risk for poverty high as long as these characteristics do not change.

It is important to distinguish between these different reasons for the persistence of poverty, as they require different policy solutions. If heterogeneity is more important, the policy for reducing poverty and social exclusion should focus on changing the characteristics that increase the probability of poverty. If, on the other hand, it is the experience of poverty that causes a subsequently higher risk for remaining in poverty, the policy should focus on preventing individuals from entering into poverty in the first place. This is because once there, the risk of remaining in poverty is likely to be higher irrespective of the initial characteristics.

The methodological problems involved in distinguishing true state dependence from heterogeneity have been a topic of discussion for at least 30 years.[2] One way to separate the explanations is to make assumptions about the distribution of the heterogeneity. This method has, however, been questioned, as it makes assumptions that are without foundation in economic theory. (Lancaster, 1990).

To a large extent, the literature has focused on persistence in unemployment. An idea, found in this literature, is to study the effects of an exogenous shock on employment. Job-loss resulting from a plant closure would, for example, be assumed to be unrelated to individual heterogeneity. A similar method is to look for exogenous instruments that vary over time and explain the state of unemployment. The idea is that these exogenous variables are unlikely to be connected to the unobserved heterogeneity. (Gregg, 2001).

Two studies that analyze persistence in low pay or low income are Stewart & Swaffield (1999) and Cappellari & Jenkins (2004). The idea is to model a transition equation, where the included variables affecting the risk of poverty can differ depending on the poverty status the previous year. As

[2]See, for example, Heckman & Borjas (1980) and the references included there.

the poverty status the previous year is not necessarily exogenous, an extra equation for the poverty status the previous year is estimated simultaneously with the transition equation. These equations are estimated using multivariate probit models. The estimates are then used to calculate measures of state dependence. In particular, the possible differences between the coefficients for the included variables, depending on the poverty status the previous year, are used to identify true state dependence.

A characteristic that has been found to increase the risk of poverty is unemployment. (Jenkins, 2000). It is, accordingly, interesting to further investigate the consequences of unemployment. As unemployment usually means a tighter personal budget, it is expected that a single person who cannot find a job is likely to reduce his/her spending. The situation for individuals who are unemployed but have a spouse can, however, be a little bit different. A cohabiting spouse could increase his/her labor income to compensate for the partner's lower income when unemployed. This effect has, in the literature, been called the "added worker" effect.[3] The idea is that a spell of unemployment informs the family that the labor market could be more difficult. With this information, a labor supply response could be optimal to compensate for the expected lower income.

Many empirical studies have underlined the importance of unobserved heterogeneity when analyzing the added worker effect. (Maloney, 1991 and Bingley & Walker, 2001). The reason is that couples could be matched in a non random manner. Observing an unemployed man could, for example, mean a higher probability for observing a non-participating or unemployed spouse. It is possible that couples are affected by the situation in the same local labor market. Some studies of the added worker effect have investigated whether the man's unemployment increases the probability that the female spouse will enter the labor market, i.e. with a

[3]For two early studies, see Bowen & Finegan (1969) and Mincer (1962).

binary variable. (See, for example, Maloney, 1991 and Prieto-Rodríguez & Rodríguez-Gutiérrez, 2003.) Other studies have chosen to study the number of hours worked by the women. (Stephens, 2002).

When studying cohabiting couples over a period, it is likely that some couples will split up during the period. In particular, it is possible that a period of unemployment also can affect the risk of a marital break up. If the analysis is based on a balanced panel over several years, it is likely that a non random sample of couples is present. If unobservable heterogeneity for the decision to remain as a couple is correlated with unobservables in the main equation, a selection problem is present.

Paper [I] in this thesis studies how individuals, depending on different background factors have varying opportunities to earn a high income. A particular concern is the possible nonlinearity in the correlation of the parent's income and the income of the adult child.

