THE RELATIONSHIP BETWEEN SOCIAL CAPITAL, WELFARE AND HEALTH IN SOUTH AFRICA

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DECLARATION

I declare that the thesis hereby submitted is my own work and has not been previously submitted by me for a degree at any other university.

MICHAEL JOHAN VON MALTITZ

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ABSTRACT

This paper is concerned with identifying the effects that seven different categories of network social capital (church groups, financial groups, production groups, private interest groups, service groups and political groups) have on household welfare and poverty, as well as individual self-rated health, as measured at the individual-, household- and community-level. Econometric techniques are employed for this purpose, using household- and individual-level panel data from the KwaZulu-Natal Income Dynamics Study (KIDS). The findings show that various social capital network types affect welfare, poverty and health positively. In particular, higher levels of household financial social capital lead to higher welfare levels among the poor (but not the poorest of the poor), and household service and political social capital cause higher welfare among households in general. Households with more financial and political group social capital are also less likely to be poor, and chronically poor. Individual financial group social capital also raises individual health levels, while better health levels result in increased service group memberships. Thus, policies aimed at building network social capital, not only among the poor but among households in general, may be particularly useful in achieving poverty alleviation and improvements in health status, including current policies of the Department of Social Development.

I: INTRODUCTION

After the abolishment of apartheid, South Africa held its first democratic elections in 1994. Social capital, which is generally regarded as the networks, norms and trust in social organizations (Putnam, 1993), has been shown to be associated positively with democratization (Marsh, 2000). The presence of social capital is also a determinant of citizen support for democratic procedures (Kunioka and Woller, 1999). Thus, one would expect the disenfranchised in South Africa to have enjoyed opportunities to expand their social capital networks following the establishment of the new South Africa.

The Reconstruction and Development Programme (RDP), moreover, set out a policy framework by which the newly elected government could deal with their first priority: reducing poverty and deprivation in South Africa (African National Congress, 1994). This goal of poverty alleviation is still being pursued today in South Africa and all around the world, as is evident from the first of the United Nations' Millennium Development Goals: "To eradicate extreme poverty and hunger" (UNDP, 2003). Narayan and Pritchett (1997) identify and explain five mechanisms through which social capital can affect poverty or welfare: through greater public sector efficacy, community cooperative action, diffusion of innovations, less imperfect information, and informal insurance. This means that there are a variety of channels through which social capital should be able to affect welfare.

If an increase in social capital significantly decreases poverty, then promoting social capital formation would represent a low-cost alternative to money-based poverty alleviation measures, such as various forms of government grants. This would be directly in line with the spirit of the RDP, and the Millennium Development Goals. The one primary goal of this paper is therefore to determine if social capital does indeed affect welfare, and so too poverty and poverty dynamics in households, using data from the KwaZulu-Natal province.

Health is also of interest in this paper. Many studies have provided evidence that social capital affects the health status of individuals positively. Self-rated health has also been shown to be a very good predictor of future morbidity and mortality, and so has been used as a measure of the health status of individuals. The second primary goal of this thesis, therefore, is to show how social capital affects the self-rated health of individuals.

Welfare, poverty and health can, in turn, exert an influence on social capital formation. It is possible that reciprocal relationships exist between social capital and welfare, poverty, or health. Therefore, the third primary objective of this research is to determine if this is the case in any of the associations between social capital on the one hand and household welfare, poverty and health on the other hand.

In essence, therefore, this thesis presents an empirical study of the relationships between welfare, health, and social capital from the KwaZulu-Natal Income Dynamics Study (KIDS), using individual-level, household-level, and community-level data.

What sets this work apart from the body of literature already published on welfare, health, and social capital, is that this paper focuses on consequences of investing in different types of social capital. In this thesis social networks are disaggregated into different categories: church groups, financial groups, production groups, private interest groups, service groups, political groups, and a catch-all category for other groups. This thesis also employs individual-level, household-level, and community-level measures of memberships in these network types in the analysis of welfare, poverty and health. The effects on household welfare and individual health of these memberships in each network category are then analyzed (although little emphasis is given to the results pertaining to the catch-all category), so that, in the concluding chapter, this research can put forward policy recommendations regarding the role of social capital in fostering economic development and improvements in health.

This thesis is divided into eight sections. In section II, the thesis will review a wide selection of recent literature published on the determinants of welfare, welfare mobility, poverty, poverty dynamics, social capital, and self-rated health. This review guides the econometric work. Section III, the methodology section, presents the research design, models, methods and data used in the analysis. Section IV, the first of four sections reporting the results of the econometric analysis, presents and discusses the welfare and welfare dynamics model estimation results. Section V similarly presents and discusses the poverty and poverty dynamics estimation results. Section VI presents and discusses the results of the individual-level self-rated health analysis. Section VII is dedicated to the question of endogeneity in these models, presenting the estimation results of the models of the determinants of different network social capital types at the individual, household, and

community levels. Section VIII summarizes the results and links these results to policy recommendations.

II: LITERATURE REVIEW

1. INTRODUCTION

This section will initially briefly review the concept of social capital and its links with health, and wealth, and will then detail several problems in dealing with social capital that have been highlighted by previous works on the topic. The focus will then shift to a review of previous empirical studies that analyze welfare and welfare dynamics, poverty and poverty dynamics, social capital, and self-rated health. These subsections of the review of empirical work (except the second last, the determinants of social capital) each start with a summary of studies that do not employ social capital as an explanatory variable. The subsections then follow up with in depth reviews of works relevant to that section and that employ social capital as an independent variable.

2. CONCEPT FRAMEWORK

One contested topic in the field of economics is that of social capital. The very definition, structure, and measurement of social capital are the objects of heated debates (Baum, 1999; Hawe and Shiell, 2000; Macinko and Starfield, 2001; Petersen, 2002; Herreros, 2004). However, even amidst the debates, many economists and social scientists agree that social capital can be a valuable policy tool in combating poverty or inequality (Putnam, 1993; Narayan and Pritchett, 1997; Grootaert *et al.*, 2002; Thorp *et al.*, 2005), as well as combating ill-health (Rose, 2000; Gilbert and Soskolne, 2003; Wen *et al.*, 2003; Lindström, 2004; Veenstra, 2005).

2.1 Definitions and measures of social capital

Putnam (1993) defines social capital as being "features of social organization, such as networks, norms[1], and trust, that facilitate coordination and cooperation for mutual benefit". Most of the papers cited elsewhere in this section borrow from this definition of social capital. Herreros (2004) provides an alternative (although overlapping) definition of social capital in which social capital is the information and norms of reciprocity that are

[1] In this definition 'norms' essentially means 'norms of reciprocity and mutual aid'.

formed by, among other things, social networks and social trust. Important to notice is the fact that networks, norms, and trust are all vital in creating and maintaining social capital.

Whitehead and Diderichsen (2001) and Peterson (2002) refer to the way in which social capital can be disaggregated into attitudinal and behavioural components. Behavioural (or structural) social capital "facilitates information sharing and collective action and decisionmaking through established roles and social networks supplemented by rules, procedures and precedents." (Grootaert and Van Bastelaer, 2002). An example, or measure of behavioural social capital, could be membership in a social network. Attitudinal or cognitive social capital is represented by shared norms, values, trust, attitudes and beliefs (Grootaert and Van Bastelaer, 2002), which creates shared responsibility and a feeling of 'connectedness'. One example of a measure of attitudinal social capital is social trust. One must note, however, that Rose (2000) criticizes the simultaneous use of attitudes and behaviours as a measure of social capital. In using them together, the author believes that the cause-and-effect aspects of social capital are lost, for example, the fact that attitudes could be a cause of behaviours (or vice versa). For this reason, it is be important to analyse behavioural social capital, such as networks, as being either an effect of attitudinal social capital, such as trust (as is done in Narayan and Pritchett (1997) and Grootaert *et al.* (2002)), or as a creator of this attitudinal social capital (Woolcock, 1998; Anheier and Kendall, 2002), or both (Brehm and Rahn, 1997).

It should be noted that the trust aspect of social capital has already been handled by previous authors in a variety of different ways. It has been used as a measure of social capital (Coleman, 1988; Isham and Kähkönen, 2002), as a prerequisite for social capital or an instrumental variable in measuring social capital[2] (Narayan, 1997; Grootaert *et al.*, 2002; Uslaner and Conley, 2003), or as a by-product of social capital (Woolcock, 1998; Anheier and Kendall, 2002). Theories have also been proposed that suggest trust and social capital form a virtuous or alternatively a vicious circle. In a virtuous circle trust influences the creation of social capital and social capital strengthens trust in return, while in a vicious circle a lack of trust reduces social capital, which leads to even lower levels of trust. When looking at these circles, the link from social capital to trust has been shown to be stronger

[2] When social capital is measured by networks and is used as a variable explaining wealth, trust is deemed to have no influence on wealth, whereas it is assumed that social capital does. Thus, trust is considered a valid instrument for social.

than the causal effect of trust on social capital (Brehm and Rahn, 1997; Claibourn and Martin, 2000).

Anheier and Kendall (2002) also argue that voluntary organizations generate or substitute trust in its members. The trustworthiness of members depends on the trustworthiness of the group, and the group's ability to counter the moral hazard problem (the risk that an individual will take advantage of the group's trust for his or her own personal gain). This is the legal-economic theory of trust, or the rational choice approach. The group lowers transaction costs among its members, based on the members cooperating with each other. According to Anheier and Kendall (2002), trust may be built by the repeated interactions of its members.

Associations allow members to form expectations about other people's trustworthiness, and help educate its members to recognize tell-tale signs of trustworthiness (Herreros, 2004). Herreros (2004) also argues that the process of deliberation that occurs within a group (especially in democratic organizations) leads one to change one's preferences towards the common good since group deliberation is normally geared towards the common good. These changes in preferences reform the members' outlook toward social trust positively.

It may also be that different types of associations foster different types of trust. Claibourn and Martin (2000) suggest that the relationship between interpersonal trust and voluntary association memberships may differ substantially across different types of groups, group involvement, and the personal experiences of group members.

Another distinction to be made when analysing social capital is the level at which social capital is being measured: micro, meso, or macro. Portes (2000) argues that different levels of social capital should be measured by different variables. He regards community (meso-level) social capital as being represented by civic spirit and individual (micro-level) social capital as being represented by social networks. This view is emphasized in several other studies. Newton (2004) shows empirically, using data from a wide range of countries, that social trust is better measured at the societal level rather than the individual level. Thorp *et al*. (2005) also suggest that network formation may be used by individuals to escape chronic poverty. However, many empirical studies define social capital on any of the three levels (micro, meso, or macro) and some studies incorporate all three of Putnam's social

organisation's features, namely networks, norms, and trust (see Kawachi *et al.* 1997, Kawachi *et al.* 1999, Isham and Kähkönen, 2002). In fact, at both the micro- and meso-levels, Grootaert and van Bastelaer (2002) sanction the use of all three together as being a "valid basis for the measurement of social capital and its impacts."

2.2. The link between wealth/poverty and health

The health-wealth relationship at the micro-level has been extensively examined (Smith, 1999; Meer *et al.*, 2003). Smith (1999: 145) points out that "[t]here is abundant evidence of a quantitatively large association between many measures of economic status, including income and wealth, and a variety of health outcomes, such as mortality or morbidity." He then highlights and expands on the debate on the direction of causality between wealth and health. Two assumptions that can generally be made are, on the one hand, that the less (more) wealth an individual has, the less (more) health care that person can afford, and on the other hand, that the less (more) health care an individual has access to, the less (more) productive that individual becomes in their income-generating processes, and thus the less (more) wealth that person can accumulate. Smith (1999) concludes by noting that in middle and older ages, health events tend to affect household income and wealth, whereas during childhood and early adulthood, economic status tends to affect health status. Fuchs (2004: 654) writes that the relationship between income and health "is probably the most complicated", although in high-income countries, researchers find that the correlation between the two is generally positive, with causality running from income to health.

2.3 The link between health and social capital

Feinstein (1993) argues that individuals with lower socioeconomic status have higher mortality rates than individuals with higher socioeconomic status. Although there are several measures of socioeconomic status, he shows that, in general, there is convincing evidence that "individuals of lower socioeconomic status do less well in the health care system" (Feinstein, 1993: 314). Socioeconomic status here is made up of both materialistic components, and behavioural, meaning that it is not only the materialistically poor that are unable to acquire better health care, but also those with socially- or culturally-orientated idiosyncrasies that "may make it more difficult to communicate with health care workers,

trust physicians, and play the system" (Feinstein, 1993: 314). Since socioeconomic status is linked to both the social and economic attributes of an individual, social capital may well play a role in determining an individual's socioeconomic status and, therefore, also the person's level of health.

Coleman (1988) describes how social capital promotes the diffusion of information, and calls this phenomenon the information channel. Surely then, as Veenstra (2001) points out, information that can be used to create and maintain high levels of health and well-being (and to discourage unhealthy practices) can more easily be diffused into society when that society has high levels of social capital. More importantly for this study, health information can be more easily attained by an individual if that individual's social capital is high. This means that health and social capital could, and should be related to one another.

2.4. The link between wealth/poverty and social capital

As mentioned in the introductory section, section one, Narayan and Pritchett (1997) regard social capital as being able to affect a household's income level through five channels: greater public sector efficacy, community cooperative action, diffusion of innovations, less imperfect information, and informal insurance. Public sector efficacy can influence household income through the better monitoring of public provision of services, while community cooperative action may similarly facilitate the provision of services which benefits all the members of the community. The diffusion of innovations, some likely to be concerned with wealth generating processes, are also facilitated by greater linkages among individuals, i.e. greater social capital. Of course, less imperfect information leads to "lower transaction costs and a greater range of market transactions in outputs, credit, land, and labo[u]r leading to higher incomes" (Narayan and Pritchett, 1997). Finally, with high levels of social capital, a household may undertake more risky, and more rewarding endeavors. In other words, higher levels of social capital should result in higher levels of income or wealth. Grootaert *et al.* (2002) also mention that social capital promotes sharing of information, and also reduces opportunistic behaviour and aids collective decision-making. With the sharing of information alone, a household could gain new potential in generating more wealth. Better farming methods, healthier practices, and knowledge of how and where to go about applying for credit, are all examples of information that could be shared in networks, that could help households generate higher wealth levels. In addition to the

information sharing, a formal social network with rules and regulations would discourage one member taking advantage of another, and so opportunistic behaviour that could harm household welfare levels could be reduced.

If one wants to take examine the link between wealth and social capital further, one can look at the relationship between chronic poverty and social capital. Thorp *et al.* (2005) write about how network or structural social capital has the potential for individuals to be a route out of chronic poverty simply through the function of the network (for example, an economic group like a stokvel, or savings club). This would mean that households with more social capital in economic- or development-oriented groups should be more likely to escape chronic poverty.

2.5. Problems arising in the analysis of social capital

The conceptualization of social capital is inherently problematic. Fine (2000) discusses the history of the development of the concept extensively, and notes that social capital is used over wide areas of expertise in both the social and economic fields. The problem lies with the highly generalized meaning of social capital – that it is essentially a social good that can be used to generate better returns for an individual or society, be it for health, welfare or a multitude of other ends. With such a wide scope, social capital can be used, and abused, in almost any discussion in the social sciences. It is therefore very important that when this research uses social capital in any analysis the very meaning of the terms, 'social', and 'capital', are preserved. In other words, it is essential that the measures used to represent social capital are indeed of a social nature (incorporating interactions between individuals of a group) and are creating a return for the individuals in the group.

There are also numerous ways in which social capital can be disaggregated besides using the behavioural-attitudinal split used in this paper. The *first* of these is the distinction between horizontal and vertical relationships. Essentially a horizontal association links individuals from the same or from similar communities or social groups. Vertical associations link groups with different levels of social, economic and/or political influence (Whitehead and Diderichsen, 2001). Differentiating social capital between bridging and bonding relationships is a *second* method one can use to disaggregate social capital (Woolcock, 1998). Bonding relations include those that might be found within

communities or families, which strengthen the ties inside that group (and possibly weaken the ties the group has with outsiders). Bridging relationships incorporate associations between groups of different types of people, whether the bridge spans a racial, cultural, gender, or any other difference. One might note that as Fine (2000) mentions, an associational bridge across a gender gap may for example exclude certain cultures. Hence, a relationship that might seem to be bridging differences on one front may be resulting in exclusion on another front. *Thirdly*, Streeten (2002) suggests classifying social capital as a non-durable consumption good, a non-durable production good, a durable capital good, a durable investment good, or a durable consumption good. However, since these classifications are interdependent, complications arise in classifying the exact nature of social capital. *Finally*, one can split social capital up into components that act at a population or macro level, and those that act at an individual or micro level. For example, as mentioned previously, Portes (2000) argues that micro-level social capital is better represented by behavioural or structural social capital, while macro-level social capital is better represented by attitudinal or cognitive social capital.

It should also be mentioned that social capital need not always be virtuous. Streeten (2002) mentions several ways in which the formation of social capital can actually inhibit economic growth or cause social exclusion. In addition, this darker side of social capital includes the formation of disreputable or illegal organizations, such as street gangs, which are essentially examples of social interactions that produce a return of some sort for the members of the group, albeit at the cost of others in society.

Portes (2000) mentions two other important issues that one needs to consider when examining social capital: pooling and copying. Individuals can only establish valuable relations with others via the investment of some human and/or financial capital. This may lead to social segmentation, since those with certain levels of education and/or wealth (or welfare) will tend to group together. Collier (2002) suggests that the act of copying is progressive: those who have higher education levels tend to have higher incomes, and thus others will attempt to copy them. However, the social segregation that Portes (2000) refers to will be a barrier to this poverty-reducing act of copying. Instead, pooling may occur. Social groups can form at different levels of human and financial capital, restricting those at other levels from joining the group. This is a regressive action. The poor tend to remain poor with no-one at higher human and financial capital levels in their social circles to copy.

What these externalities essentially mean is that significant return-generating social interactions might only be engaged in by the non-poor. While analyzing case studies of chronically poor households in Uganda, Cleaver (2005) notes that the chronically poor generally have thin institutional ties. Although they are more dependent on associational involvement, they are more restricted in joining associations (Cleaver, 2005). For example, even if they can scrape together the entrance fee of the formal association, they may not be able to make regular contributions to the group. Also, the poor may not even be able to attend meetings, due to the need to spend their time productively. So, for example, the chronically poor are generally excluded from potentially beneficial social networks.

Cleaver (2005) also mentions another problem that may arise in the analysis of social capital – that social capital is not automatically created from associational membership. The poor may be members of an organization, but due to other factors or constraints, they may still be restricted in forming beneficial social capital. Cleaver (2005) refers to this concept as discriminatory norms of participation, when the poor for example generally do not have any authority to be an integral part of the group, thus restricting the poor's use of social capital to escape poverty.

3. EMPIRICAL WORK

This subsection is divided into five parts: the determinants of household welfare, the determinants of welfare mobility, the determinants of chronic poverty, the determinants of social capital, and the determinants of self-rated health. Papers reviewed in these sections were found on online databases, including EBSCO Host, JSTOR, and Science Direct. The database searches only included papers published recently (2000-2005), and from the papers selected from the searches, several key references were followed, so that the important studies from before 2000 would also be included in this paper's literature review. Where applicable, searches were limited to economic, political, medical, and humanities fields. Only peer-reviewed, full-text articles were selected from the databases for review.

For the analysis of self-rated health, the search terms were as follows: "self-rated health" OR "self-assessed health" OR "self-reported health". For the welfare literature, the search terms were: "determinants of household welfare" OR "determinants of household income" OR "determinants of household expenditures" OR "determinants of poverty" OR

("household welfare" AND "regression"). For the analysis of chronic poverty, the search terms were as follows: ("determinants" OR "regression") AND "chronic poverty". For the analysis on welfare mobility, the terms searched for were: "welfare mobility" OR "income mobility" OR "expenditure mobility" AND ("regression" OR "determinants"). Finally, for the section analyzing social capital, the search terms were: ("trust" OR "regression") AND "social capital". Only the relevant papers of the limited selections were chosen for review in this study.

In the following discussion of the links between welfare, health, and social capital, 'significant' variables, which are denoted by ** are those significant at the 1% or 5% level, and 'weakly significant' variables, which are denoted by * are those identified as being significant only at the 10% level. Also, bear in mind that if a study shows no weakly significant coefficients in this review it does not necessarily mean there weren't any in the analyses, but rather that the weak significance may not have been reported.

3.1. Determinants of household welfare

The term 'household welfare' can be interpreted in a variety of ways, and thus, can be measured by a number of means. From a purely economic viewpoint, for example, it can be measured through functions of household income, household expenditures, household assets, or other household measures of wealth. From a socioeconomic viewpoint, on the other hand, welfare can be interpreted as any measure of well-being, such as, for example, consumption security, happiness, or benefits from the public sector. In order to scale down the review to a reasonable size, this review contains only recently published papers (1997-2005) that use similar welfare measures in their studies to the one that will be used later in this paper, namely a welfare measure based on household expenditures. The papers reviewed are also concerned with developing countries, like South Africa, meaning that the results given in these studies are applicable to the work presented in this thesis. Every paper reviewed in this section contains a welfare measure calculated as a function of household income or expenditures

Yúnez-Naude and Taylor (2001) and Grimm *et al.* (2002) analyze the determinants of household welfare among rural households in Mexico and Côte d'Ivoire respectively.

Mukherjee and Benson (2003) analyze the determinants of welfare among rural households from three different regions of Malawi, as well as the determinants of welfare among urban households in Malawi. Serumaga-Zake and Naudé (2002) analyze the determinants of household welfare poverty among Black rural and urban households in the North West province of South Africa, while Bigsten *et al.* (2003) analyze the determinants of household welfare among rural and urban households in Ethiopia.

All four studies rely on cross-sectional regressions of welfare (or welfare poverty). Yúnez-Naude and Taylor (2001) use the natural logarithm of the total net income of the household as dependent variable, while Grimm *et al.* (2002) and Serumaga-Zake and Naudé (2002) use the natural logarithm of real *per capita* monthly household expenditures. Mukherjee and Benson (2003) employ the natural logarithm of *daily* real *per capita* household expenditures. Bigsten *et al.* (2003) use *per capita* household expenditures, without the log function. Serumaga-Zake and Naudé (2002) use poverty status as dependent variable (a binary indicator indicating "1" if a household is poor and "0" if not), which is based on their welfare measure.[3]

[3] Yúnez-Naude and Taylor (2001) and Grimm *et al.* (2002) do not report the time span for the income or expenditure reported. It is assumed to be monthly.

Table 2.1. Summary of empirical studies on determinants of household welfare

Author(s)	Yúnez-Naude and Taylor (2001)	Grimm *et al.* (2002)	Mukherjee and Benson (2003)	Serumaga-Zake and Naudé (2002)		Bigsten *et al.* (2003)	
Data format (CS = cross section)	CS	multiple CS	CS	CS		Panel	
Country	Mexico	Côte d'Ivoire	Malawi	South Africa		Ethiopia	
Year(s) of data	1992-1995	1985-1998	1997-1998	1997		1994, 1995, 1997	
Unit of analysis (H = household)	H (rural)	H (urban)	H, split by U/R, and by region if R	H (rural)	H (urban)	H (rural)	H (urban)
Sample size(s)	391	670, 732, 5359, 1913	6457	158	166	4199	3990
Estimation technique	OLS	OLS	OLS	Probit	Probit	OLS (on pooled sample)	OLS (on pooled sample)
Dependent variable(s)	ln(household total net income)	ln(real *per capita* household expenditures)	ln(daily *per capita* real household expenditure)	Indicator: poverty	Indicator: poverty	*per capita* household expenditure	*per capita* household expenditure
Independent Variables							
Year		Yes**					
Country of origin		HH**		HH**	HH		
Age (and its square)		HH** (HH)	HH***	HH (HH)	HH (HH)	H*** (H), HH*** (HH*)	H*** (H), HH***, (HH**)
Gender		HH**	HH	HH	HH	HH	HH
Economic activity	C**	HH**	H***			HH***	HH***
Education	H*, HH**	HH**, HHS**	H***	H***	H***	HH, HHS	HH***, HHS***
Experience (and its square)	HH (HH*)						
Household composition		H**	H***	H***	H**	H	H***
Housheold size	H		H***	H			
Home ownership				H	H		
Family elsewhere	H**						
Cultivation land	H		H***	H	H	H***	
Crop type						H***	
Cultivated crop yield			H***				
Livestock	H**		H***			H	
Agricultural inputs			H				
Access to facilities			H***				
Electricity			H				
Public works programs			H***				
Spatial effects		City**	Agro-climatic zones***	Region	Region	Region***, distance to and size of urban market	Region***, region capital city**

Notes: In the table 'CS' stands for Cross Section', 'U' for 'Urban', 'R' for 'Rural, 'HH' for 'Household Head', 'H' for 'Household', and 'C' for 'Community'

The determinants, or explanatory variables used in these five studies are similar in many aspects. The age of the household head is employed by Serumaga-Zake and Naudé (2002), Grimm *et al.* (2002), Bigsten *et al.* (2003), and Mukherjee and Benson (2003). The three latter studies find it significantly and negatively related to household welfare. Mukherjee and Benson (2003) find that the relationship is only significant for rural households, while the analysis by Grimm *et al.* (2002) only includes urban households. Moreover, both of the studies are detailing African counties. Grimm *et al.* (2002), Serumaga-Zake and Naudé (2002), and Bigsten *et al.* (2003) also use the square of the household head's age as an explanatory variable, although only the latter finds it to be significantly related to household welfare. In this case it is positively related to household welfare, meaning that as the age of the household head increases, household welfare decreases, but at a decreasing rate. Bigsten *et al.* (2003) also include the mean age of the household members and the square of this variable in their model. They find that older mean ages are significantly associated with higher household welfare levels. Yúnez-Naude and Taylor (2001) include a variable that can be thought of as being similar to the age of the household head, and that is referred to as 'experience'. This is the age of the household head, less the number of years of schooling for that individual, less five. In essence, this measures the number of years it has been since the individual ceased his or her schooling. Although the variable itself is insignificant, the square of this measure is not, with greater squared experience significantly and negatively related to household welfare. This means that a household's welfare is significantly lower the longer it has been since that household's head ceased his or her schooling.

The gender of the household head is also included by Grimm *et al.* (2002), Serumaga-Zake and Naudé (2002), Bigsten *et al.* (2003), and Mukherjee and Benson (2003), yet only Grimm *et al.* (2002) find the variable significant, with female headed households reporting significantly higher welfare than male headed households. This relationship is the opposite to what is found in South Africa, where females may have constraints in finding jobs and other socioeconomic opportunities in society (Booysen, 2004).

Measures of education are included in all five studies. Mukherjee and Benson (2003) use the maximum level of education attained by any one household member, whereas Grimm *et al.* (2002) employ the education level of the head of the household and of the head's spouse in the regression model. Bigsten *et al.* (2003) use the primary education of the head and the

head's spouse, while Serumaga-Zake and Naudé (2002) use the total number of years of education among the household members excluding children still at school. Finally, Yúnez-Naude and Taylor (2001) include the head's education level as well as the total years of education of the household members in their regression model. In every regression in the five papers, except, that is, for rural households in Ethiopia (Bigsten *et al*., 2003), education is significantly related to welfare, with higher levels of education associated with higher levels of household welfare (or lower likelihood of being poor in the case of Serumaga-Zake and Naudé (2002)).

Household size is controlled for by Yúnez-Naude and Taylor (2001) and Mukherjee and Benson (2003). It is only significantly related to household welfare in the paper by Mukherjee and Benson (2003). In this case, the square of the household size is used, and it is significantly related to better welfare in all rural and urban households in Malawi. This is a surprising result, since one would expect larger households to be poorer than smaller households. The composition of the household is controlled for in Grimm *et al.* (2002), Serumaga-Zake and Naudé (2002), Bigsten *et al.* (2003), and Mukherjee and Benson (2003). Mukherjee and Benson (2002) find that household welfare declines as the number of children between the ages of zero and nine increases, as well as the number of children between the ages of 10 and 17. Household welfare in rural households in the southern and northern regions of Malawi declines as the number of men between the ages of 18 and 59 increases. As the number of adult females increases, household welfare in the central and northern regions of Malawi declines significantly, as well as in urban households in Malawi. As we can see from these results, the positive coefficient on the square of household size in this study will be partially offset by the numbers of household members in the different age groups.

Bigsten *et al*. (2003) include the household dependency ratio in their model, which is significantly negatively related to household welfare, meaning that the higher the number of dependents (children and elderly) compared with adults, the lower the household's welfare. Grimm *et al.* (2002) and Serumaga-Zake and Naudé (2002) include both the type of household and the age composition of the household (as well as the squares of these

numbers in the case of Grimm *et al.* (2002)).[4] Grimm *et al.* (2002) find that polygamous families have a significantly higher welfare than nuclear or enlarged non-polygamous families, and single parent families have significantly lower levels of welfare. These authors also find that for every age group (0-5, 6-14, males 15-64, females 15-64, and 65+) household welfare decreases significantly with the number in each group, but increases with each group's square (although the magnitude of the squares' coefficients are generally a tenth of the magnitude of the unsquared numbers' coefficients). Serumaga-Zake and Naudé (2002) find that the likelihood of a rural household being poor rises significantly as the number of children below the age of 15, female adults and elderly increase. Among urban households, the numbers of male and female adults are significantly positively associated with the likelihood of being poor. In this case it means that the more adults, the more likely the household is poor. These authors find household type to be insignificantly related to poverty. Yúnez-Naude and Taylor (2001) also find Mexican households that have family in the USA to have significantly higher levels of welfare compared with those who do not.

In every study besides that of Serumaga-Zake and Naudé (2002), economic activity is controlled for at a different level. In Yúnez-Naude and Taylor (2001), the community's dominant economic activity is included as a regressor. They find that a community of wage employees and a cash crop community both have significantly higher levels of household welfare compared with migrant communities. Grimm *et al.* (2002) control for the economic activity of the head of the household and find that households having heads that are unemployed, retired, public sector workers, or private sector workers, all have significantly higher household welfare than those households with heads working independently in both agricultural or non-agricultural sectors. Mukherjee and Benson (2003) control for the number of household members employed in primary, secondary, and tertiary industry (as well as the number of formal wage earners) when investigating household welfare. The authors find that having more workers in primary industry is significantly associated with higher household welfare for rural households in southern Malawi, but lower household welfare for rural households in central Malawi. In addition to this, in both of these regions, a larger number of workers in tertiary industry is significantly and positively associated

[4] Household type is split between single parent family, polygamous family or nuclear or enlarged non-polygamous family (the reference category) in Grimm *et al.* (2005), and between nuclear family, single family unit, and extended family (the reference category) in Serumaga-Zake and Naudé (2002).

with welfare. Higher welfare is also associated with higher numbers of formal wage earners, in every region and in both rural and urban households in Malawi. Bigsten *et al*. (2003) include the presence of a non-farm economic activity of the head of the household of rural households, and the type of occupation of the head in urban households. They find that among rural households, if the head takes part in any non-farm activity, the household's welfare is significantly lower. This may be because non-farm economic activity is probably a means of coping, rather than accumulating wealth or being able to spend more. Among urban households, the authors find that household heads that have their own businesses, or those who are self employed, civil servants, private employees, or casual workers, all belong to households with significantly higher welfare levels.

Access to land that can be cultivated is included in the models by Yúnez-Naude and Taylor (2001), Serumaga-Zake and Naudé (2002), Bigsten *et al.* (2003), and Mukherjee and Benson (2003). Landholding is insignificantly related to household welfare in Mexican and South African households (Yúnez-Naude and Taylor, 2001; Serumaga-Zake and Naudé, 2002). Rural households with more cultivation land in Ethiopia, rural tobacco growers in southern and central Malawi, as well as rural households in southern Malawi that plant a number of different crops, all experience significantly higher welfares than those households not doing so in these regions (Bigsten *et al*., 2003; Mukherjee and Benson, 2003). As for (maize) crop yields, a decrease in yield for households from the Mwanza, Balaka, Machinga, and Mangochi districts in southern Malawi, and an increase in yield for households from the Ntcheu, Salima, and Nkhotakota districts in central Malawi, are all significantly associated with increases in household welfare (Mukherjee and Benson, 2003). Access to agricultural inputs, as well as the variable indicating the time needed to travel to commercial facilities (for rural households) and access to electricity, and incidence of public works programs in the area are also included in the model by Mukherjee and Benson (2003). They find that longer transport times to commercial facilities are associated with significantly lower household welfare, and having public works programs ongoing in the area is significantly positively related to household welfare.

The value of livestock is included by Yúnez-Naude and Taylor (2001), and Mukherjee and Benson (2003) as an explanatory variable. The number of oxen is included in the model by Bigsten *et al.* (2003). The value of livestock is significantly positively related to household welfare in rural households.

Finally, spatial and ethnic effects are important as well in explaining differences in household welfare. Grimm *et al.* (2002) find that households in Abidjan city experience significantly higher welfare than households not in Abidjan city, and that households with Ivorian heads also experience significantly higher welfare in Côte d'Ivoire than households without Ivorian heads. Serumaga-Zake and Naudé (2002) find that having a migrant head of household significantly decreases the likelihood of a household being in poverty. Mukherjee and Benson (2003) in turn find that households from the Mwanza, Balaka, Machinga, and Mangochi districts in southern Malawi enjoy significantly higher welfare levels. Bigsten *et al.* (2003) find that rural and urban Ethiopian households in the north of the country experience significantly higher welfare than those in the South, while urban households in the regional capital cities experiences significantly lower levels of household welfare compared with urban households not in their region's capital city.

Studies by Narayan and Pritchett (1997) and Grootaert *et al.* (2002) investigate the role of social capital in explaining differences in household welfare in developing countries. Narayan and Pritchett (1997) study the influence of household and village level social capital in rural Tanzania on household *per capita* expenditures, using a sample of 1376 rural households. They estimate a regression with village social capital and village and household characteristics as independent variables. The household social capital measure employed in this study is an index of group memberships (in categories)[5] and various aspects of those groups (also in categories), including kin heterogeneity, income-level heterogeneity (of the members and group leaders compared with members), group performance, and the penalty for not paying a group's membership fee. For village social capital an index is created which aggregates the household social capital to a village level. Other explanatory variables included in the model are household size, average adult schooling, a dummy for female head of household, a non-land, non-agricultural asset ownership index,[6] a dummy indicating if the head of the household is self-employed in agriculture, a village level variable indicating distance to nearest market, and dummies controlling for the agro-climatic zones.

[5] The number of memberships falls into one of four categories: none, one, two, or three or more.
[6] The index includes several assets weighted by pre-determined weights. For example, ownership of a vehicle is given a weight of 16, while ownership of a lamp is given a weight of 2.

Table 2.2. Summary of empirical studies on determinants of household welfare, including social capital

Author(s)	Narayan and Pritchett (1997)	Grootaert *et al.* (2002)	Grootaert and Narayan (2004)
Data format	CS	CS	CS
Country	Tanzania	Burkina Faso	Bolivia
Year(s) of data	1995	1997	1997
Unit of analysis	H (rural)	H	H
Sample size	1376	960	999
Estimation technique	OLS, IV estimation, probit	OLS, IV estimation, probit	OLS
Dependent variable(s)	ln(household expenditure *per capita*)	ln(household expenditure *per capita*)	ln(household expenditure *per capita*)
Independent Variables			
Spatial effects	Agro-climatic zones, distance to market	Province**	Municipality***, Municipality's capital city***
Age (and its square)		HH** (HH**)	HH*** (HH***)
Gender	HH	HH**	HH*
Household size	H***	H***	H***
Education	H	H***	H***
Land		H	H***
Asset ownership	H***	H*	H**
Livestock		H**	H***
Economic activity	H**		H
Ethnicity		H	
Income			
Social status			
Structural Social Capital	H	H***	H***
Cognitive Social Capital	H**	H***	

Notes: 1. In the studies by Narayan and Pritchett (1997), Grootaert et al. (2002), and Grootaert and Narayan (2004), only coefficients and t-statistics are reported. For the purpose of this paper, coefficients between -1.647 and +1.647 are considered significantly different from 0 at the 10% level, coefficients between -1.963 and +1.963 are significant at the 5% level, and coefficients between -2.582 and +2.582 are significant at the 1% level.
In the table 'CS' stands for Cross Section', 'I' for 'Individual', 'HH' for 'Household Head', 'H' for 'Household', and 'C' for 'Community'

In the first village level OLS estimation of their model, a coefficient of 0,119 is estimated for social capital, which is only slightly significant (t-value 1,80). This means that the higher the social capital of a household, the higher the household's *per capita* expenditures. The model's adjusted R^2 is 0,215, meaning that 21,5% of the variation in *per capita* household expenditures is explained by their model. In further estimations at the village and household levels village social capital is instrumented by a variety of interpersonal and political trust variables.[7] 'Trust in strangers' is thought by the authors to be the most plausibly exogenous instrument *a priori*. This is because the authors expect trust in strangers to be the trust least likely to be affected by household income or memberships.

[7] These variables include measures of trust in strangers, tribesman, cell leader, village chairman (government), district officials, and central government.

For the instrument set to be accepted statistically at the household level, however, the 'trust in strangers' instrument is abandoned. The instrumented social capital coefficient decreases in magnitude, and becomes insignificant as soon as this 'trust in strangers' instrument is dropped. For the village level instrumental variable estimation, however, while using the full instrument set, the social capital variable gains in magnitude and significance. The incremental R^2s at the household level are 0,1 when the full instrument set is used, and 0,07 when the final instrument set is used. In the village level analysis the incremental R^2 is 0,12, using the full instrument set. Narayan and Pritchett (1997) go further to show that it is not household level social capital mainly that is influencing household expenditures *per capita*, but village level social capital.

In the village level final estimation (the instrument set for social capital is the full instrument set), social capital is significantly and positively related to household welfare. Average adult schooling and the village-level average of the indicator of being self-employed in agriculture are both significantly and negatively associated with household welfare. In the household level final estimation (with the instrument set for social capital, but excluding trust in strangers), asset ownership is significantly and positively related to household welfare. Household size and self-employment in agriculture are both significantly and negatively associated with household welfare.

In a household-level study on a sample of 960 Burkina Faso households, Grootaert *et al.* (2002) analyze household welfare in a similar manner to that of Narayan and Pritchett (1997). Their dependent variable, household welfare, is measured by the log of household *per capita* expenditure. Non-social capital explanatory variables included in the model are: years of education of the adult members of the household (a measure of household human capital), number of hectares of land owned and operated by the household, household ownership of cattle and of agricultural equipment, household size, demographic dummy variables,[8] the age of the head of the household and its square, as well as a dummy variable indicating whether or not the household head is female. Grootaert *et al.* (2002) show that household welfare is better explained by a model that includes household social capital measures than by a model excluding them (R^2 of 0,29 as opposed to 0,25). The eight social capital measures, or components, included in their analysis are density of associations, a

[8] Dummies denote the province of residence and language/ethnic group of the household.

heterogeneity index, a meeting attendance index, an active participation index, two membership dues indices (cash contributions and work contributions[9]), a measure of community initiation,[10] and a variable representing the mode of organisation.[11] Density of associations is measured by the number of active memberships per household. The heterogeneity index is constructed considering up to three most important groups the household belongs to (as chosen by the survey respondent (World Bank, 1998)), and then adding up the sum totals of nine dummies for each of the these groups. These dummies respectively took a value of '1' if the group's members were 'mainly from different' neighbourhoods, kin groups, occupations, economic statuses, religions, genders, ages, levels of education, and political orientations. The meeting attendance index measures the average number of times over a three month period that someone from the household attended group meetings (normalised for the number of memberships of each household). The active participation index concerns the households' most important groups again, with the index here representing the average (across the most important groups) of the members' scores on a categorical question asking if they are 'very active' (score = 2), 'somewhat active' (score = 1) or 'not very active' (score = 0) in the group's decision making. The membership dues indices convert actual cash fees contributed to the group as membership dues, and days of work contributed to the group as membership dues, into fractions of the maximum cash fees or days worked that are present in the data. The heterogeneity, active participation, and two membership dues indices were rescaled to have values from zero to 100.

Using each social capital measure as an individual variable (as opposed to joining them in an aggregated index), Grootaert *et al.* (2002) find that more memberships, more heterogeneity in the joined groups, and higher cash and work contribution index scores are all significantly associated with higher household welfare.

Regarding the non-social capital variables, more household years of education, female headship, more owned cattle, more farming equipment, and living in Sissilli (as opposed to Sanmatenga) are all significantly and positively associated with levels of household welfare. Larger households enjoy significantly lower household welfare, as do residents of

[9] 'Work contributions' refers to the number of days worked for the group as a payment for membership in the group.
[10] A distinction is made between voluntary groups *versus* externally imposed and/or mandated groups.
[11] A distinction is made between formal and informal organisation.

Yatenga (compared with residents of Sanmatenga). Older household heads also enjoy with significantly lower household welfare, although as age increases, the strength of this negative relationship decreases.

The authors focus on the networks aspect of social capital, although a measure of trust is used as an instrumental variable. Thus, both attitudinal and behavioural components of social capital are accounted for in this empirical analysis. In another OLS estimation of the model, an index of the above-mentioned social capital measures was constructed and added to the regression in place of the individual measures of social capital. This estimation, with an R^2 of 0,26, proved to be only marginally better than the estimation excluding the social capital measures, which had an R^2 of 0,25 (the R^2 of the model including the social capital measures as separate variables is 0,29). The coefficient (t-statistic) for the social capital index was 0,0045 (3,18). When household trust, length of residency in the village and trend in membership associations are used as instruments for the social capital index, an application of the standard test for over-identifying restrictions was applied in order to test the null hypothesis that the model is correctly specified and that the instruments are valid. This test accepts the null hypothesis, even though the incremental R^2 after applying the instruments proves to be only 0,01. However, the coefficient of the social capital index gained weight, moving from a significant 0,0045 to a significant 0,0271. This means that a stronger positive relationship between social capital and welfare is estimated. Causality from social capital to welfare is also implied by the coefficient of the social capital index increasing in magnitude. Reverse causality could be assumed if the coefficient decreased in magnitude after applying the instruments (Grootaert *et al.*, 2002). In other words, an increase in household social capital is here shown to increase household welfare.

A probit model of the probability of being poor (below two-thirds of mean household *per capita* expenditure in this case), with the same explanatory variables as above, is also estimated, with virtually the same results. More memberships, greater heterogeneity in memberships, higher cash and work contribution scores, more years of education, and more cattle, are all significantly associated with a decreased probability of being poor. Household size, living in Yatenga (as opposed to Sanmatenga), and being Fulfunde (as opposed to Moore, Dioula, Gourounsi/Nuni, or Bobo) are all associated with a higher probability of being poor. Again, households headed by older persons are significantly more likely to be poor, although the probability declines as age increases.

Grootaert and Narayan (2004) follow a very similar procedure to that used in Grootaert *et al*. (2002) to analyze the effects of network social capital on household welfare in Bolivia, using a sample of 999 Bolivian households. Included in the model explaining household welfare (again the welfare measure is calculated using the natural logarithm of *per capita* household expenditures) are the following explanatory variables: age of the household head and its square, gender of the household head, household size, total years of education of all household members, economic activity of the household (farm or non-farm), land ownership, animal ownership, farm equipment ownership, spatial effects (municipality), and a variety of structural social capital measure. These measures include memberships in agrarian syndicates, memberships in other groups, a heterogeneity index, a meeting attendance index, a participation index, a contribution index, and a community orientation variable. These variables are constructed in the same manner as mentioned previously in this section, except that the contribution index averages out 'in cash' and 'in kind' contributions into one value before constructing the index value.

The authors find that more memberships in agrarian syndicates as well as in other groups, higher levels of the meeting attendance and contribution indices, more memberships in community-initiated groups are significantly associated with higher levels of household welfare. They also find that lower values of the participation index are significantly associated with lower levels of household welfare. With respect to the non-social capital measures, more household education, more land, more animals, more farm equipment, and living in Misque or Charagua (as opposed to Tiahuanacu), as well as being in the municipality's capital city, are all significantly associated with higher levels of household welfare. On the other hand, larger households and female headship are both significantly and negatively associated with household welfare. The age of the head of the household, and its square, are also significant: welfare increases with increases in age, although at a decreasing rate.

In summary, we note that with or without social capital in the model, household welfare is dependent on similar factor. This does not mean social capital is not important. On the contrary, in every analysis in which it is included, social capital is found to be a significant determinant of welfare. Of critical importance to this research paper is the fact that networks, both informal and formal, are positively associated with household welfare in all

three of the preceding papers: those individuals with more networks, or structural social capital, enjoy higher levels of household welfare. However, it seems that many other aspects should be controlled for in order to disentangle the effect that social capital has on household welfare from the effect that other determinants have. These 'other' determinants include the age and gender of the household head, the human capital of the household, the economic activities of the household, the household's composition and size, agricultural assets (especially for rural households), and perhaps household wealth in other assets, all of which are significantly associated with household welfare. Unfortunately, one can note that household health levels are rarely controlled for in these analyses of household welfare. In future, both social capital and household health measures should be included in the analyses of welfare, so that, together with commonly used determinants, one can be able to establish the influence of both social capital and health on household welfare.

3.2. Determinants of income and poverty dynamics

Yaqub (2002) provides a literature review of empirical papers income and poverty dynamics from over 20 different countries (both developing and developed) using panel data sets. The studies reviewed span the years from 1968 to 1999 (papers published till 2002), and so his review covers all but the most recent literature on the topic of income mobility. The studies reviewed are presented in Table 2.3 below, sorted by the main type of mobility measure employed in these research papers: change in levels of welfare, intertemporal-mean shortfall, time in poverty, movement out of absolute poverty, and movement out of relative poverty.

The author finds that specific correlates of income and poverty mobility appear throughout the literature. These correlates fall into four specific groups: spatial, demographics and household type, human capital and labour, and physical capital. Also common in many of the studies is a term relating to regression towards the mean (i.e. base year income level, or a dichotomous variable indicating belonging to the poorest quintile of the sample, or the number of years in poverty, etc.). Yaqub (2002) counts the number of samples (out of the 27 total samples he reviewed) that find each of the different common correlates significant and insignificant (of those samples that included the correlate in the first place). The four mobility correlates are then checked across the samples, and through the process of vote counting Table 2.4 is constructed.

Table 2.3. Summary of models identifying mobility correlates

Type	Study	Sample	Mobility concept	Country	Period	N Waves	N hhlds	Indicator	Source
1	1	1	Change in levels	Chile, rural	1968-86	2	146	Income per capita	Scott & Litchfield 94
	2	2	Change in levels	China, rural	1987-97	10	3 100	Income per prime age	Giles 02
	3	3	Change in levels	Côte d'Ivoire, rural	1987-88	2	250+	Exp per capita	Grootaert et al. 97
	4		Change in levels	Côte d'Ivoire, urban	1987-88	2	250+	per capita	Grootaert et al. 97
	4	5	Change in levels	El Salvador, rural	1995-97	2	489	Income per capita	Conning et al. 00
	5		Change in levels	El Salvador, rural	1995-97	2	494	Income per household	Sanfeliu & Vega 00
	6	6	Change in levels	Ethiopia, rural	1994-95	2	1 411	CExp per capita	Dercon & Krishnan 00
	7	7	Change in levels	India, Bombay slum	1987-92	2	220	Earnings of hhld head	Swaminathan 97
	8	8	Change in levels	India, rural cultivating hhold	1975-83	9	873	Income per capita	Gaiha & Deolalikar 93
	9		Change in levels	India, rural non-cultivating hh	1975-83	9	657	Income per capita	Gaiha & Deolalikar 93
	9	10	Change in levels	Indonesia, rural	1993-97	2	6 768	Income per capita	Fields et al. 01
	10	11	Change in levels	Indonesia, rural	1997-98	2	8 141	Exp per capita	Skoufias et al. 99
	11	12	Change in levels	Mexico, rural ejido	1994-97	2	1 017	Income per hhld	Davies et al. 99
	12	13	Change in levels	Peru, Lima	1985-90	2	699	Cons per cap	Glewwe & Hall 98
	13	14	Change in levels	Poland	1995-96	2	4 919	Exp equivlsd	Okrasa 99b
	14	15	Change in levels	Russia	1994-98	2	2 390	Exp per capita	Jovanovic 00
	15	16	Change in levels	South Africa, KZ-N non-white	1993-98	2	1 393	Exp per capita	Maluccio et al. 00
	16		Change in levels	South Africa, KZ-N non-white	1993-98	2	1 003	Income per capita	Fields et al. 01
	17	17	Change in levels	South Korea	1994-98	5	3000+	Exp per capita	Goh et al. 01
	18	18	Change in levels	Venezuela	1997-98	3	7 747	per capita	Freije 00
	19	19	Change in levels	Zimbabwe, rural	1994-97	4	320+	Net crop income hhld	Owens & Hoddinott 98
2	20	20	Intertemporal - mean shortfall	China, rural	1985-90	6	5 854	Cons per capita	Jalan & Ravallion 99
	21	21	Intertemporal - mean shortfall	Egypt	1997-99	2	346	Exp per capita	Haddad & Ahmed 02
3	22	22	Status: 4yrs poor or not	Hungary	1992-97	6	1800+	Income equivlsd	World Bank 01
			Number years poor	Poland	1993-96	4	4 919	Exp equivlsd	Okrasa 99b
4	23	23	Exit abs pov	Madagascar, Antananarivo	1997-99	3	1 249	Income per hhld	Herrera & Roubaud 01
	24	24	Exit abs pov	Pakistan, rural	1986-90	5	686	Income per capita	Baulch & McCulloch 98
	25	25	Exit abs pov	Peru	1997-98	2	3 100	Exp per hhld	Herrera 01b
			Exit abs pov	Poland	1993-96	4	4 919	Exp equivlsd	Okrasa 99b
			Exit abs pov	Venezuela	1997-98	2	7 747	Income per capita	Freije 00
			Move to richer income band	Chile, rural	1968-86	2	146	Mov per capita	Scott & Litchfield 94
5	26	26	Move to richer decile	Malaysia	1967-76	2	1000+	Male head earnings	Trzcinski & Randolph 91
	27		Change rank	Mexico, rural ejido	1994-97	2	1 046	Income per hhld	Lanjouw 98
			Exit poorest quintile	Venezuela	1997-98	2	7 747	Income per capita	Freije 00
	28	27	Exit p'rst 40% to r'chst 40%	Vietnam	1992-97	2	4 305	Exp per capita	Haughton et al. 01

Source: Yaqub (2002: 13)

Table 2.4. Correlates of upward mobility, vote counting across 27 study samples

Correlate		Positive significant	Negative significant	Not significantly different from zero	Not included	Total samples
Spatial	Provincial effects	Significant in 12 samples		5	10	27
Household type	Age of hh head	6	2	10	9	27
	Household size	4	6	3	14	27
	Increase in household size	2	5	2	18	27
	Number of dependents	3	12	4	8	27
	Increase in dependents	2	8	1	16	27
	Female hh head	3	3	10	11	27
Human capital	Hhold educ., head's and total	12	0	9	6	27
	Increase in education	3	1	4	19	27
Physical capital	Land	9	0	3	15	27
	Increase in land	6	0	3	18	27

Source: Yaqub (2002: 15)

The 'regression to mean' term is significantly and negatively related to upward mobility in ten of the 11 samples that include the item, the eleventh study showing the coefficient as not significantly different from zero. From Table 2.4 we can see that not only the levels of the correlates are important, but also the changes in the levels between periods, as is illustrated by the significance of the increases of several of the regressors. One can conclude several things after inspecting Table 2.4. The first is that, in the majority of the cases, upward mobility is significantly and positively associated with the number of dependents in the households, as well as the increase in dependents. The opposite occurs for the age of the household head, education, and land ownership. Older household heads enjoy upward mobility in more often than downward mobility. Higher education (household's as well as head's) is associated with upward mobility in all of the studies in which human capital is significant, and in three of the four studies reporting increases in education significant, these increases are positively associated with upward mobility. Similarly, nine of twelve studies including land ownership report it to be positively associated with upward mobility (and the other three find it insignificantly related to upward mobility, rather than negatively related), and six of the nine studies including increases in land ownership report the variable to also be significantly related to upward mobility (and the other three find it insignificantly related to upward mobility, again rather than negatively related to it). The remainder of the table reports disputable results: in some cases the variables are negatively and significantly related to upward mobility, and in others they are positively and significantly related to upward mobility.

Table 2.5. Summary of empirical studies on determinants of welfare mobility

Author(s)	Bigsten *et al.* (2003)			
Data format	CS			
Country	Ethiopia			
Year(s) of data	1994, 1995, 1997			
Unit of analysis Sample size	H (rural) 562	H (urban) 520	H (rural) 767	H (urban) 810
Estimation technique	Probit	Probit	Probit	Probit
Dependent variable(s)	Indicator: movement out of poverty	Indicator: movement out of poverty	Indicator: movement into poverty	Indicator: movement into poverty
Independent Variables				
Age (and its square)	H (H), HH (HH)	H (H), HH** (HH**)	H (H), HH (HH)	H (H), HH (HH)
Gender	HH	HH	HH	HH
Household size	H**	H	H	H**
Dependency ratio	H	H**	H	H
Education	HH, HHS	HH**, HHS**	HH, HHS	HH**, HHS
Oxen	H**		H	
Land	H		H	
Employment/Economic Activity	H	HH**	H	HH**
Crop types	H**	H	H**	H
Spatial effects	Region**, distance to and size of urban market **	Region**, region capital city**	Region, distance to and size of urban market	Region, region capital city

Notes: In the table 'HH' stands for 'Household Head', 'H' for 'Household', and 'U/R' for 'Urban or Rural residence'

A more recent study on mobility is presented by Bigsten *et al.* (2003), in which the authors analyze the determinants of welfare mobility among urban and rural households in Ethiopia. The authors code binary variables for rural and urban households separately to indicate whether or not a household has moved into poverty between the first and the last waves of the survey, and whether or not the household has moved out of poverty in this time as well. These binary indicators serve as the dependent variables in the four regressions summarized in Table 2.5 above. The authors use the same controls in these probit regressions as were used to determine household welfare levels (see Table 2.1). These include, for both the rural and urban households, the mean age of the household (and its square), the age of the head of the household (and its square), the gender of the household head, the primary education of the household head and that of the head's spouse, and the dependency ratio. The regressions on rural mobility include controls for number of oxen, the landholdings of the household, and the type of crops cultivated. Also included for rural mobility is a binary indicator coded as "1" when the household head is involved in off-farm activities (and "0" when not), spatial effects that include an indicator coded as "1" for northern households (and "0" otherwise), and the market ratio. The latter is the ratio of

the population of the city containing the nearest market to the distance to that market. The regressions for the urban households include the control for the northern region as well, an indicator coded as "1" if the households is situated in the capital city of the region (and "0" otherwise), and the economic activity of the household head. The marginal effects of the probit estimations are reported by the authors.

Bigsten *et al.* (2003) find that among rural households, larger households are significantly less likely to move out of poverty, while households producing *chat* or *enset*, or households in the north, or households with a higher market ratio (closer to a bigger market), or more oxen, are all significantly more likely to move out of poverty. Those households that are significantly more likely to fall into poverty are those households producing *teff*, and households significantly less likely to fall into poverty are those producing coffee or *chat*.

Among urban households the results are very different. As the age of the household head increases, the likelihood of escaping from poverty decreases, but at a decreasing rate (significant negative coefficient on the age of household head in the 'out of poverty' regression, but a significant negative coefficient on the square of the age variable). Higher dependency ratios are also significantly and negatively associated with households' ability to escape poverty. On the other hand, if a household head has primary education, or if the head's spouse has primary education, the household is significantly more likely to have moved out of poverty. In addition to these, households with own-account occupied (self-employed) household heads, as well as households in the north and in the regional capital cities, are all significantly more likely to have escaped poverty. Bigsten *et al.* (2003) also find that while larger urban household are significantly more likely to have moved into poverty, a head with primary education, as well as heads employed in their own businesses, on their own accounts, or as civil servants, are all part of households that are significantly less likely to have fallen into poverty over the period of the study.

Table 2.6. Summary of empirical studies on determinants of household mobility, including social capital

Author(s)	Booysen (2004)			
Data format	Panel			
Country	South Africa			
Year(s) of data	2001, 2002			
Unit of analysis	H			
Sample size	328			
Estimation technique	OLS, probit	OLS, probit	OLS, probit	OLS, probit
Dependent variable(s)	Change in ln(adult equivalent household income)	Indicator: moved an income quintile up	Indicator: exited the lowest quintile	Indicator: Exited poorest 40% into richest 40%
Independent Variables				
Age (and its square)	HH (HH)	HH** (HH**)	HH (HH)	HH (HH**)
Gender	HH**	HH** (HH**)	HH	HH
Household composition	H**	H**	H**	H**
Education	H	H	H	H**
Asset ownership	H**	H	H	H
Employment	H**	H**	H	H**
Base income	H**	H**	H**	H**
Structural social capital	H	H	H	H
Morbidity	H	H**	H	H
Mortality	H**	H**	H**	H
Orphans in household	H	H	H**	H
Spatial effects	U/R**	U/R	U/R	U/R

Notes: In the table 'HH' stands for 'Household Head', 'H' for 'Household', and 'U/R' for 'Urban or Rural residence'

In addition to explaining chronic poverty status, Booysen (2004) also analyzes several mobility indicators among 328 Free State province households in South Africa. These measures include the change in the natural logarithm of average adult equivalent real *per capita* household income between waves III and I, a dichotomous variable indicating a "1" if the household experienced upward mobility (of quintile rank) between waves I and III and "0" otherwise, a dichotomous variable indicating a "1" if the household moved out of the poorest quintile between waves I and III and "0" otherwise, and a dichotomous variable indicating a "1" if the household moved from the poorest 40% to the richest 40% of the sample between waves I and III, and "0" otherwise.

The function of base income is significant in every model, with higher levels of base income leading to significantly less upward mobility. An increase in the number of adults in the household is significantly positively associated with income changes and upward quintile mobility, as are the number of elderly in the base year and the change in the

number of elderly (the change is also significantly and positively associated with moving from the poorest 40% to the richest 40%). The latter two results may be due to the state benefits received by the elderly in South Africa.

The age of the household head is significantly and negatively related to upward mobility, while the square of the age variable is significantly and positively related to upward mobility. This means that there may be better chances of upward mobility for households with younger and older household heads. However, the author also shows that the probability of exiting the poorest two quintiles and moving into the richest two is significantly and negatively associated with the square of the age of the household head. In other words, in this case, the elderly are severely constrained in being upwardly mobile. Female headed households are also significantly worse off in terms of income mobility.

Urban location is significantly and positively associated with income changes, as is the number of assets owned and the change in the number of assets owned by the household (the latter two are also significantly associated with a smaller chance of being chronically poor). Ownership of the dwelling is significantly associated with an income change for the worse between waves I and III. The number of unemployed and the change in this number are both significantly and negatively related to upward mobility. An increase in the number of employed persons in the household is also significantly and positively related to income changes, upward quintile mobility, and the probability of leaving the poorest 40% of the population and moving into the richest 40%.

Social capital again is not significant in any of the models, but health variables are found to be significant once more. The number of ill persons in the household is significantly and positively related to an upward quintile move (an anomaly), while the number of deaths in the household and the change in this variable are both significantly and negatively related to income mobility. The number of deaths, as well as orphans in the household (and the change in the number of orphans), are both significantly and negatively related to the event of exiting the lowest quintile.

The only significant education control is the change in the total years of education in the model explaining the move out of the poorest 40% into the richest 40%, and in this case the coefficient is negative. This coefficient is difficult to explain because it may be, on the one

hand, that only the non-poor are investing in education, or on the other hand, that education costs money, for the poor and the non-poor, which thus constrains the chance of moving from poor to rich.