The empirical analysis in Paper [I] allows for a nonlinear relationship between the father's income and the income of the adult child. This is based on Becker & Tomes (1986) suggestion in their theoretical model and the empirically findings in Corak & Heisz (1999). The model in this paper is estimated semiparametrically using a method developed in Robinson (1988). Apart from allowing a nonlinear relationship, the model includes further possible circumstances and not just the income of the parents. From the model, it is also easy to illustrate opportunity sets in the same manner as in O'Neill *et al*. (2000). As more explanatory variables are included, the opportunity sets are closer to reality. However, the opportunity sets can still be too optimistic since all possible circumstance cannot be included. To get an idea of whether this is the case, Paper [I] includes a simple analysis of the correlation between the residuals from income regressions for siblings. If all the important circumstances are included, the correlation

should be close to zero, because the reason for the correlation should have been removed.

While, Paper [I] investigates the importance of the individual's background for his/her income, Paper [II] focus on the impact of his/her background for his/her persistence in poverty. It contains an empirical investigation of the persistence of poverty, where the purpose is to distinguish heterogeneity from true state dependence. Paper [II] builds on Cappellari & Jenkins (2004), but uses a new manner of distinguishing between state dependence and heterogeneity. The part of the persistence of poverty that is explained by family specific heterogeneity is identified based on information on twins. The idea is that identical twins have very similar backgrounds and the same innate abilities. The study relies on the assumption that the poverty status of one twin does not, in itself, affect the probability that the other twin will experience poverty the following year. However, if the probability to be observed as poor is higher when the twin sibling was observed as poor the previous year, this can be explained through family specific heterogeneity. That is, the twins have characteristics in common that affect the risk of poverty for them both. The "twin method" makes it possible to separate true state dependence from heterogeneity by yielding a lower bound on heterogeneity as an explanation of persistence in a state.

Paper [III] studies whether unemployment for an individual is compensated using a higher income on the part of his/her spouse. The idea is to investigate whether a spouse can reduce the possible economic vulnerability that can follow from unemployment. However, not all couples will remain together for the period under study. The potential selection problem this presents is taken into account in the empirical part of Paper [III]. A sample selection model for panel data is estimated for the response of the individual's spouse to a spell of unemployment on the part

of the individual. The focus is on investigating whether the income of the spouse is higher when the individual is unemployed. The paper investigates both a possible female response to male unemployment and vice versa. The latter is something that, to my knowledge, has not been done in previous literature.

# Summary of the papers

### Paper [I] Opportunities, Preferences and Incomes

The study investigates whether a large set of circumstances that the individual is unable to influence are important for his/her income as an adult. The aim is to empirically evaluate the importance of certain characteristics for the individual's income whilst keeping the analysis very close to the theory of equality of opportunity.

The theoretical part of the paper, following Roemer (1998, 2002), defines the concept of equality of opportunity as a state where circumstances that the individual cannot choose or influence do not affect his/her income as an adult. The paper also defines indirect opportunity set as a set of outcomes that can be attained by putting in different amounts of effort. Such a set is identified by means of the income distribution for individuals with the same initial circumstances. The idea with illustrating indirect opportunity sets for different groups is that it enables comparisons of income, while keeping the rank within the income distribution constant between the groups.

The analysis allows that one particular circumstance, i.e. the income of the parents, could have a nonlinear effect on the individual's income as an adult. If low income parents are constrained to invest optimally in the human capital of their children, it is reasonable that the correlation of

income between the parents and children will be higher for low income parents.

To deal with the possible nonlinearity of the parents' income a semiparametric model is estimated. The income of the parents is included nonparametrically while other circumstances are included parametrically. Apart from not constraining the functional form of the parents' income, the model is suitable as an illustration of indirect opportunity sets as these can be illustrated without having too few individuals with the same initial circumstances.

The empirical analysis is performed for a large set of individuals in Sweden. The results indicate that equality of opportunity clearly does not exist, since several circumstances affect the income of the individuals. At the same time, it is, however, worth noting that even though a large set of circumstances are included, these explain a very small part of the variation in income in adulthood. The parents' income is not found to be nonlinear in its affect on individuals' incomes. Hence, the Swedish case does not support the theory of a constraint investment behavior as explanation for intergenerational income correlation. Indirect opportunity sets for different levels of parental income are also illustrated and compared. Kolmogorov-Smirnov tests are performed to see whether the indirect opportunity sets differ depending on whether the parents were in the 25th percentile or the 75th percentile. In most, but not all cases, the opportunity sets are found to be significantly different. An additional analysis of siblings indicates that the opportunity sets are too optimistic in that too much of the variation in income is labelled as effort.