In summary, we find that common measures explain income mobility in the literature. These common determinants are similar to the determinants of household welfare (and chronic poverty, as we will see later), including the age and gender of the head of the household, human capital in the household, household composition, agricultural asset variables (for rural households), economic activity, and household wealth. With little literature on the topic of how social capital influences household mobility, as well as the influences of health on welfare mobility, this paper once more cannot initially conclude that social capital and health are definitely important determinants of income mobility. Further research will be required to confirm or refute this hypothesis. An extension to the analysis of social capital and income mobility is the analysis of social capital as a determinant of chronic poverty, which is the inability to move out of poverty over time.

3.3. Determinants of chronic poverty

McKay and Lawson (2003) provide a summary of (the general characteristics of) the chronically poor, as reported in a wide range of previous empirical studies. These characteristics include lack of human capital, demographic factors, location factors, lack of physical assets, and also occupational status. In the category of human capital, fewer years of education, lower levels of education, and illiteracy, are all positively related with chronic poverty. Innate disadvantages (such as lack of management skills) are also associated with chronic poverty. In the demographics category, it's generally expected that increased household size is positively associated with chronic poverty (the exception being in farming communities where additions to the household mean additions to labour capacity and therefore output and welfare). Higher dependency ratios, the number of children in the household, and the presence of a third generation in the household are other demographic factors associated with chronic poverty. Chronic poverty is also associated with single-headed households, as well as marginalized groups, such as elderly women and the disabled. As for location, chronic poverty is more likely to be found in rural areas as opposed to urban areas, and even more so in remote rural areas. In the physical assets category, lack of actual physical assets, in particular lack of land ownership, is associated

with chronic poverty. Returns on assets are also important, being inversely associated with chronic poverty. Occupational status has important effects on chronic poverty, although these effects may differ from place to place, depending on the availability and remunerative quality of possible employment.

Roberts (2001), using the KIDS data from 1993 and 1998, shows that chronically poor households tend to have more members, are more likely to have female household heads, and are more likely to have older household heads. He also mentions that the adult members of chronically poor households are less educated and have a lower level of literacy than their non-poor counterparts, and that chronically poor households have access to less arable land *per capita*. In addition to this, chronically poor households spend considerably less money on food than other households yet are more likely to receive old age pensions.

Table 2.7. Summary of empirical studies on determinants of chronic poverty

Author(s)	Jalan and Ravallion (2000)	Kedir and McKay (2003)	Hadded and Ahmed (2003)	Bigsten *et al.* (2003)	
Data format	Panel	Panel	Panel	Panel	
Country	China	Ethiopia	Egypt	Ethiopia	
Year(s) of Data	1985-1990	1994, 1995, 1997	1997, 1999	1994, 1995, 1997	
Unit of analysis	H (rural)	H (urban)	H	H (rural)	H (urban)
Sample size	5854	1036	347	1329	1330
Estimation technique	Censored quantile regressions	Multinomial logit	Quantile regressions	Multinomial logit	Multinomial logit
Dependent variable(s)	Chronic poverty	Indicator: poor in all periods	Chronic poverty	Chronically vs. never poor	Chronically vs. never poor
Independent Variables					
Age (and its square)	HH** (HH**)	HH	HH***	H (H**), HH (HH)	H (H), HH** (HH*)
Gender		HH		HH**	HH
Marital status		HH			
Economic activity	Province	HH*		HH***, HHS	HH***
Economic sector/area	H**		HH***		
Wealth	H**	H***			
Education	H**, Province**	HH*	H***	HH***, HHS	HH***, HHS***
Household size	H**	H**	H***	H***	H***
Household composition	H**	H**	H***	H***	H***
Cultivated land [and land-based production]	H** [H**]		H***	H*	
Crop Type				H***	
Livestock			H**	H***	
Ethnicity		H**			
Access to health care	Province				
Population density	Province				
Spatial effects	Province**, Topography**, Politics**	Region	Urban/rural	Region***, distance to and size of urban market***	Region***, region capital city***

Notes: In the table, 'H' stands for 'Household', and 'HH' for 'Household Head'

In Table 2.7 above, two methods of measuring and analyzing chronic poverty are evident. The first is the use of the intertemporal mean of *per capita* poverty in the welfare measure of the household, as is used in Jalan and Ravallion (2000) and Haddad and Ahmed (2003). The welfare measure is consumption expenditure in both studies. This method provides a continuous variable for measuring the extent of chronic poverty. In contrast, the second measure of chronic poverty is simply a binary indicator measuring whether or not the household is below the poverty line in all (or a subset of) the periods under investigation. In Kedir and McKay (2003) this method is used, although this thesis must assume that the chronically poor are the households that are below the poverty line at the times of observation. Bigsten *et al.* (2003) also use this method, although the dependent variable, instead of being binary, has three categories: always poor, never poor, and transitory poor (the reference category). In Jalan and Ravallion (2000), Kedir and McKay (2003) and Haddad and Ahmed (2003) the data and analyses are panel in nature, meaning that causality can be deduced, running from the independent variables to the dependent.

The four papers use similar regressors in their analyses. All four use the age of the head of the household as an explanatory variable, although only Jalan and Ravallion (2000), Bigsten *et al.* (2003) for urban households, and Haddad and Ahmed (2003) find that it is significantly related to chronic poverty. In Jalan and Ravallion (2000) and Haddad and Ahmed (2003) the relationship is negative, meaning that households with older heads are less likely to experience chronic poverty. Jalan and Ravallion (2000) also use the square of the age of the household head, and find that it is significantly and positively related to chronic poverty. Taking into consideration the negative coefficient of the age variable, this means that chronic poverty decreases as the age of the household head increases, but at a decreasing rate. Bigsten *et al.* (2003), on the other hand, find that older household heads in urban Ethiopian households are less likely to never be poor (as opposed to be transient poor), and more likely to be chronically poor (as opposed to being transient poor). Yet, the likelihood of never being poor increases with age at a decelerating rate (a significant negative coefficient on the age-squared). Bigsten *et al.* (2003) also use the mean age of all household members and its square, and find that the square is significantly related to a smaller likelihood of being chronically poor, and significantly related to a larger likelihood of never being poor.

The gender of the household head is used as a regressor by Bigsten *et al.* (2003) and Kedir and McKay (2003). The latter authors find it to be insignificantly related to chronic poverty status. Bigsten *et al.* (2003) find that among rural households, female headed households are significantly more likely to be chronically poor and significantly less likely to never be poor. Kedir and McKay (2003) also included the marital status of the head, although, again they find it has an insignificant effect on chronic poverty status.

Kedir and McKay (2003) include human capital into their model by employing the schooling level of the household head (primary, secondary, and college-level or above, all compared with no schooling). They find that lack of secondary schooling for the head of the household is a significant cause of households falling into chronic poverty. Jalan and Ravallion (2000) and Haddad and Ahmed (2003) include human capital in their regressions in the form of household education levels, while Jalan and Ravallion (2000) also include the illiteracy rate of the adult population of the county the household resides in, in their regression model. Haddad and Ahmed (2003) simply use the mean years of schooling of all household members, and they find that it is significantly but negatively related to chronic poverty, meaning that an increase in the mean years of education in the household sees the likelihood of chronic poverty decline. Jalan and Ravallion (2000) use several indicator variables measuring household education, including the proportions of adults and children with primary and secondary school education (with 'more than secondary schooling' as the reference category for the adults, and 'illiteracy' as the reference category for the children), as well as the highest educational level of the labour force in the household: illiterate, primary school, or middle school (with more than middle school education as the reference category). The authors find that the chronic poverty declines significantly by having a higher proportion of adults in the household with secondary schooling, and a higher proportion of children with either primary or secondary education. Chronic poverty increases, however, if the highest education level of the labour force of the household is anything other than better-than-middle-schooling. As for the county illiteracy, the authors find that the higher the proportion of illiterate population in the county, the higher the chronic poverty experienced by households in that county. Bigsten *et al.* (2003) use the primary education level of the head of the households and that person's spouse. They find that the heads of rural households, and the heads of urban households and their spouses with primary education are all significantly less likely to be chronically poor (as opposed to transitory poor) compared with those with no education. The authors also find that among

urban households, heads and spouses with primary education belong to households that are significantly more likely to never be poor (as opposed to transitory poor), compared with those with no education.

Kedir and McKay (2003) and Bigsten *et al*. (2003) report that the economic activity of the household head is important in determining chronic poverty status. Kedir and McKay (2003) find that 'own account workers' (the self-employed) are significantly less likely to be a part of households that are chronically poor. Bigsten *et al*. (2003) find that rural household heads that take part in off-farm activities are significantly less likely to be in a household that is never poor (as opposed to transient poor). They also find that the specific economic activity of the head is very important among urban Ethiopian households in explaining differences in chronic poverty. Having a private business, being an own account worker, a civil servant, part of a public enterprise, or being a private employee are all associated with being in a household that is significantly less likely to be chronically poor and significantly more likely to never be poor. In addition to this, household heads that are unemployed are significantly less likely to never be poor.

Jalan and Ravallion (2000) use indicators to show employment of household members in different sectors or areas (non-farm sectors: state, and TVE, and an indicator to show a member works out of town) and a variable giving the proportion of the county's population employed in commercial enterprises. Haddad and Ahmed (2003) in turn have indicators to show employment sector of the household head. Jalan and Ravallion (2000) find that having household members working out of town or in the state sector significantly reduces chronic poverty, while Haddad and Ahmed (2003) find that chronic poverty is only reduced significantly when household heads work in the manufacturing industry, the community and recreation industry, or any other non-farm, non-trade-and-service, non-construction industry. The proportion of the county's population employed in commercial enterprises is insignificant in explaining differences in the likelihood of chronic poverty in Chinese households.

Wealth is also shown to be an important determinant of both the continuous chronic poverty measure used by Jalan and Ravallion (2000), and the likelihood of chronic poverty, as it is significant in the study Kedir and McKay (2003). The higher the value of the assets owned by a household, the more likely the household is not to be chronically poor (Kedir

and McKay, 2003). Higher average *per capita* household wealth also reduces chronic poverty, but higher variance in this wealth increases chronic poverty (Jalan and Ravallion, 2000).

Household size is controlled for in every study, with larger households for the most part being significantly less likely to experience chronic poverty (Bigsten *et al.*, 2003; Kedir and McKay, 2003). In Bigsten *et al.* (2003) smaller rural and urban households are also more likely to never be poor. Household formation is also controlled for in each of the studies. In Jalan and Ravallion (2000), households with an adult couple with three or more children have significantly higher levels of chronic poverty, although the higher the proportion of children in the age categories 12-14 years and 15-17 years, the lower chronic poverty. This is a contrasting result to the one found by Haddad and Ahmed (2003), who report that households that have more members below the age of 15 experience significantly more chronic poverty. The dependency ratio that Bigsten *et al.* (2003) use echoes this result for Ethiopian households: a higher household dependency ratio, for both urban and rural households, is significantly associated with a higher likelihood of being chronically poor and a lower likelihood of never being poor. Kedir and McKay (2003) also find that it is the number of males and females between the ages of 15 and 55 (or in other words economically active persons) that reduce the probability of being chronically poor by a significant margin.

Jalan and Ravallion (2000), Bigsten *et al.* (2003) (for rural households), and Haddad and Ahmed (2003), all control for the households' ownership of arable land, while Jalan and Ravallion (2000) go a step further, controlling for mean grain yield and yield variation. As expected, in all of the studies, cultivated land is significantly related to chronic poverty, with access to farming land reducing chronic poverty significantly (or the likelihood of being chronically poor). The mean grain yield and yield variation are also significant. Higher mean yields and less yield variation both significantly reduce chronic poverty. Haddad and Ahmed (2003) also control for the value of livestock that the household owns, and finds that the higher the value, the less the household's chronic poverty. Similarly, Bigsten *et al.* (2003) control for the number of oxen that rural households own, and find two significant relationships: the greater the number of oxen, the less likely the household is to be chronically poor, and the more likely it is to never be poor.

Ethnicity (and religion) is only controlled for by Kedir and McKay (2003), who find that the Tigre are significantly less likely to be chronically poor. Finally, spatial controls are used in every study. In Haddad and Ahmed (2003), urban/rural status is controlled for, although it is found to be insignificantly related to chronic poverty. Kedir and McKay (2003) control for region (central or south) and also find that variable insignificant in determining chronic poverty status. Jalan and Ravallion (2000), however, control for topography (indicators for the features: plains, coast, and mountains), politics (indicators for revolutionary base area, border area, and minority area), and province, with all three spatial effects showing significance in one way or another. Households from the Guangdong and Yunnan provinces experience significantly less chronic poverty (than those in Guangxi), as do households in mountainous areas, while households in revolutionary base areas experience significantly more chronic poverty. Bigsten *et al.* (2003) find that urban and rural households in the northern region of Ethiopia are significantly less likely to be chronically poor, while urban households are significantly more likely to never be poor. For rural households, the market ratio (ratio of population of the city containing the nearest market divided by the distance to that market) is also significant: the higher the ratio, the less likely the household is to be chronically poor, and the more likely it is to never be poor. For urban households, being in the regional capital city is also significant: households in these cities are more likely to be chronically poor, and less likely to never be poor.

Booysen (2004) analyses chronic poverty and mobility in a three period panel data set for a sample of 328 households from the Free State Province of South Africa. The dependent variable used to find the determinants of chronic poverty is chronic poverty status (a dichotomous variable with a "1" if the household was poor in all three waves of the survey, and "0" otherwise), exactly the same as that used by Kedir and McKay (2003).

Table 2.8. Summary of empirical studies on determinants of chronic poverty, including social capital

Author(s)	Booysen (2004)
Data format	Panel
Country	South Africa
Year(s) of data	2001, 2002
Unit of analysis	H
Sample size	328
Estimation technique	OLS, probit
Dependent variable(s)	Indicator: poor in all periods
Independent Variables	
Spatial effects	U/R
Age (and its square)	HH (HH)
Gender	HH**
Household size	H
Household composition	H
Education	H
Asset ownership	H**
Employment	H
Base income	H**
Structural social capital	H
Mortality	H**
Morbidity	H**
Spatial effects	Urban/rural

Notes: In the table, 'H' stands for 'Household', and 'HH' for 'Household Head'

The regressors used in the estimation of chronic poverty are similar to those mentioned by McKay and Lawson (2003). Base income is controlled for by base year logarithm of real adult equivalent *per capita* income. Human capital is controlled for by using the variables number of children in the household, number of adults, number of elderly, the total number of years of education in the household, the changes of these four variables between waves I and III, and the age of the household head and its square. Segmentation is represented by a dichotomous variable coded as "1" if the household head is a female and "0" otherwise, and place of residence (urban or rural). Physical capital is measured with a dichotomous variable coded as "1" if the household owns their dwelling and "0" otherwise, by the number of assets owned by the household, and by the change in the number of assets between waves I and III of the survey. The numbers of employed and unemployed persons in the household, as well as the changes in these variables between the first and last waves, are used to control for labour market influences on chronic poverty. Social capital is controlled for by the addition of a variable measuring whether or not the household asked for and received help from friends or family. Finally, health-related measures were included in the study to determine the impact of HIV/AIDS on chronic poverty. These were affected status (a dichotomous variable with a "1" indicating the household contained members with HIV/AIDS and "0" otherwise), the number of ill persons in the household,

the number of deaths in the household, the number of orphans in the household, and the changes in the levels of the latter three variables between waves I and III of the survey.

The function of base income is significant in the regression, with higher levels of base income leading to a significantly smaller likelihood of being chronically poor, as is the case for assets owned, and losses of assets between waves I and III of the survey. Female headed households are also significantly more likely to be chronically poor Social capital is not significant in the regression, but the health variables are shown to be important. HIV/AIDS affected status is significantly positively related to chronic poverty status, i.e. affected household are more likely to be chronically poor. Similarly, the number of ill persons and the number of deaths in the household, as well as changes in these over time are also significantly and positively associated with the probability of chronic poverty.

In summary, we see again that the dependent measure, this time chronic poverty, is regressed on similar household and community characteristics, with or without social capital (and health or morbidity/mortality) in the model. Unfortunately, however, with the lack of literature available on how chronic poverty can be influenced by social capital and household health, this paper cannot conclude with certainty that social capital and health do or do not add to the explanation of chronic poverty. What we have uncovered, however, is that certain determinants, as in the case of household welfare, appear over and over again in the literature. These include the household head's age and gender, the human capital in the household, the household's composition and size, the household (and head's) economic activity, agricultural assets (for rural households), and wealth in other assets. Morbidity and social capital should be added to these determinants in models explaining chronic poverty, in order to properly assess their separate influence on whether or not households stay poor over long periods of time.

3.4. Determinants of self-rated health

From the studies represented in the Table 2.9, there are several things one can note. *Firstly*, age is used as a control variable in every study that was examined, and in each case (besides maybe those that did not report significance of controls) it is significantly associated with self-rated health. In every case, the direction of the association is the same: older individuals as expected tend to report significantly worse self-rated health.

Table 2.9. Summary of empirical studies of determinants of self-rated health

Author(s)	Balabanova and McKee (2002)		Daniilidou *et al*. (2003)	Gilbert and Soskolne (2003)	Lahelma *et al*. (2004)		Arendt (2005)		Laaksonen *et al.* (2005)		Park (2005)		Wu and Schimmele (2005)
Data format	CS		CS	CS	CS		Panel		CS		CS with lags		CS
Country	Bulgaria		Greece	South Africa	Finland		Denmark		Finland		Korea		Canada
Year(s) of data	1997		2001	1997	2000, 2001		1990, 1995		2000-2002		1999, 2001		1996-1997
Unit of analysis	I (adults)		I (adults)	I	I (adult workers)		I (adult workers)		I (adult workers)		I (adults)		I (adults)
Sample size	661 men	886 women	1819	2947	1252 men	4991 women	1710 men	1548 women	1799 men	7171 women	4251 men	4479 women	67858
Estimation technique	Logit	Logit	OLS	Logit	Logit	Logit	RE ordered Logit	RE ordered Logit	Logit	Logit	OLS	OLS	Cumulative Logit
Independent Variables													
Year							I*	I*					
Age (Square of Age)	I**	I**	I**	I**	I?	I?	I***	I***	I?	I?	I*** (I**)	I*** (I***)	I*** (I*)
Gender			I**	I**									I***
Ethicity/Race													I***
Education (Parents' education)	I**	I**	I**	I**	I**	I**	I**	I**	I** (I)	I** (I)	I***	I***	I***
Income	H	H**	I**	H	H**	H**			H	H	H***	H***	H***
Wealth/Assets									I**	I**	I***	I**	
Current economic difficulties/financial situation	I**	I**							I**	I**			
Childhood economic difficulties									I	I**			
Employment/Economic activity/Occupational class				I	I**	I**			I	I**			
Household Size											H	H*	
Living conditions				H									
Marital status	I	I									I	I**	I***
Household composition				H	H?	H?							
Social status/class				I									
Immigrant													I
Health considerations			I										I***
Religious belief	I	I**											
Location	U/R	U/R											U/R

Notes: 1. The dependent variable in these studies is binary with '1' indicating fair or worse self-rated health, and '0' indicating better than fair health.
2. In the table 'CS' stands for Cross Section', 'I' for 'Individual', 'H' for 'Household', and 'U/R' for urban or rural residence.

Table 2.9. Summary of empirical studies of determinants of self-rated health (continued)

Author(s)	Lopez (2004)	Cummins *et al.* (2005)	Subramanian *et al.* (2005)
Data format	CS	CS	CS
Country	USA	Endland and Scotland	USA
Year(s) of data	2000	1994-1999	2000
Unit of analysis	I (adults)	I (adults), census wards & postal code areas	I (adults), M
Sample size	108661	13899, 178 & 81	51316, 207
Estimation technique	Logit	Logit	Logit with second order PQL
Independent Variables			
Age	I**	I**	I**
Gender	I	I	I
Ethnicity/Race	I**		I
Education	I**		I**
Income	H**		H**
Employment/Economic activity		I**	
Marital status			I**
Social status/class		I**	
Population size			M
Population poverty			M**
Racial segregation			M**
Quality of residential environment		C**	
Public recreation		C	
Crime		C	
Access to markets and banks		C	
Access to health services		C	
Political climate		C**	
Political engagement		C**	
Unemployment		C**	
Access/use of transport		C**	
Inequality	M**		
Population pc income	M		

Notes: 1. The dependent variable in these studies is binary with '1' indicating fair or worse self-rated health, and '0' indicating better than fair health.
2. In the table 'CS' stands for Cross Section', 'I' for 'Individual', 'H' for 'Household', 'U/R' for urban or rural residence, 'C' for 'Community', and 'M' for 'Metropolitan area'
3. A '?' indicates that the study does not report the significance of the coefficient.

Secondly, gender is also very important in explaining self-rated health. Where gender is not used to split the analysis into two, it is significant, apart from the papers by Lopez (2004) and Subramanian *et al.* (2005). In Gilbert and Soskolne (2003), and Daniilidou (2003), women report significantly worse self-rated health, which is what is generally perceived to be the trend (Curtis and Lawson, 2000). According to Curtis and Lawson (2000: 366) women are more likely to report psycho-social illness (minor mental health problems,

stress and health problems relating to social relationships), and so, because self-rated health incorporates aspects of both psychological and physical health, women are more often likely to report worse self-rated health. Wu and Schimmile (2005), on the other hand, find that women in Canada report better self-rated health than men.

Thirdly, education is used extensively in the literature (in every paper besides that by Cummins *et al.* (2005)), and throughout it is found to be significant and positively related to self-rated health. This means that individuals with higher education consistently report significantly better self-rated health. In fact, Arendt (2005) uses panel data to determine causality, and finds that better education causes better self-rated health. Laaksonen *et al.* (2005) even go so far as to use parental education as an explanatory variable, although it is found to be insignificantly related to self-rated health. One explanation for the fact that better educated individuals report better health may be that the better educated are more aware of their health status. Not only should they be aware of healthier practices, but they are also aware of how fortunate they may be in their current state of health. The latter may be influencing these individuals' responses on their health statuses, adding an upward bias (a bias towards better self-rated health).

Fourthly, economic variables are used throughout the literature in investigating differences in self-rated health, including:

- individual income (in Daniilidou (2003)),
- household income (unadjusted, except in Lopez (2004), where it is adjusted for household size, and Subramanian *et al.* (2005), where it is adjusted for household size and composition),
- liquid asset ownership [12] (in Park (2005)),
- home ownership (in Park (2005) and Laaksonen *et al.* (2005)),
- real estate ownership (in Park (2005)), and
- self-assessed financial status (on a four-point scale in Balabanova and McKee (2002), and a binary variable indicating income adequacy in Wu and Schimmile (2005)).

[12] Liquid assets in this case are liquid financial assets consisting of bank accounts, stocks, saving insurance, or money lent to others.

In Lahelma *et al.* (2004), Park (2005), Subramanian *et al.* (2005), and Wu and Schimmele (2005), and for men in Balabanova and McKee (2002), household income is significantly positively related to self-rated health, meaning that individuals in higher income households generally report better self-rated health. In Daniilidou (2003), the same result persists, although this time it is individual income that is positively and significantly related to self-rated health. In two of the three cases where household income is insignificant in explaining differences in self-rated health, other economic variables that are controlled for are significant. In Balabanova and McKee (2002), for example, self-assessed financial situation is included in the model, and is significant and positively related to self-rated health, meaning that a better self-reported financial situation is associated with better self-reported health. A binary variable is included in the analysis by Wu and Schimmile (2005) to indicate whether or not the respondent thinks their income is adequate. This variable is found to be significantly related to self-rated health, with individuals reporting adequate income generally also reporting better self-rated health. In Laaksonen *et al.* (2005), home ownership is controlled for, and is found to be significantly related to self-rated health, with home owners reporting better health. In this same study the authors also control for incidence of childhood economic difficulties, as well as current economic difficulties. Childhood economic difficulties are significantly related to self-rated health for women, with those who experienced difficulties reporting worse health. Similarly, for both men and women, those who report having current economic difficulties report significantly worse health as well. Park (2005) likewise found, albeit only weakly, that home ownership and real estate ownership to be significantly and positively related to self-rated, and then only for women (meaning that women home owners or real estate owner report significantly better health than women without home ownership or real estate. The addition of these non-income economic status variables may explain why, in the two studies by Balabanova and McKee (2002) and Laaksonen *et al.* (2005), household income is not significant in explaining differences in self-rated health.

The remainder of the independent variables displayed in the table appear only occasionally in the literature, and while some are very important in explaining self-rated health, it seems that others are not as important. The square of age is used by both Park (2005) and Wu and Schimmile (2005). In both cases the variable is significantly related to self-rated health. In Park (2005), for men the relationship is negative, as it is in Wu and Schimmile (2005). Taking into consideration that in both papers the sign on the coefficient of age is also

negative, this would mean that health decreases at an accelerating rate as age increases for men in Korea, and individuals in Japan. As for women in Park's (2005) study, the square of age is significantly positively related to self-rated health, meaning that for women in Korea, self-rated health declines with age at a decelerating rate.

Ethnicity or race is used only in the studies by Lopez (2004), Subramanian *et al.* (2005), and Wu and Schimmile (2005). Lopez (2004) finds that Black individuals report significantly worse self-rated health than Whites. Wu and Schimmile (2005) find that Black, French, and English Canadiens had significantly higher-than-sample-average self-rated health, while Aboriginal Canadians had significantly lower-than-sample-average self-rated health.[13] Subramanian *et al.* (2005) find that the variable indicating race (White or Black) is insignificant. The authors also include metropolitan area-level indices and interaction terms measuring forms of racial segregation. One segregation index, their 'Black isolation index', "which measures the extent to which a member of a racial/ethnic group is likely to be in contact with members of this same ethnic group (as opposed to members of other ethnic groups)" (Subramanian *et al.*, 2005: 1670), is significantly related to self-rated health. Thus, the more segregated a metropolitan area, the worse the self-reported health in that area.

Employment status is used by Gilbert and Soskolne (2003), and is found to be insignificantly related to self-rated health. It is also used by Cummins *et al.* (2005), who find that unemployed and retired individuals report significantly worse self-rated health than the employed. Occupational class is used by Lahelma *et al.* (2004) and Laaksonen *et al.* (2005), and is significantly related to self-rated health for women in both papers, and for men in Lahelma *et al* (2004). In each case, a higher rank of occupational class is associated with better self-rated health. Social status or social class is used as a control by Cummins *et al.* (2005), who find that higher social classes report significantly better health. Gilbert and Soskolne (2003), though, find social class to be insignificantly related to self-rated health.

Gilbert and Soskolne (2003) also include housing type (council housing, private sector housing, informal settlements, backyard shacks/formal backyard rooms, hostels, or site-

[13] In Wu and Schimmile (2005) insignificant racial relationships with self-rated health exist for the Canadians residents that are East and Southeast Asian, Chinese, South Asian, Arabic and West Asian, Latin American, Jewish, mixed race, and other Whites.

and-service schemes) and basic living conditions (a binary variable indicating a '1' if the respondent has a separate kitchen and/or bathroom and/or flush toilet inside the house, or '0' otherwise) as regressors. Both are found to be insignificantly related to self-rated health.

Marital status is used in four of the studies as an explanatory variable. Wu and Schimmile (2005) and Subramanian *et al.* (2005) find that that married individuals report significantly better health than divorcees or single individuals. Park (2005) also finds that, for women, being married is significantly associated with self-rated health, in that married women report better self-rated health than unmarried women. Household size is only used by Park (2005), and is found to be only weakly significant and positively related to self-rated health among women. This means that women in larger households tend to report better self-rated health. Gilbert and Soskolne (2003) use household formation (unmarried, nuclear family of one or two generations, three generations, single mother, or single father) as an explanatory variable. The variable, however, is found to be insignificant in explaining differences in self-rated health. In Lahelma *et al.* (2004), household formation is used as a control variable, although it's significance in explaining self-rated health is not reported by the authors.

The only study to control for both hospital and non-hospital insurance is that by Daniilidou (2003). Both variables are found to be insignificantly associated with self-rated health. Balabanova and McKee (2002) use religious belief status (a yes/no variable) as a regressor of self-rated health, and they find it only significant among women, where those with religious belief report significantly better self-rated health. Urban/rural classification of the household is also used by these authors, as well as by Wu and Schimmele (2005). Neither of these papers find the variable significantly related to self-rated health. Wu and Schimmile (2005) also try to capture differences in self-rated health among immigrants, yet immigrant status is also found to be insignificant. Additionally these authors include functional health considerations as explanatory variables in their analysis of self-rated health. These considerations include physical inactivity, obesity (being overweight), alcoholism, and smoking. The authors find that all of these variables are significantly associated with self-rated health, with individuals reporting any of these health problems or behaviours reporting worse self-rated health.

Other neighbourhood- and metropolitan area-level variables are included by Cummins *et al.* (2005), Lopez (2004), and Subramanian *et al.* (2005). Lopez (2004) includes metropolitan area-level inequality (GINI) measures, as well as the areas' population *per capita* income. The author finds that only inequality is significantly related to self-rated health, with residents of less equitable areas reporting worse self-rated health. Subramanian *et al.* (2005) include metropolitan area population size and poverty, in addition to the previously mentioned racial segregation indices and interaction variables. They find that population poverty is important, with areas having a higher proportion of poor residents being the areas reporting significantly worse self-rated health. Cummins *et al.* (2005) add a variety of neighbourhood-level variables to their analysis of self-rated health, including the physical quality of the residential environment, public recreation, crime, access to multiple owned food shops, access to banks and building societies, health services, left wing political climate, political engagement, unemployment, access to private transport, and transport wealth (value/prestige cars). The authors find that areas that have lower quality of physical environment, less of a left wing political climate, less political engagement, higher unemployment, less access to private transport, and lower transport wealth all have individuals reporting significantly worse health.

To study self-reported health and self-reported psychological health, Lindström (2004) makes use of data for 13604 individuals taken from a postal questionnaire issued to individuals in Scania, Sweden, in 2002 (See Table 2.10 below). Included in his analysis of self-reported health are the different combinations of the two-category variables for social participation and social trust. Social participation was considered low if the respondent only took part in three of a set of 13 mentioned social activities (study circle/course at workplace, other study circle/course, union meeting, meeting of other organizations, theatre/cinema, arts exhibition, church, sports event, letter to the editor of a newspaper/journal, demonstration, nightclub/entertainment, large gathering relatives, and private party), and high otherwise. Social trust was coded as being low if the individual responded to the statement, "Generally, you can trust other people" with "Do not agree at all" or "Do not agree", and was coded as high if the respondent chose one of the other two alternatives "Agree" or "Completely agree". A seven-category self-reported health is used for the dependent variable, but dichotomized, with the worst three alternatives being grouped together as 'bad' health, and the best four alternatives grouped together as 'good'

health. Lindström (2004) splits his analysis by gender, and calculates the odds ratios of reporting bad general health for individuals with different combinations of high and low social participation and social trust. The author finds that low trust and low participation both increase the odds of reporting bad health (for both men and women) after controlling for age, country of origin, and education. In particular, individuals with high social participation and high social trust report the best health levels, followed by those with low social participation and high trust, individuals with high social participation and low trust, and finally those with low social participation and trust, who reported the worst self-rated health. The significance of the controls are not reported by the authors.

Gilbert and Soskolne (2003) analyze the determinants of self-reported health in a sample of self-declared heads of household of 2947 households in Soweto, South Africa. In a separate regression to the one included in Table 2.10, the independent variable 'access to social resources' is included in their model. This measure includes survey responses about access to a bookshop and/or a library, having knowledge of the Bill of Rights, and of Community Policing. At the time of the survey, these variables would have been a good indicator of peoples' ability to gain access to social resources in Soweto. The variable was split into three categories: no access (having none of the four social resources), limited access (having only one or two of the four social resources), and good access (having three or all four of the social resources). Also included in the study is a variable expressing perception of quality of living. Perception of quality of living was divided into a positive perception (Soweto is a pleasant place to live, and/or the respondent would recommend it to family and friends, and a lack of exposure to crime) and a negative one (every other combination). Self-rated health is grouped into the categories 'good', 'fair' and 'bad' and a two-stage set of logistic regressions are run on the 'bad' category (to determine the odds of reporting 'bad' health for the given variables). In this regression, controlling for age, gender, and education, perception of quality of living and access to social resources are entered into the model. All the variables are significant, with older, less educated, and/or female respondents showing higher odds of reporting bad health, as well as respondents with low perceptions of quality of living and those with low or no access to social resources.

Table 2.10. Summary of empirical studies of determinants of self-rated health, including social capital

Author(s)	Rose (2000)		Gilbert and Soskolne (2002)	Bolin et al. (2003)	Wen et al. (2003)	Lindstrom et al. (2004)		Rohrer *et al.* (2004)	Veenstra (2005)
Data format	CS		CS	CS with lags	CS with lags	CS		CS	CS with lags
Country	Russia		South Africa	Sweden	USA	Sweden		USA	Canada
Year(s) of data	1998		1997	1980-1981, 1988-1989, 1996-1997	1990-1999	1999-2000		2002	2002
Unit of analysis	I (men)		I (HH)	I	I, C	I		I	I, C
Sample size	1904		2947	3800	3459, 275	6715 men	6889 women	621	1435, 25
Estimation technique	OLS		Logit	Ordinal probit	Hierarchical ordinal logit	Logit	Logit	Logit	Linear & non-linear regressions
Dependent Variable(s)	Physical SRH	Emotional SRH	SRH	SRH	SRH	SRH	SRH	SRH	SRH
Independent Variables									
Year of interview					Yes				
Age	I**	I**	I**	I**	I***	I?	I?	I**	I***
Gender	I**	I**	I**	I*	I				I
Ethnicity/Race					I			I**	
Country of origin						Yes?	Yes?		Yes
Education	I	I**	I**	I**	I***, C***	I?	I?	I**	I***
Income/Wage	H**	H**		I*	I ***				H***
Wealth/Assets				I*	C				C
Consumption concerns								I**	
Marital status				I**	I				
Household composition				H				H	
Social status	I	I**							
Structural SC	I**	I**	I**	I**	C**	I**	I**	I**	I,C
Cognitive SC	I**	I**	I**		C**	I**	I**		I**,C
Health considerations	I	I		I**	I***,C			I**	
Crime					C			I**	
Public space									C
Physical environment					C**				
Inequality					C				C

Notes: 1. The dependent variable in these studies is binary with '1' indicating fair or worse self-rated health, and '0' indicating better than fair health.
2. In the table 'CS' stands for Cross Section', 'SRH' for 'Self-Rated Health', 'I' for 'Individual', 'H' for 'Household', 'HH' for Household Head, and 'C' for 'Community'.
3. A '?' indicates that the study does not report the significance of the coefficient.

Rose (2000) uses the 1998 New Russia Barometer VII survey of 1904 Russians aged 18 or older, to show that various social capital measures influence both physical and emotional self-rated health. Although this paper is concerned only with general or global self-rated health, we must note that general self-rated health includes feelings on both physical and emotional self-rated health, and so, a review of this the study is warranted. Controlling for age, household income, gender, subjective social status, education, smoker status and exercise in a classic OLS multiple regression, Rose (2000) finds that being associated in

market networks, having someone to rely on when ill, believing one has control over one's own life, and having higher general social trust are all significantly associated with better self-rated physical health (as well as higher household income). On the other hand, using friends for information is associated with lower self-rated physical health (as well as being older or female). Using the same controls, Rose (2000) finds that better self-rated emotional health is also associated with market networks, having someone to rely on when ill, believing one has control over one's own life, and having high general social trust (as well as higher household income and better subjective social status) while social exclusion, using informal social networks, and using friends for information are all associated with reporting lower emotional health (along with being older or female, or having higher education, the latter being another surprising result).

Bolin *et al.* (2003) provide a study that estimates a demand-for-health equation from a three-period set of panel data (1980/81, 1988/89, 1996/97) on approximately 3800 Swedish individuals, aged between 16 and 84 years old. This equation is of the form:

$$H_t = aX_t + fS_t + ßH_{t-1} + ?H_{t+1} + u_t$$

where H_t is the desired stock of health capital in period t, u_t is the error term, and X_t and S_t represent variables in the first-order conditions of the family's demand-for-health optimisation problem. S_t is the desired stock of social capital.

The desired stock of health capital is measured by a three-category self-rated health variable (low, medium, and high self-rated health). An ordered probit model on this categorical variable is then estimated. Social capital in the model is measured by a dichotomous variable indicating whether or not the respondent had a close friend outside his or her household ('1' for 'yes'). Other variables controlled for in the demand-for-health model are the respondent's age, wage rate, level of education, income from capital, and dummy variables controlling for cohabitation ('1' if not living alone), marital status ('1' if divorced), household composition ('1' if the respondent has a child), and gender ('1' if the respondent is male).[14] The variables that prove to be significant at the five percent level in explaining differences in self-rated health are past and future values of self-rated health,

[14] Income from capital is used by the authors as a proxy for wealth. Bolin *et al.* (2003) do not provide any explanation as to how 'income from capital' is calculated.

age, education, marital status, and whether or not the respondent had a close friend outside his or her household. At the ten percent level, wage, income from capital and gender are significantly associated with self-rated health. Past and future values of self-rated health, education, social capital, gender (being a male), wage, and income from capital all have positive relationships with self-rated health, while age and the divorce dummy are negatively associated with present levels of self-rated health. This essentially means that high levels of present self-rated health are associated with high levels of past and future self-rated health, as well as younger ages, higher levels of education, more social capital, a higher wage, more income from capital, the absence of divorce, and being male.

Wen *et al.* (2003) analyze determinants of self-rated health using four survey datasets that encompass neighbourhood-level and individual-level data for the Chicago metropolitan area, for various years between 1990 and 2000. The data covers 3459 individuals living in 275 different neighbourhoods. The dependent variable is individual self-rated health taken from 1996, 1997, and 1999 survey data. The regressors are taken from data spanning years prior to these to adhere to the causal nature of the authors' model. In other words, the author uses independent variables measured in time periods prior to the time periods in which the dependent variable is measured, in order to be able to determine how the independent variables cause changes in the dependent variable. This paper provides a multi-level analysis, incorporating individual and neighbourhood characteristics. The neighbourhood variables include affluence, aggregated educational attainment, poverty, and neighbourhood income inequality. Physical environment in the neighbourhood is also represented by a neighbourhood-aggregated measure that encompasses the three-point likert-scale responses on the extent of the problems that individuals living in the neighbourhood have with litter, graffiti, and vacant houses and storefronts. Homicide rate per 10000 population between 1991 and 1993 is also included in the model to measure crime exposure within each neighbourhood. Neighbourhood health service adequacy is measured by a neighbourhood level index of the availability of health-enhancing services. Collective efficacy at the neighbourhood level is included by combining measures of social cohesion and social control into an index. Health-related social cohesion took into account the responses to the statements, "people around here are willing to help their neighbours," "this is a close-knit neighbourhood," "people in this neighbourhood can be trusted," and a negative item, "people in this neighbourhood generally do not get along with each other." Health-related informal social control measured up the responses to the statements, "If I

were sick I could count on my neighbours to shop for groceries for me," and "You can count on adults in this neighbourhood to watch out that children are safe and do not get in trouble," as well as including an informal control item asking respondents how likely it would be that neighbours would break up a fight that started in front of that respondent's house. The collective efficacy index is then combined with a measure for social network density/ reciprocated exchange in the neighbourhood. The latter incorporates measures of respondents' neighbourhood-based friendship networks, as well the frequency of parties, visits, advice-giving, and favour exchange among neighbours. This new index measures the social resources of the neighbourhood. Finally, a neighbourhood-level measure of prior self-rated health is taken from data spanning the period 1992-1994.

The authors then run hierarchical ordinal logit models of self-rated health, first assessing the impacts of neighbourhood affluence, poverty and inequality on individual self-rated health, and then exploring the mechanisms though which affluence impacts on health (by controlling for affluence, poverty and inequality, and adding, at first, physical environment, then health-enhancing services instead, then crime exposure and social resources only, and finally, all four of these measures). The authors find that, when the controls alone are in the model (these being age, interview year, race, gender, being married/cohabiting or not, smoking, high blood pressure, education and individuall income), being older, Black, Latino, a smoker, having lower education, having lower income, or having higher blood pressure are all significantly associated with lower levels of self-rated health. Then, after neighbourhood affluence, poverty, inequality, prior health levels, and aggregated education are included in the estimation, affluence and aggregated education are significant (with higher levels of these associated with higher levels of self-rated health). All the previous significant controls keep their significant relationships with the exception of race, which becomes insignificant. When physical environment, health-enhancing services, crime exposure, and social resources are added to the model, only social resources and physical environment become significant (better levels of these associated with better self-rated health), while affluence loses its significance. Also, a model with these controls and only crime exposure and social resources added also estimates an insignificant neighbourhood affluence effect, while the social resources index remains significant. These last two estimations show that the social resources index explains the effects of neighbourhood affluence. In addition, the full model shows that neighbourhood social resources are more

important for self-rated health than the availability of health-enhancing resources and homicide exposure.

Veenstra (2005) also analyses data in a multi-level framework, combining individual- and community-level variables to explain the variance in general self-rated health of Canadians living on the coast of British Colombia. The study includes 25 communities and 1435 individuals living in these communities, and the data spans the years between 2001 and 2003. Self-rated health is taken from the ratings that individuals give to their health in general. For the individual independent variables, social capital (community and political trust and participation in voluntary organizations) and socio-economic status and demographic controls (year of birth, gender, a dichotomous variable indicating having been born in Canada, household income, and educational attainment) are included in the estimations of self-rated health. Trust in the community is measured by an index formed from the five-point Likert scale answers to two survey questions assessing helpfulness in the community: "People here know they can get help from others if they are in trouble," and, "If there were a serious problem in the community, the people here would get together and solve it." As for political trust, the author creates an index from one survey question regarding the perceived political power of the individual in the community and seven survey questions regarding the perceived trustworthiness of politicians, community leaders, and governments. All of these items are scored on the same five-point Likert scale. Participation in associations is simply measured by the number of different types of voluntary associations that individuals participate in. The community-level independent variables used in this study are the number of public spaces per capita, the number of voluntary organizations per capita, the average levels of community and political trust, median household income, and the proportion of total household income held by the poorest 50% of respondents in each community.

Veenstra (2005) runs a null model, a regression of self-rated health on no explanatory variables at either level, only the intercept. When the random effect of the intercept turns out to be significant, he runs a model with only the community-level variables, and then finally a model including the relevant (significant) community-level variables identified in the previous stage, and all the individual level variables. The author finds that the probability of reporting fair or poor health is significantly higher for older, poorer, or less-well educated individuals, and those with lower levels of community or political trust. No

community-level variables are significant in the model of determinants of self-rated health when individual-level variables are not included in the model.

Rohrer *et al*. (2004) analyze determinants of self-rated health among 621 residents of Amarillo, Texas, in the USA. The authors conduct two regressions of self-rated health, one with all the variables included in the model, and the other with only the significant variables from the first analysis. The latter is the regression reported in Table 2.2. Independent variables in their first analysis (and categories of these variables) include:

- eating five servings of fruits and vegetables per day (yes/no)
- smoking (never or less than 100 cigarettes ever, past, daily, refused to answer)
- days of physical activity per week (one, two, three, four, or five or more)
- body weight (underweight – BMI<20; normal – 20<BMI<25; overweight – 25<BMI<30 ; or obese – BMI>30)
- neighbourhood safety (extremely safe, quite safe, slightly safe, or not at all safe)
- drawing comfort from religious or spiritual faith (yes, no, or no faith)
- participation in organized social groups such as clubs, church, synagogue, or civic organizations (yes/no)
- number of close friends or relatives who could help with emotional problems (three or more, two, one, or zero)
- housing stability (1-6 months, 6-12 months, 1-2 years, two or more years)
- having no children under the age of 18 living at home (yes/no)
- renting rather than owning one's home (yes/no)
- having no concerns about food (yes/no)
- married (yes/no)
- Hispanic (yes/no)
- White (yes/no)
- gender (male/female)
- age group (18-25, 26-35, 56-55, 56-64, 65 and older)
- highest level of education (grades 1-8, grades 9-11, grade 12 or GED, college 1-3 years, college four years or more)

Rohrer *et al.* (2004) find (from their second regression) that smoking daily, being obese, living in a reportedly unsafe neighbourhood, not participating in groups, being older, and having less education are all significantly associated with worse self-rated health. In contrast, being White or Hispanic, or having no food concerns, are all significantly associated with better self-rated health.

Several patterns emerge when looking at the above studies related to self-rated health and social capital, including results very similar to those extracted from the non-social capital self-rated health literature. *Firstly*, age is again almost always found to be significantly related to self-rated health in these studies (the exception is the age cohort variable used by Lindström (2004)), with older men and women more likely to report worse health. *Secondly*, gender again plays an important role, with females reporting significantly worse health in every study except those by Wen *et al.* (2003) and Veenstra (2005), in which the gender variable remains insignificant, and in Rohrer *et al.* (2004) where the gender variable is not entered into the final model due to lack of significance in the first estimation. *Thirdly*, education is significantly and positively related to self-rated health in every study bar the analysis by Rose (2000), where education is insignificant in determining physical self-rated health, and significantly negatively related to emotional self-rated health (higher education is associated with reporting worse emotional health in this case).

Fourthly, individual income and household income (and a few similar wealth-related variables) remain important determinants of self-rated health. Individual income is significantly and positively related to self-rated health in the papers by Wen *et al.* (2003), and Veenstra (2005), while an individual's wage and income from capital is shown to be significantly positively related to self-rated health (Bolin *et al.*, 2003). In addition, household income is significantly positively related to self-rated health in the study by Rose (2000) (for both physical and emotional self-rated health), and having no food concerns is important for better self-rated health, as discovered by Rohrer *et al.* (2004). Wen *et al.* (2003) provide evidence that neighbourhood affluence is also significantly and positively related to self-rated health when social resources are not controlled for in the model predicting self-rated health. Veenstra (2005) however, shows that median household income in a community does not significantly affect individuals' self-rated health.

Fifthly, another control that was mentioned in one or two of the above papers that is worth noting is marital status. Bolin *et al.* (2003) find that divorce is significantly associated with lower levels of self-rated health, although Wen *et al*. (2003) and Rohrer *et al.* (2004) find that marital status is insignificantly related to self-rated health. In terms of household formation, it can be noted that both Bolin *et al*. (2003) and Rohrer *et al.* (2004) find that having children in the household has no significant relationship with self-rated health. *Sixthly*, ethnicity plays a significant role in determining self-rated health in Rohrer *et al*. (2004), but not in Wen *et al*. (2003).

Finally, smoking has an insignificant relationship with both physical and emotional self-rated health in the study by Rose (2000). Yet, Wen *et al.* (2003) find both smoking and high blood pressure significantly negatively related to self-rated health, while in Rohrer *et al*. (2004), to be a heavy smoker and obese are both also significantly related to worse reported health. In Bolin *et al.* (2003), prior and future self-rated health are significantly positively associated with current self-rated health. Community-level prior health status, however, is not significantly related to self-rated health (Wen *et al.*, 2003).

When looking at cognitive social capital as determinants of self-rated health, we find several interesting results. General social trust is found to be significantly positively related to self-rated health (Rose, 2000; Gilbert and Soskolne, 2003; and Veenstra, 2005). Political trust is also significantly positively related to self-rated health in one study (Veenstra, 2005). A neighbourhood-level variable measuring social cohesion and trust is found to be significantly positively related to individuals' self-rated health (Wen *et al.*, 2003).

Moving to structural social capital, participation in voluntary associations alone is found to be significantly positively related to self-rated health by Lindström (2004). Veenstra (2005), on the other hand, finds that participation in voluntary associations is insignificant in the determination of self-rated health. Rose (2000) shows that having market networks and someone to rely on when ill are significantly associated with reporting better physical and emotional self-rated health. The author also shows that using informal networks is significantly negatively related to emotional self-rated health and using friends for information is significantly associated with both worse physical and worse emotional self-rated health levels. The same analysis shows that belonging to formal organizations and attending church are insignificant in the determination of both self-rated physical and

emotional health. Rohrer *et al.* (2004) also show that those individuals who do not participate in groups report significantly worse health. Finally, Gilbert and Soskolne (2003) show that access to social resources is significantly associated with better self-rated health.

From the above discussions it is clearly evident that it is not only demographics and socioeconomic status that determine self-rated health (and thus, health), but also the social life and connectedness (or imbeddedness) of the individual, and even the individual's state of mind. In other words, both structural social capital and cognitive social capital play a role in the determination of self-rated health, along with demographics and socioeconomic status. It must be noted that there is still the possibility of reverse causality between health and welfare, i.e. changes in health causing changes in wealth, since most of the literature reviewed finds associations between self-rated health and other variables, rather than causal direction. This means that this thesis should be wary of endogeneity in its own analyses, and should take appropriate measures to confirm it presence, or to rule it out.

3.5. Determinants of social capital

In this subsection of the literature review, the determinants of behavioural, or network social capital are reviewed. One of the most commonly used determinants of network social capital, trust, is discussed in depth. In addition to trust, however, several authors have used other measures as determinants of network social capital. A few of these studies are, therefore, included in the discussion.

3.5.1. The trust-network relationship

It's hypothesized that voluntary associations and trust are linked positively, and that a reciprocal relationship exists between the two. At the macro-level, the 1999-2000 wave of the European Values Survey shows that there is a positive association between interpersonal trust and voluntary associations in 28 of the 32 participating countries (Anheier and Kendall, 2002).[15] Where social or political order is questioned the

[15] The EVS covers Britain, France Germany, Austria, Italy, Spain, the Netherlands, Belgium, Denmark, Sweden, Iceland, Northern Ireland, Ireland, Estonia, Latvia, Lithuania, Poland, Czech Republic, Slovakia, Hungary, Romania, Bulgaria, Croatia, Greece, Russia, Malta, Luxembourg, Slovenia, Ukraine, Belarus, and the USA (Anheier and Kendall, 2002). Romania, Russia, Ukraine, and Belarus are the countries where the

relationship breaks down, as was the case for Nigeria, Brazil, and Bosnia in the World Values Survey for 1995-1997 (Anheier and Kendall, 2002). Nigeria was under dictatorship at the time, Brazil was rife with social inequities and exclusion, and Bosnia was suffering from ethnic strife and the beginnings of a civil war. Freitag (2003) uses data from the World Values Surveys for 1995-96 for Switzerland and Japan, and shows that economic and cultural associational activism in Japan is significantly and positively associated with social trust.

Various authors have investigated how trust affects networks. Uslaner and Conley (2003) show that among Chinese in Southern California, those who are particularized trusters withdraw from wider civic participation (and involve themselves only in closed associations), versus those who are generalized trusters, who participate to a greater degree in American community. [16]

This result contradicts the hypothesis put forward by Anheier and Kendall (2002) and Newton (2004), namely, that voluntary associations may be second-order trust generators. This means that family and friends instill a trusting (or distrusting) attitude in a person, and this leads to joining (or not joining) voluntary associations, which would build on the trust that the member already has. In this case more thick trust leads a person to join in bridging associations, or a lack of thick trust causes them to refrain from joining these associations.

Narayan and Pritchett (1997), as mentioned above elsewhere, show that trust influences social capital. In two regression estimations in the paper, one each for households and villages, household and village level social capital respectively are instrumented by a variety of interpersonal and political trust variables. [17] 'Trust in strangers' is thought by the authors to be the most plausibly exogenous instrument *a priori*. At the village level, instrumented social capital is stronger in magnitude and significance, than the social capital coefficient before instrumental variable estimation. However, for the instrument set to be accepted statistically at the household level, the 'trust in strangers' instrument is dropped

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positive association between interpersonal trust and membership in voluntary organizations is weak or non-existant.

[16] 'Particularized', or 'thick' trust is trust that is formed between friends and family, whereas 'generalized' or 'thin' trust is trust of strangers.

[17] These variables include measures of trust in strangers, tribesman, cell leader, village chairman (government), district officials, and central government.

from the model. The instrumented social capital coefficient is then larger in magnitude, but lower in significance, than it is without the instruments. This is because the authors expect trust in strangers to be the trust least likely to be affected by household income or memberships. Trust in strangers is often also used as an important measure of, or a part of, general (social) trust (for example in Freitag (2003)). A similar instrumental variable analysis is performed by Grootaert *et al.* (2002). In one model, network social capital is instrumented by household trust, length of residency in the village, and trends in memberships in associations. The instruments are tested and reported to be valid. In other words, household trust in both papers is found to be an important condition for the creation of network social capital.

The effects of networks on trust have also been investigated in a number of studies. At the individual level, Veenstra (2002) tests the effect that voluntary association memberships has on various forms of trust, namely interpersonal trust, trust in experts, and political trust, using data from a survey of individuals in Saskatchewan, Canada. The author finds that networks affect trust, but more particularly, that different aspects of trust are better generated by different types of groups. For example, he shows that social trust is fostered by religious-oriented and cooperative groups.

Claibourn and Martin (2000) test the hypothesized reciprocal positive relationship between generalized trust and voluntary association memberships, using a three period panel data set of United States high school students and their parents. The data was collected in 1965, 1973, and 1982. The authors find that generalized trust does not influence the number of voluntary associations that an individual joins, and that the effect that joining associations has on generalized trust is relatively short-lived, if anything, and specific to particular cohorts or age-groups. This means that only certain age cohorts experienced the effect that joining associations can have on trust, and when experienced, the effect did not extend very far into the future.

Using data from the General Social Surveys of 1972-94, Brehm and Rahn (1997) show that civic participation (in the form of a score for voluntary association memberships) explains trust better than trust explains civic participation.

Herreros (2004) hypothesizes and shows that, using the Barometer of Andalusian Public Opinion of 2000, particularized trust is created as a by-product of membership in horizontal-type associations. He goes on to show that social or generalized trust can also be formed as a by-product of participation in associations. Using the Andalusian data, he shows that social trust is especially fostered in political organizations, where deliberation towards the common good is continuously repeated. Most importantly for this paper, however, Herreros (2004) shows that the width of membership in associations affects the amount of social trust gained by adding more memberships. The marginal benefit, in terms of social trust, of joining an extra association decreases as the number of associations increase, until a point where a person can start to trust less due to the fact that they have so many networks to fall back onto. This substitution effect will be revisited later in this paper.

Yet, several studies challenge the strength or existence of any link between trust and voluntary association memberships. Newton (2001) suggests that there if there is a simple positive relationship between trust (in aggregate) and membership in voluntary associations (in aggregate), it is weak. The author writes that different kinds of people show different types of trust for differing reasons, and that these differing trust types may be associated with memberships in different ways. Many relationships between types of trust and kinds of memberships may exist. Meanwhile, Freitag (2003) provides evidence against the hypothesis that active membership in voluntary organizations fosters social trust in Switzerland and Japan. Although he finds that economic and cultural group activism fosters trust in Japan, the evidence he provides also suggests that it is other factors, such as age, gender, institutional confidence, a cosmopolitan culture[18], and less daily television viewing, rather than group activism, that better foster social trust in Switzerland and Japan.

3.5.2. Determinants of social capital other than trust

La Ferrara (2002) analyzes the determinants of participation in formal organizations among rural Tanzanian individuals (usually heads of households), with a particular focus on the effects of village-level inequality in assets. The author regresses the binary indicator of participation on the regressors given in Table 2.9 in a cross-sectional probit estimation, and

[18] This item is a composite of pride in nationality, and the region that the respondent identifies with most strongly.

then tests the endogeneity that may be present between the village level inequality measure and the participation measure. The method used to test this problem is two-stage least squares estimation, and, once instrumenting the village-level inequality with several additional variables, these instruments are found to be valid. The instruments include average precipitation in critical months, rainfall variability, average temperature, temperature variability, and the median distances of village households to the nearest markets for livestock and farm products. With the valid instruments, endogeniety is proved to not be present, and the coefficient of village inequality stays relatively similar to the coefficient for the variable in the basic probit estimation.

In the basic, non-two-stage regressions, the author finds that education and individual and village wealth (in assets) have a positive impact on whether or not the individual will be a member of a group, whereas inequality and the log of the village population have a negative impact. Their most important result is this negative impact of the village-level GINI coefficient: the higher the inequality is in the village, the less likely individuals are to participate in groups.

In addition to these regressions, La Ferrara (2002) also estimates the models for the poor and the non-poor. Poverty is determined in three ways: relative poverty, subjective, or self-assessed poverty, and subjective overestimate. The latter is poverty reported by households compared with how poor the village believes the household to be. The author finds that increasing inequality among the groups (poor or non-poor) only decreases participation for the non-poor. This is because the richest of the non-poor stand less and less to gain after being pushed further and further up in the wealth distribution (a consequence of greater inequality).

La Ferrara (2002: 264) also finds that "[h]aving an accurate measure of the skewedness of the income distribution seems to matter to understand the differential impact of inequality on participation by the rich and the poor", in particular, when separating groups into two types: restricted access (anyone can join provided the fees to join can be paid) and open access (the group can decide whether or not to include a new member). When there is inequality at the bottom half of the distribution, participation in open access groups is affected (decreased), whereas when there is inequality at the top half of the distribution, participation in restricted access is affected (increased).

Table 2.11. Summary of empirical studies on determinants of social capital

Author(s)	La Ferrara (2002)	Lindström *et al.* (2002)	Bolin et al. (2003)
Data format	CS	CSCS	CS with lags
Country	Tanzania	Sweden	Sweden
Year(s) of data	1993, 1995.	1994-1996	1980-1981, 1988-1989, 1996-1997
Unit of analysis	H	I (46 – 68 yrs old)	I
Sample size	1376	13335	3800
Estimation technique	Probit, 2SLS	Logit	Probit
Dependent variable(s)	Indicator: participation in groups	Indicator: low social participation	Indicator: friend outside household
Independent Variables			
Social capital			Past** and future**
Country of origin		I**	
Age	I	I**	I**
Gender	I*	I**	I**
H size	H		
Household composition			H*
Education	I*, V	I[19]**	I
Employment/Activity	V	I**	I
Wealth	I*, V**		I
Income			I
Health considerations		I**	
Marriage/Divorce			I
Cohabitation		I**	I*
Inequality	V**		
Population	V*		
Fragmentation	V		

Notes: In the table, 'I' stands for 'Individual', 'H' for 'Household', and 'V' for 'Village'

Finally, La Ferrara (2002) shows how income inequality in a village affects different aspects of different group types.[20] Important for this paper is that if there is greater inequality in a village, the members of burial societies and religious groups are more likely to all be poor.

Lindström *et al.* (2002) analyse social capital, in particular low social participation, among middle-aged and older Swedish adults. Social participation is considered low if the respondent only took part in three of a set of 13 mentioned social activities (study circle/course at workplace, other study circle/course, union meeting, meeting of other organizations, theatre/cinema, arts exhibition, church, sports event, letter to the editor of a newspaper/journal, demonstration, nightclub/entertainment, large gathering relatives, and private party), and high otherwise. The social participation variable is thus simply a binary

[19] In this analysis Occupational status or education are entered into the logit model. Only one of the measures is used at a time, since they are highly correlated.

[20] These aspects of groups include for example, members all being poor, or members being from mixed wealth levels. The group types include religious, political, burial societies, women's, farmers', and other financial groups, as well as open access versus restricted access group types.

indicator. The focus of the authors' study is to determine neighbourhood-level determinants of low social participation.

Controlling for age, gender, country of origin, education or occupational status, (both of these measures do not appear in the same model estimation) unemployment, living alone, sick leave and disability pension, the authors find that very little of the variance left over in low social participation is explained at the neighbourhood level. Rather, they find that low social participation is higher for individuals with lower education, less skilled work, older ages, those who are living alone, males, the unemployed, and those on sick leave or with receiving disability pension. The strongest determinants in this regression are the occupational status, or the education level.