The paper contributes to the literature in the following ways. Firstly, the semiparametric model does not specify the functional form of the parental income, and the elasticity is allowed to vary over the income of the

parents. No particular pattern is found, which shows that earlier results for Canada (Corak & Heisz, 1999) are not universal. Secondly, a large set of circumstances are included in the analysis and the theory of equality of opportunity is analyzed in a more consistent way than typically has been done in the literature.

**Paper [II] Heterogeneity or True State Dependence in Poverty - The tale told by twins**

This paper studies the persistence of poverty in Sweden. The purpose is to distinguish between true state dependence and heterogeneity in explaining why poverty tends to persist on an individual level. Knowing whether true state dependence, (i.e. that *the experience* of poverty) or heterogeneity, (i.e. the initial characteristics), is more important in increasing the risk of remaining in poverty could be crucial in designing an effective policy to handle poverty.

A new measure of family specific heterogeneity is defined. This is based on information from monozygotic twins and builds on the assumption that the experience of poverty for one twin does not, in itself, affect the probability of poverty for his/her sibling twin the following year. A multivariate probit model is estimated, and the measure of family specific heterogeneity can easily be calculated based on the estimates.

The empirical analysis is performed with a data set of twins born between 1949 and 1958 in Sweden. Two different measures of poverty are used. The first measure is whether the individual received social assistance during the year. The second measure is whether the individual fails to reach 60 percent of the median disposable income for the sample. The disposable income is weighted with an equivalence scale depending on the composition of the family.

The results indicate that when social assistance is used as the measure of poverty, 24 – 31 percent of the poverty persistence is due to family specific heterogeneity. When the poverty measure is based on disposable income, 22 – 24 percent of the poverty persistence is attached to family specific heterogeneity. Accordingly, the results underline the importance of true state dependence as an explanation for poverty persistence in Sweden.

The main contribution of the study is to distinguish between true state dependence and heterogeneity using a new method based on twins. The method is appealing as a twin sibling provides a reference case with very similar unobserved characteristics such as innate abilities and family background.

**Paper [III] Unemployment, Splitting Up, and Spousal Income Replacement**

The purpose of this study is to evaluate whether a spouse can respond in such a way as to compensate for the lower family income that is received when his/her partner is unemployed. Since not all couples stay together for the whole period, a sample selection problem could occur. It is, for example, possible that the need for compensatory behavior is greater for families that actually split up.

The theoretical part of the paper explains both the literature on the added worker effect and marital break ups. The focus in both theories is unexpected shocks, such as unemployment, that can motivate both compensatory behavior and a marital split.

The empirical analysis is performed using a sample selection model for panel data. Differences over time are used to deal with unobserved

heterogeneity and correction terms, constructed from an estimation of bivariate probit models, are used to handle the possible selection problem. Both a male and a female sample, for individuals born 1965 are used in the study. The individuals are matched to possible spouses in 1994 and information about whether the couples stay together is included for each year until 1999. Several different variables are constructed for the months in unemployment for the spouse, depending on the income quintile in which the spouse was included in the previous year and the length of the time spent in unemployment. Since quite few individuals in quintile four and five became unemployed the following year no distinction is made for the length of time in unemployment.

The results indicate that only in the case of unemployed men who earned a quite high income the previous year, i.e. were in the fourth income quintile is the loss in income compensated by a higher income on the part of the spouse. Similarly, long term unemployed women who earned a quite low income the previous year, i.e. were in the second quintile are also found to be compensated by a higher income on the part of the spouse. In general, however, compensatory behavior for the overall population is not found to be common.

The paper contributes to the literature in the following way. Firstly, earlier studies have not modelled the selection problem. Empirical applications of selection models for panel data are also quite rare in general, and the study provides an example of how these kinds of models can work. Secondly, both a male and a female response are analyzed. Earlier literature has, to my knowledge, exclusively seen the female as the second income earner. The results in this study indicate that this could be a serious deficit in the empirical literature, at least in the Swedish case.

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