Bolin *et al.* (2003) investigate the role of wealth in explaining differences in social capital, also among Swedish individuals. Their objective in this case is to estimate a probit demand-for-social capital model of the form:

$$S_t = a_s X_{st} + ß_s S_{t-1} + ?_s S_{t+1} + u_{st}$$

where S_t is the desired stock of social capital in period t, u_{st} is the error term and X_{st} represents variables in the first-order conditions of the family's demand-for-social capital optimisation problem.

Social capital in this model is simply measured again by a dummy variable indicating whether or not the respondent had a close friend outside his or her household. This may be considered inadequate as a measure of social capital when assessing social capital measures theoretically via Putnam's (2003) definition. The reason is that Bolin *et al.*'s (2003) measure lacks an indication of formal social networks, social trust and social norms. At most, their social capital measure may be regarded as a proxy for informal networks.

The variables used in explaining social capital include the respondent's past and future social capital, age, wage rate, average number of hours worked per week, level of education, income from capital, and dummy variables for cohabitation, marital status, presence of children, and gender. Variables that prove significant are past and future values of social capital (positive relationship with present social capital), gender (females having

more social capital), and age (inverse relationship with present social capital). Important to this research is the fact that in this study the wealth variables (wage rate and income from capital) do not significantly explain the present level of social capital, in other words, it was found that there is no significant relationship between social capital and wealth in Sweden.

In summary, it can be seen that social participation is determined by a variety of characteristics, the most noteworthy being individual characteristics such as gender, age, education, occupational status, marital status, and wealth. However it is also thought that neighbourhood or village level characteristics also effect the social participation of individuals, simply because of the nature of social capital – it is a social phenomenon regarding, among other things, the formation of networks in a community.

III: METHODOLOGY

1. HYPOTHESES

The objective of this thesis is to determine as far as possible, the relationships between social capital, welfare, and health, at both the individual and household levels.

There are five hypotheses that will be tested:

1. Higher levels of household and community level social capital and higher levels of household morbidity respectively increase and decrease household welfare.
2. Increases in household and community social capital cause households to be upwardly mobile, while increases in household morbidity cause them to move down the income distribution.
3. Household and community social capital and household morbidity respectively decrease and increase the likelihoods of households being poor, and chronically poor.
4. Higher levels of individual, household, and community social capital and higher levels of household welfare increase individual health levels.
5. Household welfare (among others) affects social capital positively; individual health (among others) affects individual, household and community social capital either positively or negatively.

2. DATA

This research uses the combined datasets of the Project for Statistics on Living Standards and Development (PSLSD), undertaken in 1993, and the follow up KwaZulu-Natal Income Dynamics Study (KIDS) surveys undertaken in 1998 and 2004.[21] Household splits after

[21] The KwaZulu-Natal Income Dynamics Study (KIDS) was a collaborative project of the International Food Policy Research Institute, the University of Natal-Durban, the University of Wisconsin-Madison, and the Southern Africa Labour and Development Research Unit at the University of Cape Town. The 2004 data used in the analysis was generously provided by the KIDS research team before the public release of the data. The data used in this paper were edited in places, in particular for individual's ages, education levels, household heads, and even gender. However, these changes were few and recoding was approached with much care, so as to preserve the validity of the data.

1993 and 1998 were also tracked and re-interviewed. Unfortunately, after more than a decade, even after considerable efforts to track down and resurvey the households surveyed in 1993, there is attrition in the dataset.[22] Split-off households are treated as new 1998 and 2004 households in the analysis. White and Coloured households were not resurveyed in the 1998 and 2004 KIDS surveys since the minor advantages of including these small groups would have "precluded most comparative ethnic analyses. Moreover, the households in these ethnic groups were entirely located in a small number of clusters (due to the lack of spatial integration of the population), [thus] undermining their representativeness" (KwaZulu-Natal Income Dynamics Study, 2003). These two studies form a three-period panel data set of 1412 households in 1993, 1075 households in 1998, and 1428 households in 2004. Once data constraints have been taken into account, the household models include 1158 African and Indian households. Since the 1993 survey was designed to be self-weighted, it may only be assumed that the 1998 sample of households is representative of the 1993 population, as is the sample in 2004.

As far as the individuals in the dataset are concerned, this paper analyzes data only collected for so-called "core" persons, or household decision-makers. "Core persons" include the self-declared head of household from 1993 (as well as this person's spouse or partner) and those living in a three generation household who are the children, children-in-law or nieces/nephews of the self-declared head, at least 30 years old, and have at least one child living in the household (as well as these individuals' partners or spouses) (May *et al.*, 2000). Yet, some of the core persons identified in the KIDS survey do not meet these criteria, but are left as core persons simply because they are assumed to be one of the household's key decision makers. The assumption, therefore, is that core persons are key decision makers, affecting various aspects of the household's welfare (KwaZulu-Natal Income Dynamics Study, 2003). The dataset consists of 10,068 individuals in 1993, 14,534 individuals in 1998, and 9,704 in 2004. After non-core persons have been dropped and data constraints have been taken into account, the individual-level models include 1717 core persons.

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[22] For more detail on the magnitude and nature of attrition in the 1993 and 1998 KIDS datasets refer to May *et al.* (2000) and Maluccio (2000). At the time, no information was available on the magnitude and nature of attrition in the 2004 KIDS dataset.

The community- or cluster-level data was collected from 63 sampling clusters. The data for a cluster was collected during the meetings of focus groups consisting of selected individuals from that cluster, chosen specifically to answer the community questionnaire.

Descriptive statistics of the variables used in the household-level econometric models are presented in the appendix in Table A1, while descriptive statistics of the variables used in the individual-level regression models are presented in the appendix in Table A2. The observations included in Table A1 are those households with a non-missing welfare variable, and those in Table A2 are the individuals with a non-missing self-rated health variable.

3. EMPIRICAL MODELS

This paper analyses the relationship between welfare, health, and social capital at the micro-level, specifically at the individual and household levels. In this thesis there are five analytical sections, each attempting to test one of the hypotheses presented above. The sections present the analysis of the determinants of household welfare, the determinants of welfare mobility, the determinants of welfare poverty, the determinants of self-rated health, and the determinants of social capital.

Depending on the nature of any dependent variable and the data available to estimate each model, the models that will be estimated include:

1. levels of the dependent variable being regressed on the levels of the dependent variable,
2. levels of the dependent variable being regressed on the lagged levels of the independent variables,
3. levels of the dependent variable being regressed on the differences over time in the independent variables, as well as the levels of the invariant independent variables,
4. differences over time in the dependent variable being regressed on the lagged levels of the independent variables, and
5. differences over time in the dependent variable being regressed on the differences over time in the independent variables, as well as the levels of the invariant independent variables.

It must be noted that from this point onwards these five models will be referred to simply as the levels-on-levels, levels-on-lags, levels-on-differences, differences-on-lags, and differences-on-differences models respectively.

Where possible, the random effects (RE) generalized least squares (GLS) model or RE probit model is chosen over the fixed effects (FE) estimates in these panel estimations. This is done for two reasons. *Firstly*, the RE model is usually employed to estimate panel regressions based on randomly sampled observations, as is the case in most household surveys (Gujarati, 2003). *Secondly*, the FE regression drops time-invariant variables from the analyses. However, from the literature review, one can see that several time-invariant variables are important determinants of household welfare, welfare mobility, poverty dynamics, and individual health. These include ethnicity or race, gender, and, in some instances, place of residence. In every GLS: RE estimation, the Breusch and Pagan Lagrange Multiplier test is performed to test that the RE model is better than the pooled (i.e. to test that the time dimension is significant in the RE model). In every RE probit estimation the likelihood ratio test of rho being zero is performed, also to test that the RE model is better than the pooled.

Below follows the detailed descriptions of the dependent variable(s) employed in each set of regression models, detail regarding the estimation techniques, as well as the model specifications, which were informed by the literature review. Note that for simplicity the levels-on-levels model is represented in each of the model specifications presented below.

The measure of household welfare employed here is the natural logarithm of real (2000 Rands) adult equivalent monthly household expenditure. Nominal estimates of adult equivalent monthly household expenditure for 1993, 1998, and 2004 were converted into 2000 prices using published CPI figures from Statistics South Africa (2005). Although income can be argued to reflect consumption or expenditure opportunities (Hagenaars, 1991: 135-146), saving and dissaving, i.e. consumption smoothing, may serve to create large disparities between income and expenditure data. This study employs expenditure data instead of income data because of this consumption smoothing: with consumption smoothing, expenditure data provides us with information about past and future incomes (Lipton and Ravallion, 1995: 2573), and provides us with a better estimate of current and

long-term welfare (Booysen, 2001:677). Household expenditure data were adjusted for differences in household size because a larger household may exhibit the same expenditure data as a smaller one, while simultaneously having a lower welfare. This is due to differences in household composition and size (Lipton and Ravallion, 1995). The adjustment made will be similar to that made by Booysen (2004: 526-527). In his paper total monthly income is divided by n^a, where n is the number of household members and a an adjustment for household economies of scale (Filmer and Pritchett, 1998:13). An adequately robust and reliable adjustment for household economies of scale is an a of 0,6, according to Lanjouw and Ravallion (1995).

When household welfare, which is a continuous variable, is the dependent variable, the independent variables employed in the random effects generalized least squares regressions include:

- the household's network social capital,
- the cluster's available network social capital,
- the household's total years of education,
- the household's morbidity burden (the number of ill persons in the household),
- the household's access to farming equipment and access to grazing land (access coded "1", no access coded as "0"),
- the household's age composition (number of children 0-14 years old, numbers of male and female adults aged 15-64 years old, and number of elderly aged 65 and older),
- characteristics of the household head, including age, squared age, gender (female coded as "1" and male coded as "0"), and years of education,
- the household's race (Black, coded as "1", vs. Indian, coded as "0"), and
- the cluster's location (rural, coded as "1", or urban, coded as "0").

It must be noted that location or place of residence in this data is time-invariant: only the household's original cluster location is recorded. These households, when observed in later periods, as well as new households having formed from these original households, were assigned the same cluster location as for the original household observed in the first period.

There are several aspects of these network social capital measures that need to be noted. The 1993 data on social capital was collected retrospectively in 1998. A recall period as long as this (five years) is perhaps too long yield reliable data. The social capital membership question were asked for 1998, and then immediately after the question was reiterated to capture 1993 memberships. It can be argued that this will lead to biases in the 1993 data towards the actual situation for memberships in 1998. In addition, the method used to collect the data on community-level social capital can also be called into question. Apart from the fact that the 1993 data on this measure was also collected retrospectively, these data were collected by means of focus groups with selected individuals living in that cluster. These focus groups may or may not have been able to uncover all the groups operating in the cluster. Thus, the cluster-level social capital variables may not necessarily represent an accurate measure of the true availability of networks.

Given these numerous possible deficiencies in the social capital measures it is necessary to test the robustness of all the model estimations, both the one above, as well as all the models presented below. For this reason, where possible, all models were re-estimated omitting the 1993 data. This allows the researcher to identify robust results in these models. The limitation of this robustness check, of course, is that in some cases the panel nature of the data is lost, and the analysis is reduced to a cross-sectional one.

The morbidity burden measure moreover is, perhaps, not the best measure of household morbidity levels. Morbidity is simply measured by the number of residents in each household reporting having been ill in the fortnight prior to the survey. This measure is chosen in order to have a consistent measure of household health over the three surveys. A better measure would have been to use the number of chronically ill persons in the household. These would be the individuals reporting having been ill for the entire fortnight prior to the survey and who were still ill at the time of the survey. However, the question as to the duration of illness and the persistence of the illness on the day of the interview was not included in the 2004 survey. Thus, the simple, yet less accurate measure of morbidity is used in the analysis.

The household head was not reported in the 2004 data. Thus, where applicable, the heads of the 1993 households were kept as heads in 2004. This resulted in the exclusion from the analysis of a large number of observations (households without 1993 data or simply

without 1993 household head data, which totaled 127 households). Yet, as the estimation results showed characteristics of the household head to be significant in many cases, as was reported in the literature, the models were not estimated excluding household head characteristics.

The model takes the following form:

$$HW_{i,j} = a + bHSC_{i,j} + cCSC_{i,j} + dHC_{i,j} + eMB_{i,j} + fX_{i,j} + u_i$$

where

HW_i is the welfare of household i in cluster j

$HSC_{i,j}$ is the household's endowment of network social capital

$CSC_{i,j}$ is the community's available network social capital

$HC_{i,j}$ is the household's endowment of human capital

$MB_{i,j,k}$ is the morbidity burden of household j

$X_{i,j}$ is a vector of other household, household head, and cluster characteristics (f is a vector of parameters), and

u_i is the error term

Household-level social capital, included here as independent variables, is measured by the total memberships of that household in seven different categories of group types.[23] These group types include church groups, financial groups (stokvels, or savings clubs, and burial societies), production groups (farmers' associations, informal traders' associations, sewing groups and community garden groups), private interest groups (sports, dance/music/singing and study groups), service groups (development committees, water committees and school committees), political groups (tribal authorities, men's groups, women's groups and youth

[23] In order to add depth to the social capital measures, an index of performance of up to four of the most important groups that the household belongs to (as chosen by the survey respondent), and an index of the household members' meeting attendance of these most important groups, can be included. The group performance index totals the categorical responses (across the household's most important group associations) to the question of the groups' performance, with a performance of a group of "0" being 'very weak', and a performance of "5" being 'very strong'. The meeting attendance index is constructed in an identical way, except a "0" for a group's meeting attendance means 'no meetings attended', while a "5" represents 'all meetings attended'. Thus, higher values on the indices indicate higher levels of group performance and group meeting attendance. Results of estimations that included the measure of group performance and/or the measure of household group meeting attendance for the different types of networks are omitted from this paper due to data constraints for these variables, which cause omission of a significant number of observations from these analyses. Thus, this study can't explore the role of quality of memberships in explaining differences in household welfare, household poverty, and individual health.

groups), and a catch-all category for other groups.[24] Social capital at the cluster level is in turn measured by the total number of groups (also split by group type) available to households or individuals in that cluster. These data were respectively collected during the household interviews and community surveys. Because social networks measure social capital in this study, social capital is often referred to as network social capital further in this work.

Social networks may at first seem to be an inadequate measure of the diverse concept of social capital. However, when one refers to Putnam's (1993) definition of social capital incorporating networks, norms, and social trust, one will notice that networks are the only behavioral aspect incorporated in the definition. Besides networks being structures that are easily measured, one may find solace in the fact that Rose (2000) suggests that any analysis of social capital should disaggregate the attitudinal and behavioral parts of social capital in order to be able to analyze the interplay between them. In any case, it may be important to determine the whether or not behavioral social capital does, in fact, play a role in the relationship between welfare, health and social capital in general, before incorporating the more abstract side of social capital, the attitudinal side.

Additionally, one can note that using formal social networks as a measure of social capital do indeed allow this paper to adhere to the very essence of the terms 'social' and 'capital'. The networks represent social interactions between individuals, and they are formed on the premise that the members of the group may be able to generate a return of some sort, be it financial, health-related, or, very basically, utility-related.

In this thesis, households are 'poor' if their welfare is below the poverty line in any one period, which is set at the 40th percentile of the welfare distribution in the first wave of the survey, i.e. a per adult-equivalent real monthly expenditure of R589. If the household is on or above the poverty line it is deemed 'non-poor'.

[24] Trust is not used as a measure of social capital in this study. As mentioned before when discussing the role of trust as an instrument for social capital, preliminary analysis of the KIDS data suggests that trust does is associated significantly but negatively with network memberships. Remember, though, from the literature review section, that this result is not entirely unheard of. Anheier and Kendall (2002) for example show that where the social or political order is questioned, the relationship between trust and networks may break down. This is probably the case in South Africa, a country which has only recently celebrated ten years of democracy.

Chronic poverty on the other hand is regarded as a long-term inability to escape the grip of poverty. It can be defined as being, among others, the inter-temporal average poverty over a number of years (as in Jalan and Ravallion, 2000), or as being when a household, for example, is poor for an extended period, usually several years (Booysen, 2004), or as being the permanent component of poverty as determined by a fixed-effects regression of poverty (McKay and Lawson, 2003). Jalan and Ravallion (2000) split total poverty into two parts, namely transient poverty and chronic poverty. The authors say that transient poverty "is the contribution of consumption variability over time to expected consumption poverty" (Jalan and Ravallion, 2000: 84). From any definition, however, the key concept of chronic poverty can be uncovered: that it is poverty that remains for an extended period of time. Furthermore, the transient poor are normally those that are observed to poor in some, but not all periods. In this thesis, households are deemed chronically poor if their welfare on average over time is below the poverty line (R589), transient poor if their welfare on average is above the poverty line but they are non-poor in at least one period, and non-poor if their welfare in each period equals or exceeds the poverty line.

In the above models, pooling and copying phenomena, which were discussed in the literature review, need to also be considered. To determine if pooling or copying occurs, the above analysis can be taken a step further by dividing households into two groups, the poor and non-poor, and re-estimating the household-level regressions. If it's found that, for the non-poor, social capital is more influential in determining welfare than it is for the poor, this would be evidence for the pooling and copying phenomena (Portes, 2000).

When the determinants of poverty are analyzed using the appropriate random effects probit, multinomial probit, or cross-sectional probit model, the dependent variables include:

- poverty status (a binary variable indicating a "1" for households that are poor and "0" otherwise),
- change in poverty status (a categorical variable indicating a household moves into or out of poverty between survey waves, and with no change in status as the reference category),

- poverty type (a categorical variable indicating a household is either chronically poor, transient poor, or non-poor, the latter being the reference category), and
- chronic poverty status (a categorical variable indicating a "1" if the household is chronically, and "0" otherwise).

The independent variables in the poverty analysis include exactly the same measures as in the welfare analysis. These are:

- the household's network social capital,
- the cluster's available network social capital,
- the household's total years of education,
- the household's morbidity burden (the number of ill persons in the household),
- the household's access to farming equipment and access to grazing land (access coded "1", no access coded as "0"),
- the household's age composition (number of children 0-14 years old, numbers of male and female adults aged 15-64 years old, and number of elderly aged 65 and older),
- characteristics of the household head, including age, squared age, gender (female coded as "1" and male coded as "0"), and years of education,
- the household's race (Black, coded as "1", vs. Indian, coded as "0"), and
- the cluster's location (rural, coded as "1", or urban, coded as "0").

Therefore, these models take the following general form:

$$PSTAT_i = a + bHSC_{i,j} + cCSC_{i,j} + dHC_{i,j} + eMB_{i,j} + fX_{i,j} + u_i$$

where

$PSTAT_i$ is the poverty status of household i

$HSC_{i,j}$ is the household's endowment of network social capital

$CSC_{i,j}$ is the community's available network social capital

$HC_{i,j}$ is the household's endowment of human capital

$MB_{i,j,k}$ is the morbidity burden of household j

$X_{i,j}$ is a vector of other household, household head, and cluster characteristics (f is a vector of parameters), and

u_i is the error term

Self-rated health is coded into a binary variable indicating a "1" for fair, poor, or very poor health, and "0" for good or very good health. Individual self-rated health is the dependent variable in a panel probit regression, while changes over time in self-rated health is the dependent variable in a multinomial probit model ("1" for a deterioration in self-rated health, "0" for no change in self-rated health, and "-1" for an improvement in self-rated health. As self-rated health was only measured in 1998 and 2004 the individual-level analysis is limited to two time periods, 1998 and 2004. The independent variables in these models include:

- the individual's network social capital,
- the household's network social capital,
- the cluster's available network social capital,
- household welfare,
- age and the square of age,
- gender (female coded as "1", and male as "0"),
- race (African coded as "1", and Indian as "0"),
- years of education,
- marital status (married coded as "1", and unmarried coded as "0"),
- household composition,
- cluster location,
- as well as the number of ill persons in the household, given that the respondent him or herself has not been ill in the fortnight before the survey interview (the variable is "0" if the respondent was ill).

Thus, the models take the following general form:

$$SRH_{i,j,k} = a + bISC_{i,j,k} + cHSC_{i,j,k} + dCSC_{i,j,k} + eHC_{i,j,k} + fHW_{j,k} + gMB_{i,j,k} + hX_{i,j,k} + u_i$$

where

$SRH_{i,j,k}$ is the self-rated health of individual i in household j in cluster k

$ISC_{i,j,k}$ is the individual's endowment of social capital

$HSC_{i,j,k}$ is the household's endowment of social capital

$CSC_{i,j,k}$ is the community's availability of social capital

$HC_{i,j,k}$ is the individual's endowment of human capital

$HW_{j,k}$ is household welfare of household j

$MB_{i,j,k}$ is the morbidity burden of household j on individual i

$X_{i,j,k}$ is a vector of other individual, household and cluster characteristics (h is a vector of parameters), and

u_i is the error term

Individual-level social capital is measured by the total memberships of that individual in each of the same seven different group types listed above, based on data collected from the household interviews.

The final empirical section deals with the analysis of social capital. It must be noted, however, that this empirical section (section VII) is not an exploratory venture seeking out the determinants of social capital, but rather a section dedicated to testing the endogenous relationships that may exist between social capital on the one hand and welfare, poverty, and health on the other hand, as implicated in the results reported in the sections preceding this discussion (sections V, VI, and VII). If welfare, poverty, or health show significant links with social capital (at the individual, household, or community levels) in the levels-on-levels or differences-on-differences models, these social capital variables are employed as dependent variables in random effects generalized least square regression models.

The reason for this is as follows: if there is a significant association between the dependent and an independent variables in these models, causality in this relationship cannot automatically be assumed, since the dependent variable is measured at the same instance as the independent variable is measured. Further estimations, as presented in the final empirical section, are needed to determine the causal direction of the specific relationship between social capital, welfare, poverty, and health.

When these significant social capital variables are treated as dependent variables, the variables they previously meant to explain are now included as independent measures in the models. To assess endogeneity, these models are only estimated using the econometric techniques that can determine definite causality, i.e. the levels-on-lags, levels-on-differences, and differences-on-lags models. This method of 'swapping' the independent and dependent measures, and re-estimating the results using models that can determine causality, is used instead of the more common method used to address endogeneity in econometric models, namely instrumental variable (IV) estimation. Using IV estimation, one would seek variables that influence social capital but are independent from the dependent variable (welfare, poverty, or health). If the instruments are found to be valid (and the social capital variables are still significant once instrumented), one would be able to say that social capital causes differences in that dependent variable. Narayan and Pritchett (1997) and Grootaert *et al.* (2002), for example, report trust measures to be valid instruments for network social capital.[25] Preliminary analysis of the KIDS data suggests that such an aggregate index of household trust is significantly and negatively related to aggregate memberships, a relationship that invalidates the use of trust as an instrument for social capital (a positive sign is required). As a result, this alternative method is preferred over IV estimation, given the absence of valid instruments for network social capital.

As mentioned above, the independent variables in the social capital regressions depend on the regressions in which the study is trying to confirm or refute an endogenous relationship. If the relationship to be investigated is in the welfare or poverty sections, the independent variables include:

- the household's (other) network social capital,
- the cluster's (other) available network social capital,
- the household's total years of education,
- the household's morbidity burden (the number of ill persons in the household),
- the household's access to farming equipment and access to grazing land (access coded "1", no access coded as "0"),

[25] The instruments are not without their own problems in these studies. For example, in Narayan and Pritchett (1997), the 'trust in strangers' instrument had to be dropped for the instrument set to be statistically valid, and yet this is the measure considered theoretically most valid.

- the household's age composition (number of children 0-14 years old, numbers of male and female adults aged 15-64 years old, and number of elderly aged 65 and older),
- characteristics of the household head, including age, squared age, gender (female coded as "1" and male coded as "0"), and years of education,
- the household's race (Black, coded as "1", vs. Indian, coded as "0"), and
- the cluster's location (rural, coded as "1", or urban, coded as "0").

The model therefore takes the form of the general household-level regression for the welfare and poverty analysis, except with social capital type under investigation as the dependent variable, and welfare or poverty as an independent variable.

If the relationship to be investigated is with self-rated health, the independent variables include:

- the individual's (other) network social capital,
- the household's (other) network social capital,
- the cluster's (other) available network social capital,
- household welfare,
- age and the square of age,
- gender (female coded as "1", and male as "0"),
- race (African coded as "1", and Indian as "0"),
- years of education,
- marital status (married coded as "1", and unmarried coded as "0"),
- household composition,
- cluster location,
- as well as the number of ill persons in the household, given that the respondent him or herself has not been ill in the fortnight before the survey interview (the variable is "0" if the respondent was ill).

The model takes the form of the individual-level health regression, except with the social capital type under investigation as the dependent variable, and self-rated health now included as an independent variable.

4. ORIGINALITY OF THIS RESEARCH

These empirical models estimated here differ from those in the literature on welfare, poverty, health, and social capital in a number of ways. This study includes panel data analysis of welfare, poverty, health and social capital, instead of the usual cross-sectional analysis. Though panel data is commonly usually used in the analysis of income and poverty dynamics, this paper yet again goes further than most previous studies by adding social capital into the analysis, as well as health or morbidity data.

In addition to this, and perhaps most importantly, network social capital is split into its component group types, namely:

1. Church groups (being a member of a religion or faith)
2. Economic groups (burial societies, and stokvels, or savings clubs)
3. Production groups (traders' associations, farmers' associations, sewing groups, and community gardening groups)
4. Private interest groups (singing/dancing/music groups, studying groups, and sports groups)
5. Community groups (water committees, development committees, and school committees)
6. Political groups (men's associations, women's associations, youth groups, and tribal committees)
7. Other groups

The reason for the splits is three-fold. *Firstly*, it may be that different types of groups are better suited to achieving different outcomes (Thorp *et al.*, 2005). We may for example find that being in economic groups aids the welfare of a household, whereas being a member of a self-interest group or church group may influence self-rated health. *Secondly*, the structure of the group may play an important role. Vertically organized groups, such as political groups, may be able to influence a household's welfare more than a horizontally organized group. This is one of the problems with social capital: that like-minded people and people of similar status generally get together in a group (a horizontal association). This is the pooling problem that is mentioned by Portes (2000). *Thirdly*, to be able to explore the various consequences of investing in different types of networks is very

important from a policy-maker's perspective. Knowing the effects of different groups means that policy decisions can be made regarding specific group types. This issue will be revisited in the concluding section, section VIII. Thus, splitting total memberships up into their component types may provide far more insight into the phenomenon of structural social capital than the conventional analysis employing aggregate measures of social capital.

Yet another unique feature of this the analysis is that it analyzes social capital links at the individual, household, and community levels in the health models. In the welfare and poverty analyses, both household-level and cluster-level social capital are included simultaneously in the models, an approach that is rare.

IV: WELFARE DYNAMICS

This section is dedicated to the detailed analysis household welfare. Initially the models introduced in the methodology section are estimated using the full panel data set (1993, 1998, and 2004 data). The results of the estimations are then discussed in detail. The models are then re-estimated using the abridged panel data set (1998 and 2004 data) in order to determine the robust coefficient results. As mentioned in the methodology section, the models are re-estimated in order to obtain results after excluding the 1993 social capital data that was collected retrospectively in 1998. The differences between the two sets of estimations, as well as the robust results from the two sets are then discussed.

Before focusing on the coefficient results of the estimations presented in Table 4.1, it should be noted that the goodness-of-fit of the models are significant ($p<0.01$), and in every case the Breusch and Pagan Lagrangian multiplier (LM) test is rejected ($p<0.01$). The latter means that, in every estimation, the random effects (RE) model is preferred to the pooled model. As for goodness-of-fit, R^2 statistics (the percentage of the variation in the dependent variable explained by the variation in the independent variables) are extremely high, both across the time dimension (the R^2 within), and across the spatial dimension (the R^2 between). The R^2 (between) statistics are lower when the dependent variable is in differences form, but this is to be expected since the third period in the time dimension is lost when differences between periods are analyzed.

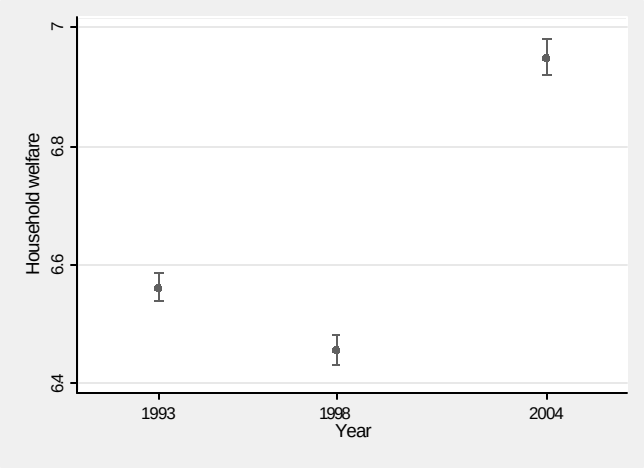
The first independent measure to take note of in the analyses presented in Table 1 is the trend in time after controlling for all other variables in the model. With significant negative and positive coefficients on the 1998 and 2004 dichotomous variables respectively in every model in Table 1, it is clear that there household welfare deteriorated significantly between 1993 and 1998, but then rose above 1993 levels. This result can also be summarized on a bivariate level (not controlling for anything other than year) in the graph below (Figure 4.1).

Table 4.1. Regressions of household welfare using 1993, 1998, and 2004 data

GLS: RE	Levels-on-levels		Levels-on-lags		Levels-on-differences		Differences-on-lags		Differences-on-differences	
Year (1993)										
1998	-0.223	***							-0.620	***
2004	0.200	***	0.385	***	0.597	***	0.643	***		
Head's years of education	0.064	***	0.049	***	0.053	***	-0.002		0.050	***
Head gender (female = 1, male = 0)	-0.106	***	-0.053		0.009		0.018		-0.044	
Head's estimated age	0.024	***	0.003		0.021	**	-0.017	**	0.031	***
Square of the head's estimated age	0.000	***	0.000		0.000		0.000	*	0.000	***
Number of 0 to 14 year olds	-0.044	***	-0.044	***	-0.011		0.006		-0.021	**
Number of males 15 to 64 years old	-0.065	***	-0.057	***	0.004		0.006		-0.004	
Number of females 15 to 64 years old	-0.081	***	-0.091	***	-0.012		-0.030		-0.039	*
Number of 65 year olds and older	-0.088	***	-0.012		-0.111	***	0.043		-0.100	**
Race (African = 1, Indian = 0)	-0.631	***	-0.938	***	-1.102	***	-0.250	***	-0.227	***
Place of residence (rural = 1, urban = 0)	-0.290	***	-0.254	***	-0.469	***	0.015		-0.112	**
Household total years of education	0.007	***	0.014	***	-0.003	**	0.005	***	-0.003	
Owns farming vehicle (yes = 1, no =0)	0.053		-0.030		-0.044		-0.298		0.045	
Owns mechanical farm equipment (yes = 1, no =0)	-0.110	**	-0.087		0.077	*	-0.034		-0.042	
Owns farming tools (yes = 1, no =0)	0.159	***	0.033		0.089	***	-0.113	***	0.116	***
Access to grazing land (yes = 1, no =0)	0.164	***	0.067		0.012		-0.083	*	0.108	***
Number of cattle	0.011	***	0.000		0.005		-0.004		0.007	
Number of ill persons in household	0.013		0.018		-0.021		-0.012		0.004	
Household social capital										
Household church group memberships	-0.007		0.005		-0.013	*	-0.022		0.000	
Household finance group memberships	0.050	***	0.049	**	0.051	***	-0.017		0.041	***
Household production group memberships	0.050		-0.062		0.105	*	-0.113		0.091	
Household private interest group memberships	0.022		-0.027		0.050	**	-0.013		0.044	
Household service group memberships	0.117	**	0.024		0.074		-0.092		0.115	*
Household political group memberships	0.089	**	0.030		0.078		-0.013		0.017	
Other household group memberships	0.058		0.206		0.085		0.047		-0.047	
Community social capital										
Cluster church groups	0.003		0.004		0.001		0.002		-0.003	
Cluster finance groups	0.005		0.010		-0.003		-0.004		0.009	*
Cluster production groups	-0.010	**	-0.017		0.006		-0.011		-0.009	
Cluster private interest groups	-0.001		-0.004		0.003		0.003		0.003	
Cluster service groups	0.007	**	0.002		-0.003		-0.012	**	-0.002	
Cluster political groups	-0.012		0.013		-0.018		0.033	***	0.006	
Cluster other groups	0.157	***	-0.048		0.007		-0.106		-0.067	
Constant	6.369	***	7.068	***	7.585	***	0.543	**	0.723	***
Observations	2314		1443		1142		1443		1142	
Groups	1158		913		808		913		808	
R-square statistic: within	0.252		0.333		0.420		0.271		0.300	
between	0.626		0.612		0.561		0.167		0.222	
overall	0.594		0.582		0.566		0.225		0.259	
Wald's Chi-square statistic	2551.96	***	1722.04	***	1297.53	***	410.29	***	386.70	***
LM test for RE: Chi-square(1)	75.90	***	32.54	***	86.37	***	70.80	***	29.90	***

Notes: *** indicates coefficients and tests significant at the 1% level; ** indicates coefficients and tests significant at the 5% level; * indicates coefficients and test significant at the 10% level.

Figure 4.1. Household welfare by year



Households headed by women experience lower levels of welfare, as is evident from the significant negative coefficient for this regressor in the levels-on-levels model. The age of the household head is also positive and significant in this model, with older household heads experiencing higher welfare. An increase in the age of the household head (via a change in headship) also exposes the household to positive welfare changes and higher welfare levels, although, from the significant negative coefficient on age in the difference-on-lags model, one can conclude that older household heads expose the household to adverse welfare changes later on.

As for household composition, higher numbers of any age group cause household welfare to decline, evident from the significant negative coefficients in the levels-on-levels model in Table 4.1. A joint test that the coefficients of these variables are equal to each other is not rejected, and so it is evident that household size is more of an influence on household welfare than the composition of the household. Higher numbers of adults and children, however, cause significantly lower levels of future welfare, while increases in the numbers of children, female adults, and elderly expose the household to adverse changes in welfare.

African households experience lower levels of welfare and greater declines in welfare than Indian households do. This is clearly evident from the negative and significant coefficients of the race variable in all the models in Table 4.1. Similarly, rural households experience significantly lower levels of welfare and greater adverse welfare changes than their urban counterparts do, although in the difference-on-lags model the coefficient is not significant.

The level of education of the household head is significantly and positively related to household welfare in every model except in the differences-on-lags model. This means that households with a better educated household head enjoy higher levels of welfare in the present, and will also do so in the future, while raising the head's education level will raise the level of welfare the household enjoys. Following naturally, raising the head's education level will also promote beneficial changes in the welfare level of the household. Household total education tells a slightly different story: In the levels-on-levels and levels-on-lags models the coefficient is significant and positive, although in the levels-on-differences, and difference-on-differences models, the coefficients are negative and significant. This means that, while higher levels of household education cause better welfare levels now and in the future, increasing household education decreases the level of welfare initially, and subjects the household to adverse changes in welfare.

Households with farming tools, access to grazing land, and more cattle, report higher welfare levels, although those with mechanical farming equipment seem to be worse off. This result should be viewed with caution, though, since there are only 20 households in 1998, and seven in 2004 that own mechanical farm equipment without owning farming tools, whereas 14 households in 1993, 136 in 1998, and 90 in 2004 have access to both types of items, mechanical and non-mechanical. Since the positive coefficient on the farming tools variable exceeds the negative coefficient on mechanical equipment, one may argue that farms with both items are still bettering their welfare levels. Perhaps in the minority of households that do own mechanical equipment without owning farming tools, it is difficult to fully and most efficiently utilize that mechanical equipment. To test this result, the model is re-estimated with three binary variables indicating ownership of only mechanical equipment, ownership of mechanical equipment and farm tools, and ownership of only farm tools. The coefficients for the two former indicators, though, are insignificant, while the coefficient for ownership of farm tools only is significant and positive.

In addition to the results obtained in the levels-on-levels model, increases in access to mechanical and non-mechanical farming equipment increase the level of welfare experienced by the household. Additionally, increases in farming tools and grazing land access increase the beneficial changes in welfare experienced by the household. Unfortunately however, the significant and negative coefficients on the access to farm tools

and access to grazing land regressors in the difference-on-lags model provide evidence that having farming tools and grazing land access expose the household to adverse welfare changes in the future.

The morbidity burden is insignificantly related to welfare throughout the models. This raises the same question posed in the method section: could this result be due to the fact that morbidity indeed does not play a significant role in levels or changes in household welfare, or is it that the morbidity measure is a poor measure of the true burden of illness on the household.

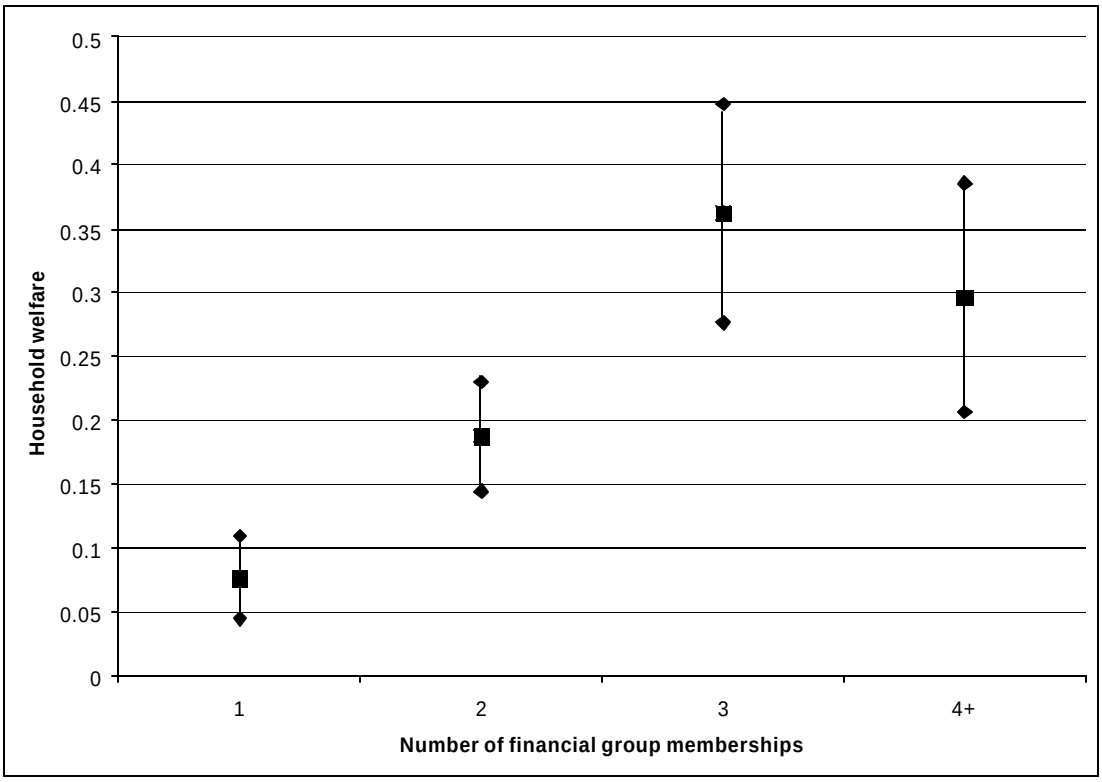
Coming to the social capital variables, we notice firstly from the levels-on-levels model that greater household group memberships in financial, service and political groups are associated with higher household welfare. Understandably, higher levels of financial group memberships increase welfare levels in the future, while increases in the number of memberships in financial, production, and private interest groups also raise future welfare levels. An increase in financial group and service group memberships also increases beneficial welfare changes. Church memberships are negative and significant in the levels-on-differences model, meaning that increasing church memberships leads to lower welfare.

The fact that financial group membership is so prominent in the estimations can spark a debate on the endogeneity of the variable. It can be argued that, surely, only individuals with higher welfares can take advantage of a savings group, or burial society, for example. However, from the nature of these models (using lags and differences as well as current levels) and the fact that financial group social capital is significant across the levels-on-levels, levels-on-lags, levels-on-differences, and differences-on-differences models, it clear that even if there is an element of endogeneity present, there is clear causality from financial groups to welfare as well.

The social capital analysis can be taken further, with a slightly more in-depth look at how the numbers of financial, service, and political group memberships affect household welfare in the levels-on-levels model. If one splits membership in financial groups into dichotomous variables indicating one, two, three, or four or more memberships (with no memberships as a reference category), one can run the regression (levels-on-levels) again with the dummies in place of the continuous membership variable. Plotting the means and

standard errors of the coefficients then provides evidence as to how increasing memberships are associated with higher welfare.

Figure 4.2. Welfare and financial group social capital



From this graph it is clear that having one membership in a financial group in the household increases welfare significantly. It is also clear, that by adding memberships (up until three) a household can significantly increase their welfare. Having four or more memberships, however, although providing significantly more welfare than having just a single membership or none, is not necessarily more worthwhile than having just two or three.

The same can be done with service and political groups, although this time each is split only into one or two or more memberships. The following figures arise:

Figure 4.3. Welfare and service group social capital

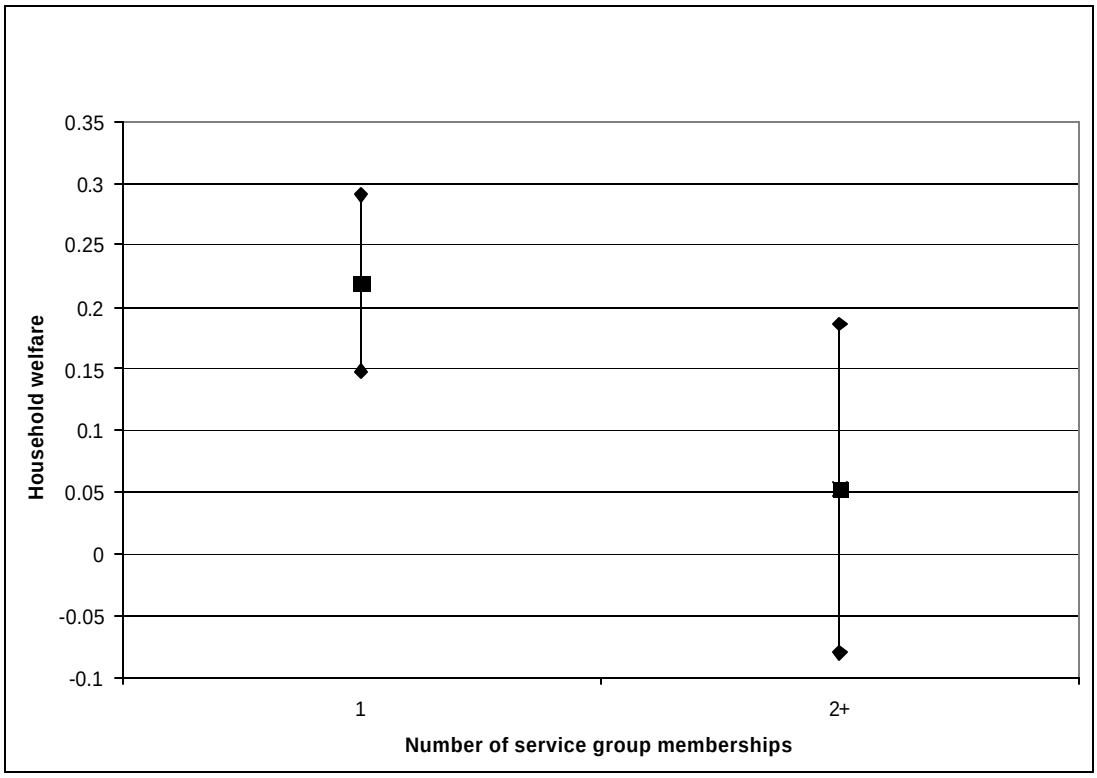
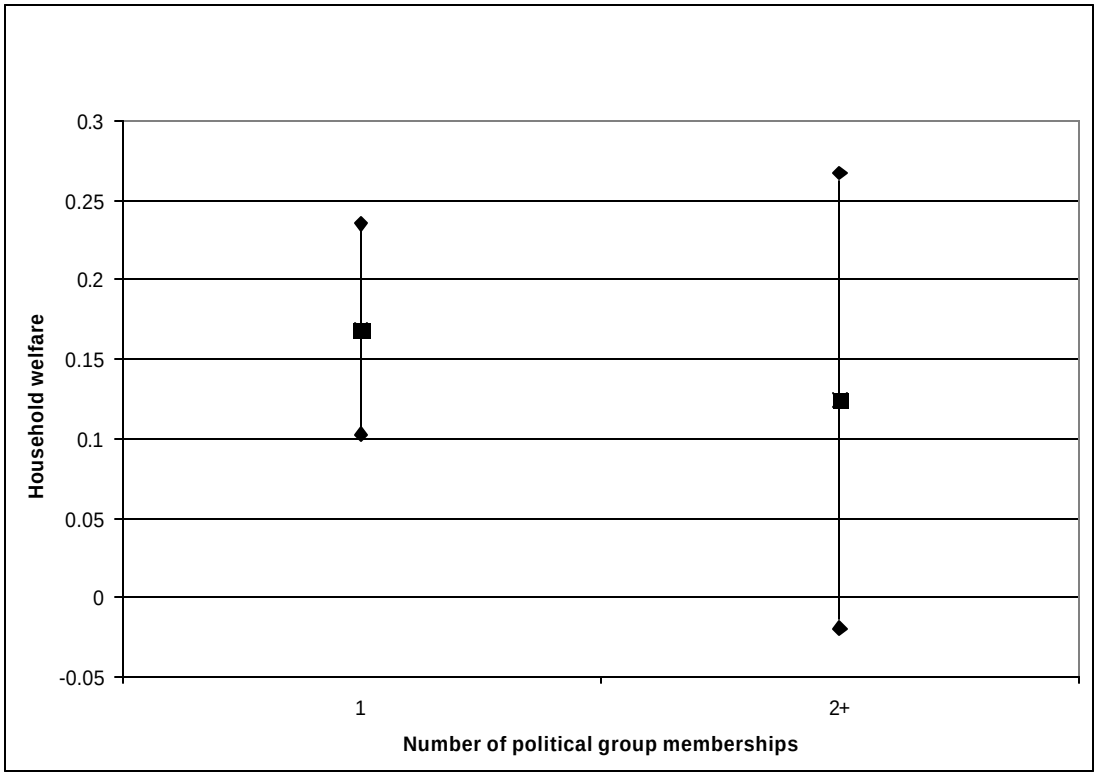


Figure 4.4. Welfare and political group social capital



From these plots we can see that it is worthwhile for a household to have some service group or political group social capital, but households with more memberships in these groups are not as sure to benefit from not only their increased involvement, but their involvement at all. This we can see from the standard error bars extending below zero.

Finally, the cluster-level social capital availability variables provide seemingly strange results, with both negative and positive coefficients appearing in the estimation. Due to this fact, the fact that the coefficients on these variables are generally small (even in comparison to the household social capital measures), and because the coefficients change drastically in significance over the two sets of estimations of the models (i.e. the ones including ad excluding the 1993 data collected retrospectively in 1998), little effort will be made to explain their (possibly spurious) connection with household welfare in these models. Once the following estimations have been reviewed, however, a note will be made on the coefficients that have stayed relatively constant over both estimations of the five models.

When the 1993 data is dropped from the estimation procedure, all models but the levels-on-levels model become cross-sectional analyses (Table 4.2). This in itself could weaken the reliability of the outcomes, since less data is used and the time component is lost. On the other hand, the strong R^2 statistics (from the levels-on-lags and levels-on-differences models at least) that are still evident from these estimations leads one to believe that the robust variables are probably still capturing the variation in welfare that they have already been capturing up until these estimations. For the panel data regression (the levels-on-levels model), the R^2 statistics are still very high, and the LM test is still rejected, favouring the RE model over the pooled.

In this set of regressions, the time trend remains evident, except in the differences-on-lags model. It is, therefore, still clear that welfare levels increased between 1998 and 2004, controlling for everything else in the model.

Table 4.2. Regressions of household welfare using 1998 and 2004 data

	GLS: RE		OLS		OLS		OLS		OLS	
	Levels-on-levels		Levels-on-lags		Levels-on-differences		Differences-on-lags		Differences-on-differences	
Year (2004 = 1, 1998 = 0)	0.411	***								
Head's years of education	0.067	***	0.049	***	0.094	***	-0.006		0.088	***
Head gender (female = 1, male = 0)	-0.091	**	-0.017		-0.133		0.040		-0.363	**
Head's estimated age	0.020	**	0.003		0.066	***	-0.014		0.048	**
Square of the head's estimated age	0.000		0.000		-0.001	**	0.000		0.000	*
Number of 0 to 14 year olds	-0.050	***	-0.061	***	-0.017		-0.013		-0.028	
Number of males 15 to 64 years old	-0.081	***	-0.035		-0.038		0.041		-0.061	
Number of females 15 to 64 years old	-0.097	***	-0.065	**	-0.069		0.002		-0.069	*
Number of 65 year olds and older	-0.120	***	0.035		-0.136		0.175	**	-0.199	***
Race (African = 1, Indian = 0)	-0.852	***	-1.139	***	-1.192	***	-0.208		-0.304	**
Place of residence (rural = 1, urban = 0)	-0.290	***	-0.197	**	-0.396	***	0.095		0.109	
Household total years of education	0.009	***	0.013	***	-0.001		0.004		0.000	
Owns farming vehicle(yes = 1, no =0)	0.004		-0.202		-0.095		-0.598	**	-0.104	
Owns mechanical farm equipment (yes = 1, no =0)	-0.013		0.065		-0.041		-0.030		0.057	
Owns farming tools (yes = 1, no =0)	0.112	***	0.006		0.126	**	-0.087		0.065	
Access to grazing land (yes = 1, no =0)	0.095	**	-0.038		0.204	**	-0.098		0.167	*
Number of cattle	0.013	***	-0.001		0.019	**	-0.009		0.009	
Number of ill persons in household	-0.021		-0.017		0.023		0.009		-0.004	
Household social capital										
Household church group memberships	-0.008		-0.004		-0.009		-0.034		0.002	
Household finance group memberships	0.061	***	0.005		0.043	**	-0.078	**	0.062	***
Household production group memberships	0.102		-0.131		0.096		-0.205	*	0.177	*
Household private interest group memberships	0.042	*	0.004		0.033		-0.065		0.015	
Household service group memberships	0.146	***	0.121		-0.076		-0.081		-0.014	
Household political group memberships	0.125	**	0.039		0.013		-0.067		0.053	
Other household group memberships	0.034		0.072		0.112		-0.214		-0.021	
Community social capital										
Cluster church groups	0.000		0.012	**	0.001		0.012	**	-0.001	
Cluster finance groups	0.003		0.023	*	-0.003		0.021		0.002	
Cluster production groups	-0.006		-0.025		0.010		-0.031	**	0.001	
Cluster private interest groups	0.001		-0.007		0.007		0.001		0.001	
Cluster service groups	0.005		-0.009		-0.010		-0.018	*	-0.002	
Cluster political groups	0.004		0.007		-0.001		0.000		-0.003	
Cluster other groups	0.058		-0.287	**	0.118		-0.179		-0.042	
Constant	6.451	***	7.612	***	8.187	***	1.042	**	0.606	***
Observation	1308		617		363		617		363	
Groups	945									
R-square statistic within	0.431									
between	0.644									
overall	0.646		0.531		0.581		0.131		0.172	
Adjusted R-square			0.506		0.542		0.085		0.095	
Wald's Chi-square statistic	2076.64	***								
LM test for RE: Chi-square(1)	40.77	***								
F statistic			21.39	***	14.79	***	2.85	***	2.22	***

Notes: *** indicates coefficients and tests significant at the 1% level; ** indicates coefficients and tests significant at the 5% level; * indicates coefficients and test significant at the 10% level.

In general, it seems that without the 1993 data, suspect negative and significant coefficients from the first set of estimations lose their significance without the 1993 data. This goes for the negative coefficient for the head's age in the differences-on-lags model, as well as the presence of mechanical farm equipment in the levels-on-levels model, and the negative coefficients on household education and church group memberships in the levels-on-differences model. This does not mean, however, that the previous results can be discarded. With one less time period in the data, the estimation may not be able to adequately capture any intricate relationships that may well exist in practice, but that may, as mentioned before, seem suspect.

In the second set of estimations, once more we see household composition, or size, play the same roles as before, as with household education, farming assets, financial group household social capital, and service and political group household social capital. Female-headed households also still experience lower welfare levels, but additionally, households in which the gender of the household head changed from male to female between 1998 and 2004 experienced a significant decline in household welfare.

The cluster-level social capital availability variables change significances, magnitudes, and signs – evidence to suggest the access variables may not be reliable. The only variable to not lose significance is the cluster-level access to service groups in the differences-on-lags model. Since the coefficient also remains negative, one could assume that households in communities with less access to service groups enjoyed increases in their welfare over time.

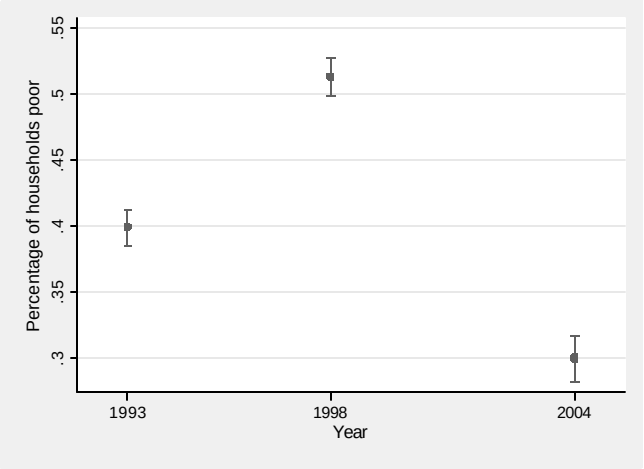
In summary, one can notice that the repetition of the models with different datasets have allowed this analysis to seek out robust determinants of the levels of welfare and differences in welfare over time. It is clear that (agricultural) physical capital, human capital, and social capital influence the formation of household welfare in KwaZulu-Natal, as well as household demographics. Ethnicity, location, and characteristics of the household are all important, showing that lower welfare and worse welfare changes are inherent in certain demographic groups. This is a common result found in literature incorporating analysis of household welfare, and the results in this paper so far match those expected after following a review of those previous studies.

The most basic of agricultural assets are important for better welfare in a province with such an agricultural background, while owning cattle is also beneficial, all results similar to those found by Yúnez-Naude and Taylor (2001), Grootaert *et al.* (2002), and Narayan and Grootaert (2004). Education is important as well, with this paper provinding the same findings as obtained by the majority of the reviewed literature, with better educated households generally faring better. As for network social capital, involvement *is* important – conclusions similar to those in Narayan and Pritchett (1997), Rose (1999), Grootaert *et al.* (2002), and Narayan and Grootaert (2004). But this time around specific group types are of particular interest, i.e. financial, service, and political groups. Some involvement in community service groups and political groups increases the welfare of a household, while belonging to financial groups is found to raise welfare, even though higher welfare may initially be required to be able to join the group. One must realize that, as Thorp *et al.* (2005) mention, financial groups, generally organized in a horizontal fashion, are helping to raise welfare simply through the function of the group, while households involved in a political or a service group are probably raising welfare through the vertical nature of the group – exposure to individuals of different socio-economic backgrounds. This highlights the important role of both horizontal and vertical networks in improving household welfare. Also, the results suggest that it is household-level rather than community-level social capital that is important in explaining differences in household welfare.

V: POVERTY DYNAMICS

An extension to the analysis of household welfare in panel data would be to examine welfare poverty. To gain an understanding of the dynamics of poverty, as mentioned in the methodology section, this research completes several estimations of different poverty measures: a binary indicator labeling the household as being poor or not, a categorical variable indicating movement into or out of poverty (as opposed to staying in or out of poverty), a categorical variable indicating chronic poverty or transient poverty (as opposed to being non-poor), and a binary indicator labeling the household as chronically poor or not. In addition to these, a levels-on-levels regression of welfare is performed separately for the poor and the non-poor. This extra welfare regression follows on the work preceding it in this section, and is estimated to determine whether or not pooling and copying is occurring in social capital amongst the poor and the non-poor. This section of the empirical work will analyze these models in this order, starting with household poverty.

Figure 5.1. Poverty rates by year



To gain an understanding of poverty in the sample over the three years, a simple standard error bar chart can be compiled (Figure 5.1) indicating poverty rates and standard errors over time. As detailed in the method section, the poverty line is set at the 40th percentile of the 1993 household welfare, a real adult equivalent monthly expenditure figure of R589. As was evident in the previous section on the determinants of welfare, the time trend in poverty is clear: welfare poverty increased significantly from 1993 to 1998, and then declined by 2004 to a level significantly lower than in 1993. Further analysis can be done

by compiling a panel transition probability matrix, which shows the probability of households to move from one group (poor or non-poor) to the other over a single time period. These transition probabilities are displayed in Table 5.1 below.

Table 5.1 Transition probabilities for movement, or an absence of movement, across the poverty line

	Move to		
	Non-poor	Poor	Total
Move from			
Non-poor	706	256	962
	73.4%	26.6%	100%
Poor	306	489	795
	38.5%	61.5%	100%
Total	1,012	745	1,757
	57.6%	42.4%	100%

From this table we can see that the probability of moving out of poverty is 38%, whereas the probability of moving into poverty is only 26%. This is telling us that poverty in KwaZulu-Natal is on the decline. The probability of staying poor is 61%, compared with the higher probability (73%) of staying out of poverty.

Now that the trends and transitions of poverty in the province have been inferred from the sample, one can ask the question as to what the determinants of poverty are. Table 5.2 presents the RE probit regression models of household poverty on the determinants of household welfare, as used previously in the regressions of household welfare (recall that the levels of the binary poverty indicator are regressed separately only on levels, lags, and differences of the independent variables). The change in poverty status of households will also be regressed separately on lags and differences of the independent variables. These multinomial probit regressions will be presented separately a little later on in this section.

Table 5.2 Regressions of household poverty using data from 1993, 1998, and 2004

RE Probit	Levels-on-levels		Levels-on-lags		Levels-on-differences	
Year (1993)						
1998	0.775	***	0.632	***	1.160	***
2004	0.053					
Head's years of education	-0.117	***	-0.078	***	-0.152	***
Head gender (female = 1, male = 0)	0.191	**	0.155		-0.226	
Head's estimated age	-0.038	**	-0.028		-0.043	
Square of the head's estimated age	0.000	*	0.000		0.000	
Number of 0 to 14 year olds	0.109	***	0.103	***	-0.010	
Number of males 15 to 64 years old	0.187	***	0.156	***	-0.094	
Number of females 15 to 64 years old	0.256	***	0.199	***	0.018	
Number of 65 year olds and older	0.209	**	0.027		0.256	*
Race (African = 1, Indian = 0)	1.728	***	2.080	***	2.171	***
Place of residence (rural = 1, urban = 0)	0.494	***	0.303	**	1.111	***
Household total years of education	-0.022	***	-0.032	***	0.023	***
Owns farming vehicle (yes = 1, no =0)	0.357		0.309		0.464	
Owns mechanical farm equipment (yes = 1, no =0)	0.069		-0.066		-0.024	
Owns farming tools (yes = 1, no =0)	-0.337	***	-0.014		-0.305	***
Access to grazing land (yes = 1, no =0)	-0.400	***	-0.018		0.002	
Number of cattle	-0.014		0.004		-0.001	
Number of ill persons in household	-0.132	***	-0.052		0.014	
Household social capital						
Household church group memberships	-0.020		-0.005		-0.006	
Household finance group memberships	-0.198	***	-0.142	**	-0.132	***
Household production group memberships	-0.123		0.225		-0.392	*
Household private interest group memberships	-0.014		0.081		-0.184	**
Household service group memberships	-0.162		-0.159		-0.081	
Household political group memberships	-0.279	*	-0.019		-0.242	
Other household group memberships	-0.375		0.662		-1.227	
Cluster social capital						
Cluster church groups	0.005		0.011		-0.004	
Cluster finance groups	-0.034	***	-0.028		0.021	
Cluster production groups	0.022		0.006		0.004	
Cluster private interest groups	0.019	*	0.008		0.009	
Cluster service groups	-0.001		0.049	**	-0.036	
Cluster political groups	0.002		-0.094	***	0.079	*
Cluster other groups	-0.205		0.562		-0.201	
Constant	-0.925	*	-1.639	***	-3.544	***
Observations	2314		1443		1142	
Groups	1158		913		808	
Wald's Chi-square statistic	371.97	***	173.910	***	89.83	***
Log likelihood	-1051.4421		-660.587		-535.43181	
Likelihood-ratio test of rho=0	9.06	***	3.57	***	16.66	***

Notes: *** indicates coefficients and tests significant at the 1% level; ** indicates coefficients and tests significant at the 5% level; * indicates coefficients and test significant at the 10% level.

The model estimations have very good fits, with highly significant Chi-square statistics. In addition to this, the RE estimations are all preferred to their pooled model counterparts,

since the likelihood ratio tests presented in the last row of the table are all significant. This means that in all three estimations in the table, the time dimension of the data is important. In addition, variability over time can be captured by the independent variables as well, in particular the lags and differences.

Similar results to the welfare regressions appear in Table 5.2. Controlling for all the other independent variables in the model, poverty is worse in 1998 than in 1993, but it is not significantly better in 2004 than in 1993. This is contrary to the bivariate relationship represented in Figure 1, which shows that poverty decreases in 2004 to a lower level than was present in 1993. Essentially, the conflicting may result simply mean that poverty is not just declining over time, but rather that the determinants of poverty are changing over time such that households are becoming less likely to be poor because of these changes.

As is evident from the table, the education of the head is again very important for the household. Higher levels of education for the household head reduces both the current and future probability of being poor, while increasing the head's education level also lessens the future probability of being poor. Again, as well, household education is playing a similar role, but not an identical one. Raising education levels lowers the chance of being poor now or in the future, but increasing education levels increases the probability of being poor after the increase. The simplest explanation for this could be the financial burden associated with furthering household members' educations, which could initially see household welfare decline. The levels-on-levels welfare model estimation also shows a similar result (when including the 1993 data): lower welfare levels are associated with previous increases in total household years of education (see Table 4.1).

Having a female household head also raises the probability of being poor, although it has no significant effect for the household later on into the future. Similarly, younger household heads are more likely to be poor than older heads.

Household composition also plays a similar role to that played in the welfare regressions. In the levels-on-levels model, it is evident that household size is more influential than composition, with increases in the number of members in any age group increasing the household's probability of being poor. Higher numbers of children and adults also raise the

future probability of being poor, while increases in the number of elderly also raise the probability of later on being poor.

Once more, African households and those residing in rural areas experience higher (and much larger) probabilities of being poor than their Indian and urban counterparts, respectively. Having grazing land access and access to farming tools also lowers the probability of being poor, while gaining access to farm tools lowers the chance of being poor after acquiring the tools.

Perhaps the strangest result in the table, and one for which this research cannot draw a logical explanation from previous literature at least, is the negative and significant coefficient on the morbidity burden in the levels-on-levels model. This result means that, in the sample, higher morbidity lowers the probability of being poor. The explanation for this may be the fact that, in South Africa, ill people qualify for a disability grant. Furthermore, uptake in these grants has increased significantly over time (Booysen and Van der Berg, 2005). Thus, greater morbidity burdens may reduce the probability of being poor.

Coming to the household-level social capital measures, one will immediately notice that membership in financial groups lowers the current and future probability of being poor, while increasing memberships in this type of group also decreases the probability of being poor. One should be reminded, however, of the similar result found in the welfare regressions, which warrants the same word of caution – although the presence of the group definitely lowers exposure to poverty, a household may already have to be non-poor to be able to benefit from these groups. The same welfare-financial group cycle may be present: higher welfare leads to more financial group memberships which in turn lead to better welfare levels (and hence less probability of being poor). In addition to the significant financial group membership coefficients, an increase in production group memberships, or an increase in private interest group memberships, or higher levels of political group memberships all are associated with lower probabilities of being poor.

As for the community-level social capital, keeping in mind the arguments laid out after the welfare regressions with respect to these variables, we must be cautious of any conclusions that can be drawn from the regression results. After dropping the 1993 data, and re-estimating the three models, if the coefficients of these group availability variables remain

unchanged, then only may the results presented here be regarded as robust, and thus any conclusions drawn from the results, as valid.

Ignoring the positive coefficients for the time being (these will be revisited provided they remain positive and significant in the next set of estimations), financial group availability has a negative and significant coefficient in the levels-on-levels model, meaning that a higher number of financial groups in the community actually lowers the probability of households in that community being poor. Availability of political groups in turn lowers the future probability of being poor.

When the 1993 data is omitted from the models, only the levels-on-levels model retains its panel nature. However, all the models are still significant, and the two cross-sectional probit estimations have high pseudo R^2 statistics, keeping in mind that for cross-sectional data a R^2 over 20% is considered adequate.

The time trend is evident again in the panel levels-on-levels model, with households being less likely to be poor in 2004 compared with 1998. The education level of the household head is still significant with a negative coefficient in the levels-on-levels and levels-on-lags models. This means that households enjoy a smaller likelihood of being poor now and in the future when the household head is better educated. The education of the household is also significant, with negative coefficients in the two models. Similarly, therefore, better educated households are less likely to be poor now and in the future.

Older household heads are still less likely to be poor once the 1993 data is dropped, although the effect of gender is not significant anymore. In the levels-on-levels model, household composition plays the same role, with larger households in any of the composition categories experiencing a higher likelihood of being poor. Without the 1993 data, however, only greater numbers of children raise the likelihood of being poor in the future. African households are more likely to be poor than Indian households, now and in future. Rural households are more likely to be poor, although the effect of living in a rural area in the past is lost.

Table 5.3. Regressions of household poverty using data from 1998, and 2004

	RE Probit		Probit		Probit	
	Levels-on-levels		Levels-on-lags		Levels-on-differences	
Year (2004 = 1, 1998 = 0)	-0.650	***				
Head's years of education	-0.128	***	-0.065	**	-0.098	
Head gender (female = 1, male = 0)	0.101		0.056		-0.068	
Head's estimated age	-0.040	*	-0.036		-0.053	
Square of the head's estimated age	0.000		0.000		0.000	
Number of 0 to 14 year olds	0.108	***	0.083	***	0.044	
Number of males 15 to 64 years old	0.175	***	0.010		-0.018	
Number of females 15 to 64 years old	0.317	***	0.040		0.055	
Number of 65 year olds and older	0.409	***	-0.079		0.138	
Race (African = 1, Indian = 0)	1.724	***	1.977	***	0.794	*
Place of residence (rural = 1, urban = 0)	0.610	***	0.291		0.986	***
Household total years of education	-0.022	***	-0.014	**	0.016	
Owns farming vehicle (yes = 1, no =0)	0.479		0.728		0.651	
Owns mechanical farm equipment (yes = 1, no =0)	-0.061		-0.238		0.191	
Owns farming tools (yes = 1, no =0)	-0.265	**	0.006		-0.272	*
Access to grazing land (yes = 1, no =0)	-0.179		0.253		-0.348	*
Number of cattle	-0.019		0.010		-0.037	
Number of ill persons in household	-0.017		0.003		-0.167	*
Household social capital						
Household church group memberships	-0.028		-0.006		0.002	
Household finance group memberships	-0.194	***	-0.045		-0.109	**
Household production group memberships	-0.232		0.335		-0.308	
Household private interest group memberships	-0.100		0.002		-0.006	
Household service group memberships	-0.244		-0.211		0.286	
Household political group memberships	-0.513	***	-0.164		-0.070	
Other household group memberships	-0.575		0.873		-0.640	
Cluster social capital						
Cluster church groups	0.008		0.002		-0.005	
Cluster finance groups	-0.020		-0.077	***	0.017	
Cluster production groups	0.027		0.045		0.011	
Cluster private interest groups	0.016		0.005		-0.003	
Cluster service groups	-0.013		0.067	**	-0.026	
Cluster political groups	-0.038		-0.045		0.018	
Cluster other groups	-0.192		0.676	*	-0.280	
Constant	-0.033		-1.175		-2.058	***
Observations	1308		617		363	
Groups	945					
Pseudo R-square statistic			0.243		0.284	
Wald's Chi-square statistic	230.39	***				
Likelihood ration Chi-square statistic			180.27	***	118.02	***
Likelihood-ratio test of rho=0	4.89	**				

Notes: *** indicates coefficients and tests significant at the 1% level; ** indicates coefficients and tests significant at the 5% level; * indicates coefficients and test significant at the 10% level.

Access to farming tools is robust in the levels-on-levels model and the levels-on-differences model, meaning that owning farm tools and acquiring access to farm tools both

lower the chances of the household being poor. Additionally, acquiring grazing land access is now significantly related to a smaller probability of being poor.

The morbidity burden is again negatively related to poverty, but this time in the levels-on-differences model, meaning that a decrease in the burden of morbidity is associated with a higher likelihood of being poor. Again, this is evidence of households with increases in the number of ill persons collecting more compensation from disability grants, thus helping to reduce the probability that the household is will be poor.

Finance group memberships again have negative coefficients in Table 5.3, although without the 1993 data, the effect of financial group memberships in the future is lost (note the insignificant coefficient in the levels-on-lags model). Still, though, increasing memberships and having a high level of memberships are both related to lower likelihoods of being poor. Political group membership is also robust in the panel levels-on-levels model, meaning that one cannot dispute the fact that more political group involvement leads to a lower likelihood of being poor.

At the community level, higher numbers service groups still lower the likelihood of households in that area being poor, the only robust result among these variables. Community availability of financial groups is not significant in the levels-on-levels regression anymore, but rather the levels-on-lags model, meaning that if the 1993 data is dropped, higher numbers of these groups seems to reduce the likelihood of being poor, but only later on in time (as opposed to immediately).

Similar to the overarching conclusions made after the welfare model regressions, we can note that it is household demographics, the most basic agricultural physical capital, human capital, and social capital in the form of household financial group memberships and political group memberships that contribute to households being less likely to be poor. Again, similar to the results in the welfare model estimations, there is evidence that both horizontal networks (finance groups) and vertical networks (political groups) are important for households in decreasing the likelihood of households being poor. Also similar to the welfare results, it has been shown that it is household-level network social capital, rather than community-level network social capital that is important in explaining the determinants of poverty.

The only difference between these conclusions and those drawn for the welfare regressions seems to be the lack of significance here of household membership in service groups. This essentially leads one to believe that it is generally the same characteristics of a household that determine welfare levels that determine the probability of the household being poor or not. The exception in our case is that, while service group memberships benefit a household's welfare generating processes, they do not influence whether a household is poor or not. The exact dynamics of this relationship (whether there is pooling in the service groups, so that only the poor or non-poor benefit from memberships in those organizations) can only be explored by performing additional regressions. For example, one could re-estimate a welfare model for the poor and non-poor separately. In addition to clearing up the dynamics of service group social capital, these estimations should display any pooling that may be occurring in the different types of groups. The results of this estimation are presented in Table 4.

The estimations provide good fits for the poor and the non-poor. The year indicators present an interesting result. For the poor, household welfare is significantly lower in 1998 and 2004 than in 1993, while for the non-poor, household welfare increases significantly between 1993 and 2004. This may be evidence of increasing inequality in KwaZulu-Natal.

From this table we see that financial groups are important for the poor, and service groups are important for the non-poor. Both household-level memberships in these groups, and cluster-level availability of these groups are significantly and positively related to household welfare. This result may have important implications for the copying and pooling phenomena. The poor are most likely benefiting from being in financial groups that include households with higher welfare levels. This is an example of copying. As for service groups, the poor are not benefiting at all from memberships in these groups, meaning that copying may not be occurring in these groups. Rather, pooling may be present, where the poor and the non-poor join separate service groups. These conclusions must be noted with a word of caution, though: without exploring group structures in depth, the conclusions should be regarded as possible explanations for the results in Table 5.4, rather than definite ones.

Table 5.4. Welfare levels-on-levels regression for the poor and non-poor using the 1993, 1998, and 2004 data

GLS: RE	Levels-on-levels for the poor		Levels-on-levels for the non-poor	
Year (1993)				
1998	-0.191	***	-0.008	
2004	-0.109	*	0.331	***
Head's years of education	0.018	***	0.043	***
Head gender (female = 1, male = 0)	-0.066	**	-0.075	**
Head's estimated age	0.004		0.019	***
Square of the head's estimated age	0.000		0.000	**
Number of 0 to 14 year olds	-0.012	*	-0.040	***
Number of males 15 to 64 years old	-0.036	***	-0.034	**
Number of females 15 to 64 years old	-0.020		-0.047	***
Number of 65 year olds and older	-0.003		-0.074	**
Race (African = 1, Indian = 0)	-0.109		-0.399	***
Place of residence (rural = 1, urban = 0)	-0.148	***	-0.099	**
Household total years of education	0.005	***	0.005	***
Owns farming vehicle(yes = 1, no =0)	0.024		0.227	*
Owns mechanical farm equipment (yes = 1, no =0)	-0.066		-0.067	
Owns farming tools (yes = 1, no =0)	0.101	***	0.059	**
Access to grazing land (yes = 1, no =0)	0.110	***	0.042	
Number of cattle	0.007	**	0.005	
Number of ill persons in household	0.008		-0.019	
Household social capital				
Household church group memberships	-0.008		-0.010	
Household finance group memberships	0.030	**	-0.002	
Household production group memberships	0.025		0.058	
Household private interest group memberships	-0.010		0.014	
Household service group memberships	-0.053		0.166	***
Household political group memberships	0.063		0.027	
Other household group memberships	-0.199		0.054	
Community social capital				
Cluster church groups	-0.002		0.004	**
Cluster finance groups	0.010	**	-0.006	
Cluster production groups	-0.002		-0.002	
Cluster private interest groups	0.005		0.005	
Cluster service groups	0.001		0.010	***
Cluster political groups	-0.008		-0.017	**
Cluster other groups	0.030		0.107	***
Constant	5.959	***	6.605	***
Observations	969		1345	
Groups	655		811	
R-square statistic within	0.088		0.4202	
between	0.163		0.518	
overall	0.143		0.5564	
Wald's Chi-square statistic	156.6	***	1433.62	***
LM test for RE	0.42		87.5	***

Notes: *** indicates coefficients and tests significant at the 1% level; ** indicates coefficients and tests significant at the 5% level; * indicates coefficients and test significant at the 10% level.

Glancing at the remainder of the coefficients, one can draw similar conclusions to those already mentioned – that household demographics, agricultural physical capital, human capital, and social capital all matter in explaining differences in household welfare. This time around, though, besides the social capital results, we can see that agricultural assets are more important for the poor than the non-poor (probably because poverty is more prevalent in the rural areas), and a larger household size is more of a strain for the non-poor.

To test the robustness of the results presented in Table 5.4, the regression for the poor was re-estimated as a pooled OLS model (since the LM statistic is insignificant in the tables), and both regressions were also re-estimated without the 1993 data. The results are extremely robust: almost no major differences are evident in the pooled model for the poor. This means that financial group social capital is still significantly and positively associated with household welfare for the poor, and service group social capital is still significantly and positively related to household welfare among the non-poor. When the 1993 data is dropped, household-level financial group memberships are once more positively and significantly related to household welfare for the poor, and service groups (and availability of these groups at the cluster level) are still positively and significantly related to household welfare for the non-poor. Differences in the regressions without the 1993 data are that household private interest group memberships become significant (and are positively related to household welfare) for the poor, while cluster-level availability of financial groups loses its significance for the poor.

Initially, after estimating the welfare regressions, the question arose as to whether or not endogeneity could explain why the financial group membership variable has a positive and significant coefficient. From these last estimations, however, it is substantially clearer that the endogeinity is not as much of an issue as it could have been – poor households, and not the non-poor, benefit most from financial group memberships, meaning that it is those without high levels of welfare that are able to raise welfare levels using that type of group. Yet, it must be noted also, that even though it is only the poor benefiting from financial group social capital, there may still be endogeneity between this type of social capital and household welfare. One may find that it is the poor households with higher welfare levels that have financial group social capital.

Table 5.5. Poverty status change regressions using the 1993, 1998, and 2004 data

Multinomial probit	Differences-on-lags				Differences-on-differences			
Change in poverty status	Out of poverty		Into poverty		Out of poverty		Into poverty	
Year (1998 = 1, 2004 = 0)	-1.031	***	0.826	***	-0.920	***	0.785	***
Head's years of education	-0.107	***	-0.039		0.020		-0.109	**
Head gender (female = 1, male = 0)	-0.080		-0.104		-0.099		-0.144	
Head's estimated age	-0.027		0.015		0.006		-0.046	
Square of the head's estimated age	0.000		0.000		0.000		0.000	
Number of 0 to 14 year olds	-0.007		-0.020		-0.058		-0.034	
Number of males 15 to 64 years old	0.042		0.007		-0.078		-0.081	
Number of females 15 to 64 years old	0.017		0.004		-0.079		0.122	*
Number of 65 year olds and older	0.212		0.131		-0.092		0.093	
Race (African = 1, Indian = 0)	2.260	***	2.739	***	1.912	***	1.675	***
Place of residence (rural = 1, urban = 0)	-0.014		-0.218		-0.017		0.194	
Household total years of education	0.011	*	-0.001		-0.001		0.009	
Owns farming vehicle (yes = 1, no =0)	-32.520		-0.287		-0.417		0.287	
Owns mechanical farm equipment (yes = 1, no =0)	0.015		-0.083		-0.161		0.084	
Owns farming tools (yes = 1, no =0)	-0.226		0.262		0.284	**	-0.013	
Access to grazing land (yes = 1, no =0)	0.032		0.398	**	0.085		-0.323	**
Number of cattle	-0.028		-0.021		0.022		0.037	*
Number of ill persons in household	-0.076		0.029		0.083		-0.043	
Household social capital								
Household church group memberships	-0.122	**	-0.030		0.027		-0.059	
Household finance group memberships	-0.062		0.022		0.080		-0.037	
Household production group memberships	-0.641	**	-0.266		0.329		-0.224	
Household private interest group memberships	-0.171		-0.131		0.050		-0.155	
Household service group memberships	-0.062		0.081		0.087		0.115	
Household political group memberships	0.352		0.342		0.111		0.238	
Other household group memberships	-31.743		-31.454		-0.278		-0.896	
Community social capital								
Cluster church groups	0.004		0.021		0.000		0.007	
Cluster finance groups	0.001		0.012		0.022		0.002	
Cluster production groups	-0.021		0.015		-0.045	**	0.008	
Cluster private interest groups	0.030		-0.012		-0.013		-0.026	
Cluster service groups	-0.007		0.019		0.004		-0.018	
Cluster political groups	-0.025		-0.140	***	-0.036		0.020	
Cluster other groups	-0.182		0.138		-0.239		-0.002	
Constant	-1.436	*	-4.346	***	-2.437	***	-3.393	***
Observations			1443				1142	
Log likelihood			-1023.485				-775.627	
Wald's Chi-square							220.22	***

Notes: 1. *** indicates coefficients and tests significant at the 1% level; ** indicates coefficients and tests significant at the 5% level; * indicates coefficients and test significant at the 10% level.

2. The results for the differences-on-lags model estimation are not entirely complete, due to the fact that the number of iterations of the multinomial probit model was kept to a maximum of 50. Without reaching convergence in the specified number of iterations, the model may not be able to provide a goodness-of-fit test statistic, and the coefficients for a number of variables can be given without reliability attached (the shaded cells in the table).

To continue to analyze the determinants of poverty, this research must follow on to the multinomial probit estimations of the change in poverty status variable. These estimations allow one to decipher how households move into and out of poverty, as opposed to staying non-poor or staying poor. The initial estimations, those using all the data, are presented in Table 5.5.

The differences-on-lags model reaches convergence and has a significant fit, whereas convergence is not achieved in the differences-on-lags model. Note also that households are more likely to move into poverty in 1998 and less likely to move out of poverty (than stay poor or non-poor in both cases) compared with 2004.

With or without estimation convergence the significant variables are most often as expected. It is clear that African households are more likely to move both into and out of poverty compared with Indian households, as opposed to staying poor or non-poor. A move out of poverty is also more likely to occur if previous levels of household education are higher. The acquisition of farming tools helps increase the chance that a household will move out of poverty. Previously owning grazing land, however, increases the chances that the household will move into poverty rather than stay where it is. This last result is the same as that obtained in the differences-on-lags welfare regression – where having grazing land exposes the household to future adverse welfare changes. Strangely enough, it seems that acquiring grazing land helps a household fight a drop into poverty (note the significant negative coefficient on the grazing land access acquisition variable in the differences-on-differences model), specifically for moves into poverty. Morbidity once more is insignificant in the estimations.

Some results, though, are suspicious. For example, in the differences-on-lags model higher levels of household head education are significantly associated with lower probabilities of in future moving out of poverty. On the other hand, increasing the level of the head's education is less likely to cause a move into poverty than no move at all, which is a plausible result.

Moving to the analysis of social capital, several more interesting results are evident, allowing a deeper understanding, in particular, of household social capital. The first thing to notice is that financial group social capital is not significant in these estimations. One

may go as far as to say that it seems that, although poor households can use these groups to raise their welfare levels, it's generally not enough to escape the grip of poverty. The question now is if these insignificant results for financial social capital are robust. Further multinomial probit estimations that exclude the 1993 data can shed light on this and are discussed below.

The remainder of the social capital results however, seem also to be suspect. The more church group memberships and production group memberships, the less likely the household is to escape poverty. It seems that a test for robustness of these results is indeed necessary, not just to clear the air of any false conclusions made about financial group social capital, but the other group types as well.

Finally, the cluster-level availability of social capital can be examined as well, bearing in mind that for reasons noted elsewhere the conclusions may change once the 1993 data is dropped. More political group availability enables households to avoid falling into poverty. An increase in cluster availability of production groups, however, is associated with households less likely to escape poverty (than stay poor or non-poor). Note the possibility of endogeneity in this latter result: it may be that those households unable to escape poverty are starting to form production groups to address this problem.

When the 1993 data is dropped from these models, the results in Table 5.6 are obtained. Of course, a sign for caution immediately arises from the fact that in the differences-on-lags estimation, convergence is again not achieved, and in the differences-on-differences model estimation the goodness-of-fit is not significant. One reason for the lack of significance in the second estimation could be the small number of observations that are retained once the 1993 time period has been dropped from the estimation procedure (n = 363).

Table 5.6: Poverty status change regressions using the 1998 and 2004 data

Multinomial Probit	Differences-on-lags				Differences-on-differences			
Change in poverty status	Out of poverty		Into poverty		Out of poverty		Into poverty	
Head's years of education	-0.107	***	-0.029		0.016		-0.155	
Head gender (female = 1, male = 0)	-0.073		-0.172		-0.100		0.859	
Head's estimated age	-0.051		-0.077		0.056		-0.074	
Square of the head's estimated age	0.000		0.001		0.000		0.000	
Number of 0 to 14 year olds	0.016		0.096		-0.104		-0.173	
Number of males 15 to 64 years old	0.151	*	0.018		-0.051		-0.046	
Number of females 15 to 64 years old	0.156	*	-0.021		-0.176		0.037	
Number of 65 year olds and older	0.347	*	-0.394		-0.477	*	0.008	
Race (African = 1, Indian = 0)	2.336	***	1.942	**	2.736	***	1.540	**
Place of residence (rural = 1, urban = 0)	0.248		-0.319		0.077		-0.648	
Household total years of education	-0.003		-0.010		0.006		0.051	*
Owns farming vehicle (yes = 1, no =0)	-37.527		0.922		-0.905		-0.414	
Owns mechanical farm equipment (yes = 1, no =0)	-0.198		-0.409		-0.053		-0.214	
Owns farming tools (yes = 1, no =0)	-0.114		0.137		0.481	**	0.391	
Access to grazing land (yes = 1, no =0)	-0.138		0.473		0.438	*	-0.854	*
Number of cattle	-0.016		-0.006		0.017		0.111	
Number of ill persons in household	0.024		-0.065		0.110		0.071	
Household social capital								
Household church group memberships	-0.084		0.081		0.020		-0.158	**
Household finance group memberships	-0.171	*	-0.072		0.099	*	-0.105	
Household production group memberships	-0.778	*	-0.140		0.390		-0.458	
Household private interest group memberships	-0.334	**	-0.257		0.027		-0.039	
Household service group memberships	-0.276		-0.113		-0.068		1.639	***
Household political group memberships	0.245		0.316		0.151		0.033	
Other household group memberships	-31.752		-31.845		-0.240		-0.824	
Cluster social capital								
Cluster church groups	0.005		-0.009		0.008		-0.009	
Cluster finance groups	0.098	**	0.035		0.013		0.034	
Cluster production groups	-0.075		0.047		-0.032		-0.028	
Cluster private interest groups	0.024		-0.045		-0.012		0.006	
Cluster service groups	-0.047		0.026		-0.001		-0.046	
Cluster political groups	-0.078		-0.051		-0.050		0.076	
Cluster other groups	-0.289		-0.083		-0.741	*	-0.247	
CONSTANT	-1.196		-1.298		-3.417	***	-2.740	***
Observations			617				363	
Log likelihood			-416.59				-210.96	
Wald's Chi-square statistic							70.38	

Notes: 1. *** indicates coefficients and tests significant at the 1% level; ** indicates coefficients and tests significant at the 5% level; * indicates coefficients and test significant at the 10% level.

2. The results for the differences-on-lags model estimation are not entirely complete, due to the fact that the number of iterations of the multinomial probit model was kept to a maximum of 50. Without reaching convergence in the specified number of iterations, the model may not be able to provide a goodness-of-fit test statistic, and the coefficients for a number of variables can be given without reliability attached (the shaded cells in the table).

According to the differences-on-lags model in Table 5.6, African households are again more likely to move in and out of poverty than stay poor or non-poor. Households are more likely moreover to escape poverty when they have a greater number of adults and elderly in the household, and a household head with less education, as well as fewer finance, production, and private interest group memberships. Most of these results are in direct contrast to the conclusions drawn until this point, and also to *a priori* expectations. There are three logical results, though. *Firstly*, the positive significant coefficient of cluster-level availability of financial groups means that households from communities with higher numbers of these groups have households that are more likely to move out of poverty than not having experienced a change in poverty status. *Secondly*, households with greater numbers of elderly may be receiving higher compensation from pensions, and are thus more likely to move out of poverty (than stay poor or non-poor). *Thirdly*, households with more adults have more economically active members, and are also, therefore, more likely to escaper poverty (than stay poor or non-poor).

Moving to the differences-on-differences model displayed in Table 5.6, slightly fewer obscure results appear. Again African households are more mobile in the welfare distribution. Also, smaller or negative changes in the number of elderly in the household are associated with households being more likely to escape poverty. This may be due to the fact that increasing the number of dependents in household should increase the strain on that household's welfare. An increase in household education levels is more likely to draw households under into poverty. Gaining access to farming tools and grazing land helps raise the likelihood of households escaping poverty, while losing grazing land access is associated with households falling into poverty.

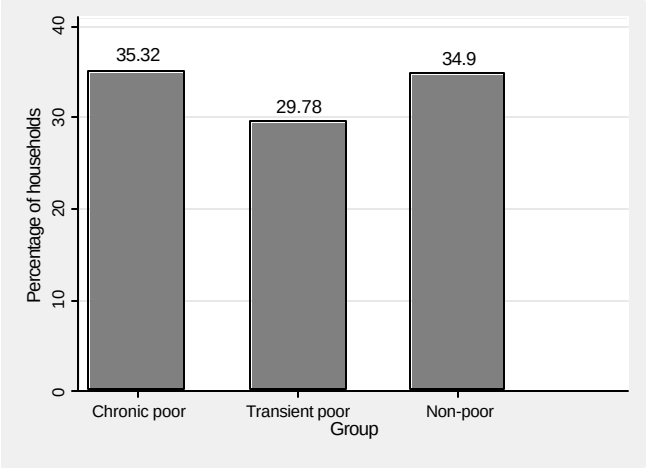
In terms of household group social capital, decreasing church group memberships is associated with households falling into poverty, while increasing financial group memberships is associated with households moving up and out of poverty. Households with more service group memberships are also more likely to fall into poverty. Remember, though, that endogeneity may also play a role in the estimation results of the difference-on-difference model, and may account for some of these results.

There are no robustly significant social capital coefficients in the two estimation sets. Thus, after the estimations presented in Tables 5.5 and 5.6, we can say little more about social

capital and poverty with complete confidence. In any case, convergence of the multinomial probit models could only be reached in two of the four regression outcomes, and one of the two converged models is not even significant in terms of overall fit. One should allow the results to therefore bear less weight than the results obtained previously in the welfare and poverty (level) regressions.

Another extension to poverty analysis and mobility analysis in panel data is to find the determinants of chronic poverty and transient poverty, as opposed to never being poor.[26] A glance at the sample yields the proportions of households in each category as represented in Figure 5.2.

Figure 5.2. Proportion of households chronically poor, transient poor, and non-poor



[26] As mentioned in the methodology section, households are defined as being chronically poor in this paper if they are observed below the poverty line in each period or if their inter-temporal welfare average is below the poverty line. Households are defined as being transient poor if their inter-temporal average is above the poverty line and they are poor in at least one of the three time periods. Non-poor households are never observed to be below the poverty line.

Table 5.7. Poverty type regressions using the 1993, 1998, and 2004 data

Multinomial Probit	Levels on levels				Levels-on-differences			
Type of poverty	Chronic		Transient		Chronic		Transient	
Head's years of education	-0.190	***	-0.140	***	-0.239	***	-0.116	**
Head gender (female = 1, male = 0)	0.363	**	-0.025		-0.320		-0.081	
Head's estimated age	-0.104	***	-0.057	**	-0.092	**	-0.075	*
Square of the head's estimated age	0.001	***	0.000		0.001		0.000	
Number of 0 to 14 year olds	0.270	***	0.166	***	-0.041		-0.016	
Number of males 15 to 64 years old	0.510	***	0.288	***	-0.082		-0.104	
Number of females 15 to 64 years old	0.523	***	0.336	***	-0.062		0.011	
Number of 65 year olds and older	0.531	***	0.436	***	0.115		0.220	
Race (African = 1, Indian = 0)	20.269		2.214	***	20.505	***	2.130	***
Place of residence (rural = 1, urban = 0)	0.965	***	0.069		1.663	***	0.289	
Household total years of education	-0.073	***	-0.032	***	0.022	**	0.014	
Owns farming vehicle (yes = 1, no =0)	0.524		0.124		-0.154		-0.145	
Owns mechanical farm equipment (yes = 1, no =0)	0.003		-0.143		-0.108		-0.164	
Owns farming tools (yes = 1, no =0)	-0.052		-0.086		-0.206		-0.082	
Access to grazing land (yes = 1, no =0)	-0.325	*	-0.121		0.310	**	0.127	
Number of cattle	-0.030		-0.043	**	-0.003		0.008	
Number of ill persons in household	-0.041		-0.129	*	0.003		0.004	
Household social capital								
Household church group memberships	0.051	*	0.037		0.019		0.013	
Household finance group memberships	-0.239	***	-0.173	***	-0.055		-0.023	
Household production group memberships	0.155		0.033		0.044		-0.104	
Household private interest group memberships	0.031		-0.033		-0.172	*	-0.083	
Household service group memberships	-0.080		-0.036		-0.160		-0.064	
Household political group memberships	-0.501	*	0.173		-0.210		0.148	
Other household group memberships	-0.035		-0.681		-1.519	*	-0.703	
Cluster social capita;								
Cluster church groups	0.009		0.025	**	0.013		0.024	*
Cluster finance groups	-0.030		0.005		0.038	*	0.035	*
Cluster production groups	-0.040		-0.033		-0.038		-0.059	**
Cluster private interest groups	0.068	***	0.050	***	-0.004		0.007	
Cluster service groups	0.075	***	-0.003		-0.028		-0.013	
Cluster political groups	-0.078	**	-0.073	**	0.033		0.032	
Cluster other groups	0.082		-0.313		-0.362		-0.449	*
Constant	-17.523	***	0.038		-21.075		-1.983	***
Observations			1555				890	
Log likelihood			-1116.78				-724.87	
Wald's Chi-square statistic							76085.75	***

Notes: 1. *** indicates coefficients and tests significant at the 1% level; ** indicates coefficients and tests significant at the 5% level; * indicates coefficients and test significant at the 10% level.
2. The results for the estimations are not entirely complete, due to the fact that the number of iterations of the multinomial probit model was kept to a maximum of 50. Without reaching convergence in the specified number of iterations, the model may not be able to provide a goodness-of-fit test statistic, and the coefficients for a number of variables can be given without reliability attached (the shaded cells in the table).

As with the poverty status change regressions, a multinomial probit estimation is performed (with the non-poor as the reference category), so that one can determine the characteristics

of the chronically poor compared with those of the non-poor, and also the characteristics of the transient poor compared with the non-poor as well. These results are presented in Table 5.7. To test the robustness of the results, the 1993 data is later on omitted from the analysis and the results of these estimations are presented in Table 5.8. Both models estimations fail to achieve convergence, but the levels-on-differences model converges obtains a fit statistic which is highly significant. The results of these estimations are mostly as one would expect after having reviewed the literature on the topic.

The education of the household head is significant and negatively related to poverty in each category and in both estimations. The magnitudes of the coefficients however are larger in the 'chronic poverty' category of both models. This means that, while higher levels and increases in the head's education are associated with reduced likelihoods of being chronically or transitory poor (compared in both cases to being non-poor), the association is greater in magnitude for chronic poverty – the chronically poor have worse educated heads. Household education is also higher in the levels-on-levels model for the non-poor, than it is for the chronic poor and transient poor (especially again for the chronically poor).

A household, however, is slightly more likely to be chronically poor if there have recently been increases in household education levels. This result echoes the results seen previously for household education in the differences models using all the data (for example, in the levels-on-differences welfare model). Thus far one could only assume that the models capture the financial burden of schooling. However, it may also be that it is the chronically poor that are trying hardest to increase education levels. There is no direction of causality in the multinomial probit estimation, because there is no time dimension, so one must assume that both causal directions are possibly valid, meaning that either the chronically poor are attempting to raise education levels, or the processes of raising the levels of education are keeping the households poor.

Female headed households as expected are more likely to be chronically poor than non-poor. Older household heads are less likely to be chronically or transient poor, while increases in the age of the head of the household are also associated with households avoiding both types of poverty. Household size is also critical in the levels-on-levels estimation, with larger households being more likely to be chronically poor or, separately, transient poor, than non-poor. The effect, again, is greater for the 'chronic poverty'

category – the larger households are the more likely to be chronically poor than transient poor.

African households are more likely to poor, both chronically and transitorily. In fact, in the sample, only African households are chronically poor, explaining the very large coefficient for ethnicity in the two model estimations in Table 5.7. Rural households are also more likely to be chronically poor than non-poor.

The grazing land access variable provides an interesting result in Table 5.7. Owning grazing land is associated with a smaller probability of being chronically poor, whereas the chronically poor are more likely to have recently acquired grazing land. Again one must note that causality could be in either direction: acquiring grazing land could be keeping the household poor, or the chronically poor could have acquired the land in order to break out of poverty. The transient poor in turn are more likely to own fewer cattle than the non-poor (note the negative and significant coefficient on the variable in the 'transient poverty' category in the levels-on-levels model).

The household morbidity burden is also significant, with a negative coefficient in the 'transient poverty' category of the levels-on-levels model. This means that households with higher morbidity burdens are less likely to be transient poor, and more likely to be non-poor. The reason for this is probably because these households are receiving more compensation in the form of disability grants, as mentioned previously in this section.

In the household-level social capital results, several aspects are noteworthy. Chronically poor households have more church memberships than the non-poor. As for financial group social capital, both the chronically poor and the transient poor, but especially the chronically poor, have fewer memberships than the non-poor. Furthermore, households with fewer private interest and political group memberships are more likely to be chronically poor. Causality cannot be assumed from these estimations, and so, with these estimations alone, we can only say that either the chronically poor and transient poor have fewer (or more) memberships because they are poor, or the memberships are helping the households remain non-poor (poor). The non-poor are also more likely to have increases in private group memberships (and other group memberships) than the chronically poor, and also to have higher levels of political group memberships.

The results pertaining to availability of social capital at the cluster-level will be discussed once the 1993 data has been dropped and the models re-estimated. This is to avoid making any conclusions in connection with non-robust and unreliable estimates.

Table 5.8: Poverty type regressions using the 1998 and 2004 data

Multinomial Probit	Levels-on-levels				Levels-on-differences			
Poverty type	Chronic		Transient		Chronic		Transient	
Head's years of education	-0.333	***	-0.202	***	-0.166		-0.165	
Head gender (female = 1, male = 0)	0.610	*	0.123		0.282		0.332	
Head's estimated age	-0.356	***	-0.281	**	-0.164	*	0.003	
Square of the head's estimated age	0.003	***	0.002	**	0.002	*	0.000	
Number of 0 to 14 year olds	0.319	***	0.183		0.045		-0.078	
Number of males 15 to 64 years old	0.930	***	0.528	**	0.110		-0.244	
Number of females 15 to 64 years old	0.785	***	0.659	***	0.120		-0.054	
Number of 65 year olds and older	0.690	*	0.684	*	-0.010		-0.141	
Race (African = 1, Indian = 0)	19.413		1.817	**	22.094		2.589	***
Place of residence (rural = 1, urban = 0)	1.042	**	-0.032		1.553	***	-0.067	
Household total years of education	-0.098	***	-0.054	**	0.006		0.032	*
Owns farming vehicle (yes = 1, no =0)	0.834		-0.747		-0.130		-0.481	
Owns mechanical farm equipment (yes = 1, no =0)	0.279		0.212		0.438		0.285	
Owns farming tools (yes = 1, no =0)	-0.484		-0.330		-0.252		-0.103	
Access to grazing land (yes = 1, no =0)	0.322		0.095		0.134		0.144	
Number of cattle	-0.141	**	-0.072		-0.160	***	-0.025	
Number of ill persons in household	-0.089		-0.121		-0.124		-0.095	
Household social capital								
Household church group memberships	-0.017		-0.054		0.026		0.007	
Household finance group memberships	-0.147		-0.068		-0.035		0.021	
Household production group memberships	-0.606		-0.398		-0.194		-0.126	
Household private interest group memberships	0.055		0.042		-0.029		0.038	
Household service group memberships	-0.360		0.007		0.018		0.041	
Household political group memberships	-0.810		0.128		0.153		0.320	
Other household group memberships	-0.564		-0.850		-1.392		-0.805	
Community social capital								
Cluster church groups	0.009		0.032	*	0.015		0.035	**
Cluster finance groups	0.020		0.024		0.064	**	0.037	
Cluster production groups	0.050		-0.020		-0.017		-0.065	**
Cluster private interest groups	0.020		0.008		-0.040	*	-0.014	
Cluster service groups	-0.060		-0.057	*	-0.038		-0.008	
Cluster political groups	-0.096		-0.084		-0.004		-0.005	
Cluster other groups	-3.358	**	-1.359	**	-1.885	***	-0.822	**
Constant	-7.739	**	8.230	**	-22.840	***	-2.301	***
Observations			382				360	
Log likelihood			-232.688				-255.345	

Notes: 1. *** indicates coefficients and tests significant at the 1% level; ** indicates coefficients and tests significant at the 5% level; * indicates coefficients and test significant at the 10% level.

2. The results for the estimations are not entirely complete, due to the fact that the number of iterations of the multinomial probit model was kept to a maximum of 50. Without reaching convergence in the specified number of iterations, the model may not be able to provide a goodness-of-fit test statistic, and the coefficients for a number of variables can be given without reliability attached (the shaded cells in the table).

Table 5.9. Chronic poverty regressions using the 1993, 1998, and 2004 data

Probit Chronic Poverty	Levels-on-levels		Levels-on-differences	
Head's years of education	-0.090	***	-0.132	***
Head gender (female = 1, male = 0)	0.299	***	-0.231	
Head's estimated age	-0.037	**	-0.032	
Square of the head's estimated age	0.000	*	0.000	
Number of 0 to 14 year olds	0.107	***	-0.024	
Number of males 15 to 64 years old	0.208	***	-0.020	
Number of females 15 to 64 years old	0.193	***	-0.056	
Number of 65 year olds and older	0.174	*	-0.005	
Race (African = 1, Indian = 0)				
Place of residence (rural = 1, urban = 0)	0.714	***	1.164	***
Household total years of education	-0.035	***	0.011	*
Owns farming vehicle (yes = 1, no =0)	0.339		-0.063	
Owns mechanical farm equipment (yes = 1, no =0)	0.075		-0.008	
Owns farming tools (yes = 1, no =0)	-0.012		-0.121	
Access to grazing land (yes = 1, no =0)	-0.189	*	0.180	*
Number of cattle	0.000		-0.007	
Number of ill persons in household	0.034		0.003	
Household church group memberships	0.015		0.008	
Household finance group memberships	-0.086	**	-0.030	
Household production group memberships	0.098		0.087	
Household private interest group memberships	0.044		-0.097	
Household service group memberships	-0.091		-0.093	
Household political group memberships	-0.499	***	-0.263	
Other household group memberships	0.280		-0.846	
Cluster church groups	-0.008		-0.004	
Cluster finance groups	-0.025	**	0.012	
Cluster production groups	-0.011		-0.003	
Cluster private interest groups	0.022	**	-0.007	
Cluster service groups	0.057	***	-0.015	
Cluster political groups	-0.016		0.012	
Cluster other groups	0.188		-0.089	
Constant	0.286		-0.947	***
Observations	1275		711	
Log likelihood	-649.47		-419.53	
LR chi2(df)	434.18	***	126.58	***
Pseudo R2	0.2505		0.1311	

Notes: 1. *** indicates coefficients and tests significant at the 1% level; ** indicates coefficients and tests significant at the 5% level; * indicates coefficients and test significant at the 10% level.

Unfortunately, the estimations excluding the 1993 data again fail to reach convergence (Table 5.8). In the levels-on-levels model, the results are similar to before with respect to the non-social capital variables, except that this time around the chronically poor, as expected, have fewer cattle than the non-poor. All of the household-level social capital variables moreover lose significance without the 1993 data. We can, therefore, find no robust significant results for household social capital as determinants of chronic or transient poverty (compared with being non-poor).

In the differences-on-differences model, many of the significant coefficients in the previous estimation also become insignificant one the 1993 data is dropped. Household education, however, is now significant and has a positive coefficient in the 'transient poverty' category. Thus, the transient poor have higher education levels compared with the non-poor, which is contrary to expectations. As expected, though, an increase in cattle is now also more likely to be associated with being non-poor rather than chronically poor.

The household-level social capital variables are insignificant in this regression, although at the cluster-level there are several robust results (coefficients that are significant across both estimations, with and without the 1993 data). The transient poor generally have increased availability of church group social capital and larger and less of production group social capital (and other group social capital) than the non-poor. The chronically poor are more associated with increases in access to financial group social capital than the non-poor. This may be evidence of the dependence on financial group social capital to those who need it most, the chronically poor, in particular given the nature of these groups (e.g. stokvels). However, endogeneity may be present once more: it may be that the households' poverty types in a community dictate the networks formed in that community, rather than the other way around.

A final set of models in this section are estimated in an attempt to clarify further the results in Tables 5.7 and 5.8. Because chronic poverty is such an undesired status in a world rapidly trying to meet the expectations of the Millennium Development Goals, a clearer picture of the determinants of chronic poverty alone (compared with both the transient poor and non-poor rather than just the non-poor) may be required. For this reason, a binary indicator labeling households as chronically poor or not chronically poor is used as a dependent variable in a set of probit models. The estimation results of these models are

presented in Tables 5.9 and 5.10, the latter estimating the models without the 1993 data. Because all chronically poor in the sample are African households, the ethnicity variable is dropped from the estimations. One can also notice that the models have significant fits and the levels-on-levels model has a reasonably high R^2 statistics.

The results of the levels-on-levels model reaffirm the previous results. Households with male, older, and more educated heads are less likely to be chronically poor, and the same goes for smaller, urban, better educated households, as well as those with access to grazing land. On the social capital side of things, households with a larger number of finance and political group memberships are less likely to be chronically poor, and the same goes for those households in areas with fewer finance groups and more private interest and service groups. The latter result, is debatable, however, and will be revisited after the second set of estimations of these models.

In the levels-on-differences regression it is shown that households with heads that are increasing their education levels generally enjoy a smaller likelihood of being chronically poor, while households that are increasing household total education are slightly more likely to be chronically poor. Again, since causality cannot be determined in a cross-sectional analysis, one must assume that the causal relationship can go both ways – chronically poor households are either trying to escape the poverty trap by increasing education, or by increasing education, households remain poor initially, given the financial burden accompanying this increase in human capital. Rural households and households newly acquiring grazing land are also more likely to be chronically poor. Changes in social capital are not significantly related to being chronically poor.

When the 1993 data is dropped from the analysis, both models remain significant and this time both have reasonably high R^2 statistics (Table 5.10). In the levels-on-levels model, the only major differences are that the number of elderly, access to grazing land, access to financial groups and access to private interest groups become insignificantly related to chronic poverty. The estimation leaves household-level financial and political group social capital significantly negatively related to chronic poverty, meaning that the conclusion that the chronically poor have fewer financial and political group memberships is reliable. Another robust result is that chronically poor households live in communities more service groups can be found. This is not the first time this result appears, although the previous

appearance of a significant positive coefficient for cluster service group availability is in the levels-on-levels welfare regression for the non-poor. These conflicting results force one to treat what seems to be a robust result in the last two estimations as unreliable.

Table 5.10: Chronic poverty regressions using the 1998 and 2004 data

Probit	Levels-on-levels		Levels-on-differences	
Chronic Poverty				
Head's years of education	-0.124	***	-0.040	
Head gender (female = 1, male = 0)	0.247	**	-0.001	
Head's estimated age	-0.044	*	-0.126	**
Square of the head's estimated age	0.000		0.001	**
Number of 0 to 14 year olds	0.095	***	0.067	
Number of males 15 to 64 years old	0.170	***	0.202	**
Number of females 15 to 64 years old	0.149	***	0.103	
Number of 65 year olds and older	0.178		0.054	
Race (African = 1, Indian = 0)				
Place of residence (rural = 1, urban = 0)	0.705	***	1.224	***
Household total years of education	-0.027	***	-0.009	
Owns farming vehicle (yes = 1, no =0)	0.326		0.141	
Owns mechanical farm equipment (yes = 1, no =0)	-0.039		0.209	
Owns farming tools (yes = 1, no =0)	-0.141		-0.152	
Access to grazing land (yes = 1, no =0)	0.004		0.036	
Number of cattle	-0.003		-0.112	***
Number of ill persons in household	0.058		-0.039	
Household social capital				
Household church group memberships	0.015		0.019	
Household finance group memberships	-0.074	**	-0.034	
Household production group memberships	0.076		-0.073	
Household private interest group memberships	-0.016		-0.047	
Household service group memberships	-0.214		0.029	
Household political group memberships	-0.606	***	-0.057	
Other household group memberships	0.255		-0.666	
Community social capital				
Cluster church groups	-0.003		-0.006	
Cluster finance groups	-0.023		0.029	
Cluster production groups	-0.006		0.013	
Cluster private interest groups	0.015		-0.024	*
Cluster service groups	0.032	*	-0.023	
Cluster political groups	-0.004		0.002	
Cluster other groups	0.166		-1.070	**
Constant	0.912		-1.165	***
Observations	811		279	
LR Chi-square statustic	272.25	***	89.31	***
Pseudo R-square statistic	0.247		0.235	

Notes: 1. *** indicates coefficients and tests significant at the 1% level; ** indicates coefficients and tests significant at the 5% level; * indicates coefficients and test significant at the 10% level.

In the levels-on-differences model, the results change slightly once the 1993 data is omitted. A decrease in the household head's age, a decrease in the number of cattle owned, and an increase in the number of male adults in the household are now significantly associated with chronic poverty, as are living in communities with less private interest (and other) groups.

With the previous results of this section and the welfare regressions section added to these, an intricate picture of financial group social capital in particular can be laid out. The only analysis that remains to be completed is that of welfare and poverty on financial group social capital. As the results so far have shown, financial social capital raises welfare over time, and the poor are benefiting from the financial groups more so than the non-poor. However, the evidence was not conclusive that financial group social capital in fact pulls the poor households out of poverty. It is also shown that we cannot assume that non-poor households have more financial group memberships than the poor, although before dropping the 1993 data, there was some evidence to suggest that this is the case. Finally we can note that there is a significant negative association between financial group social capital and chronic poverty. Even though these regressions are cross-sectional, other results suggest that financial social capital can be used by households to escape chronic poverty, although such social capital does not necessarily allow households to escape transient poverty.

The above results, to a certain degree, concur with evidence in the literature review section. What this research adds to the existing body of literature though, is a more detailed look at how different types of social capital, particularly memberships in different group types, are important in explaining poverty dynamics. Though problems with endogeneity remain, financial, service, and political group memberships are associated significantly with poverty and poverty dynamics. However, with the wealth of estimation results presented in this section, there is enough evidence to put forward policy approaches to use social capital to combat poverty, although this will be dealt with in the concluding chapter.

VI: SELF-RATED HEALTH

This section of the empirical work presents the individual-level estimations of self-rated health. Initially the models with the levels of the dependent variable will be examined, and then these will be followed later by the multinomial probit estimations of falling into and climbing out of fair or poor health status.

To start off the analysis though, it is wise to trends over time in self-rated health status: an indicator variable indicating fair, poor, or very poor health compared with good or very good health.[27] A panel transition probability table can be compiled to determine the probability of leaving fair or worse health, or falling into it, or of not moving at all over time. These results are presented in Table 6.1 below.

Table 6.1: Transition probabilities in self-rated health status

	Move to		
	Good or better health	Fair or worse health	Total
Move from			
Good or better health	103	125	228
	45.2%	54.8%	100%
Fair or worse health	173	523	696
	24.9%	75.1%	100%
Total	276	648	924
	29.9%	70.1%	100%

This bivariate analysis indicates that 54% of the individuals reporting good health reported poor health in the next time period, while the rest remained reporting good health. Similarly, 24% of those reporting poor health reported good health in the next time period, while the remainder continued to report poor health. From this very basic analysis, it seems that self-rated health status is on the decline. The discussion now moves onto the regression estimates.

[27] Note that, as mentioned in the methodology section, in this empirical section fair, poor, and very poor health is simply referred to as 'poor' health, while good or very good health is simply referred to as 'good' health.

Table 6.2: Self-rated health regressions using the 1993, 1998, and 2004 data

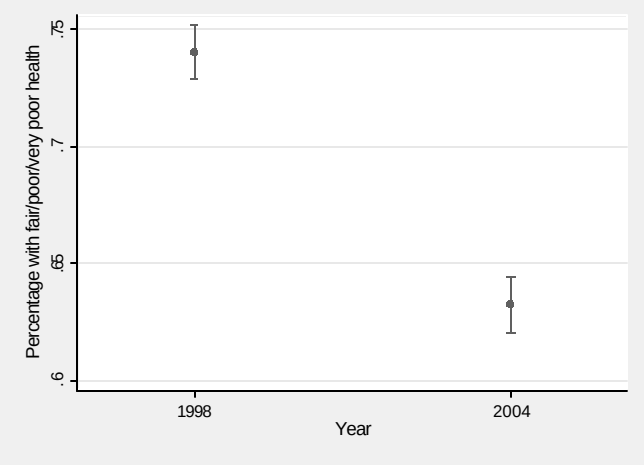
RE Probit Poor health (yes = 1, good health = 0)	Levels-on-levels		Levels-on-lags		Levels-on-differences	
Year (1998 = 1, 2004 = 0)	0.330	***	0.392	***	0.521	***
Estimated age	0.038	*	0.032	*	-0.391	***
Estimated age squares	0.000		0.000		0.004	***
Gender (female=1, male = 0)	0.445	***	0.518	***	0.524	***
Race (African=1, Indian = 0)	-0.813	***	-0.562	***	-0.069	
Place of residence (rural = 1, urban = 0)	0.138		0.232	**	0.308	***
Years of education	-0.043	***	-0.024	*	-0.058	**
Marital status (married = 1, otherwise = 0)	-0.048		0.119		-0.113	
Household welfare	-0.243	***	-0.269	***	-0.062	
Number of 0 to 14 year olds	-0.027		-0.049	***	0.013	
Number of male 15 to 64 year olds	-0.006		0.015		-0.057	*
Number of female 15 to 64 year olds	-0.012		0.003		-0.016	
Number of 65 year olds and older	-0.006		0.063		-0.094	
Number of ill persons in household if healthy	-0.030		0.009		-0.018	
Individual social capital						
Church group memberships	0.096		-0.076		0.150	
Finance group memberships	-0.074		0.163		-0.134	*
Production group memberships	0.284		1.518	***	-0.322	
Private interest group memberships	-0.091		-0.614	*	0.156	
Service group memberships	-0.395	*	0.004		-0.474	**
Political group memberships	0.204		-0.056		0.058	
Other group memberships	0.314		0.579		0.295	
Household social capital						
Household church group memberships	-0.003		0.044		-0.007	
Household finance group memberships	0.070	**	-0.083		0.049	
Household production group memberships	-0.011		-0.301		-0.004	
Household private interest group memberships	0.023		0.034		-0.008	
Household service group memberships	0.441	***	0.230		0.096	
Household political group memberships	-0.101		-0.170		0.138	
Other household group memberships	-0.280		-1.044	*	-0.180	
Community social capital						
Cluster church groups	-0.013	***	-0.016	**	-0.002	
Cluster finance groups	0.030	***	-0.003		0.022	**
Cluster production groups	0.008		0.022		0.002	
Cluster private interest groups	-0.008		-0.003		-0.013	*
Cluster service groups	0.008		-0.009		0.028	***
Cluster political groups	0.032		0.087	***	-0.024	
Cluster other groups	-0.091		-0.216		-0.010	
Constant	0.572		0.602		-0.083	
Observations	2505		2271		2184	
Groups	1717		1498		1475	
Wald's Chi-square statistic	248.140	***	226.39	***	208.07	***
Likelihood-ratio test of rho=0	2.54	*	1.8	*	3.24	**

Notes: *** indicates coefficients and tests significant at the 1% level; ** indicates coefficients and tests significant at the 5% level; * indicates coefficients and test significant at the 10% level.

One must immediately look at the goodness of fit of the model estimations, as given by the Wald's Chi-square statistics. These are all highly significant, meaning that the models adequately explain a significant amount of the variation in individual self-rated health. Another test statistic that is significant in all of the models is the likelihood ratio test

statistic, which means that the time dimension in the data is significant, and thus the RE model is preferred to the pooled version. Note also that the levels-on-levels model cannot be re-estimated without the 1993 data, since the dependent variable does not exist in the 1993 dataset. The other two models presented in this table, however, will be re-estimated without the 1993 data to test the results for robustness.

Figure 6.1: Probability of reporting poor health by year



The time trend in self-rated health is immediately evident one we start examining the coefficients' estimations. Contrary to the transition probability table (Table 6.1), once controlling for all the other covariates of health it seems that health has improved (the likelihood of reporting fair or poor health has decreased) after 1998. The bivariate relationship between time and self-rated health is displayed in Figure 1. Again one can notice the significant decline in the probability of reporting poor health over time. This is an even more basic result than is presented in Table 1, and yet it, too, captures a rising trend in health levels.

Focusing on the levels-on-levels and the levels-on-lags models in Table 6.2, several interesting results are evident. The age of the individual is significant, with older individuals as expected reporting worse health. Females also have significantly worse reported health, again as expected, while Africans report much better health than Indians. The effects of living in a rural area only influence health in the future, with those in rural areas reporting poorer health. The more educated the individual is, the better his/her current and future health. There is also a significant relationship between health and household

welfare. It seems that, after most of the morbidity burden variables have been found insignificant in the welfare and poverty regressions, the direction of causality between welfare and health in the sample is running from welfare to health, and not the other way around. The higher the household's welfare, the better the residents' self-rated health, now and in the future. Also, the more children in the household the better the reported health levels of the household's members in the future.

Coming to the individual-level social capital influences on health, it seems that having high levels of production group social capital is bad for one's health in the future, while the opposite is true for private interest group memberships: higher levels of these raise health levels in the future. It remains to be seen whether these results are robust once the 1993 data has been dropped from the models. Belonging to service groups similarly increases health levels presently. At the household level, higher levels of finance group and service group memberships raise current self-rated health levels. Interestingly enough, these are two of the three group types that were found to be positively related to household welfare (the third being political group social capital).

Greater availability at the cluster level of church group social capital is a cause of lower health levels for individuals in that area currently and into the future, judging by the negative and significant coefficients on the church group availability variables in two of the models. Higher numbers of financial groups in the community in turn raises health levels however, and more political group availability is better for future health levels. Again, it remains to be seen whether these cluster-level social capital results are robust.

Moving to the levels-on-differences model estimation, a strange coefficient estimate is immediately evident: that of estimated age. It is significant and positive in the levels-on-levels and levels-on-lags models, and significant and negative in the levels-on-differences model. These coefficients are meaningless, however, since the age increases of the individuals should differ by a maximum of two years, and only because interview times for those individuals were far apart in the same year. Theoretically, the difference should be a constant in this sample, or at least it would be hoped that it would be insignificant.

Gender and place of residence are significant in the sample still (remember that these variables are not differenced, nor is the measure of ethnicity or race), with females and

rural area residents reporting worse health levels. Also, an increase in years of education leads to better health levels, as expected. At the household level, an increase in the number of male adults in the household is associated with better health levels of individuals in that household.

As for social capital, increases in memberships in both finance groups and service groups cause better health levels, as do increases in private interest group availability at the cluster level. Interestingly enough, increases in availability of financial and service groups at the cluster-level are associated with worse self-rated health, although the coefficients for these are larger in absolute values at the individual level (though only significantly large in the case of service groups). These latter coefficient results may be due to the endogeneity problem once more. Communities with more unhealthy individuals may create finance and service networks to assist in dealing with the poor levels of health. Again, it is necessary to test the robustness of this model estimation's results by dropping the 1993 data from the analysis.

The model estimations presented in Table 6.3 are both significant fits, and both have reasonable pseudo R^2 statistics (above 20%).

Without the 1993 data in the model, age in the levels-on-lags model loses significance, as does race, rural residence, and years of education – all items that are generally thought to be related to health (and, according to the literature, self-rated health in particular). Household welfare and the number of children in the household, however, remain significant and negatively related to reporting poor health. Marriage gains significance, and has a positive coefficient, meaning that married individuals are more likely to report poor self-rated health in the future. Besides the 'other groups' category at the individual and household levels, social capital is insignificant. There are no robust cluster-level social capital results in the levels-on-lags model.

Table 6.3: Self-rated health regressions using the 1998 and 2004 data

Probit Poor health (yes = 1, good health = 0)	Levels-on-lags		Levels-on-differences	
Estimated age	0.051		-0.429	***
Estimated age squares	0.000		0.004	***
Gender (female=1, male = 0)	0.598	***	0.557	***
Race (African=1, Indian = 0)	0.161		0.470	**
Place of residence (rural = 1, urban = 0)	0.152		0.421	***
Years of education	-0.002		-0.046	
Marital status (married = 1, otherwise = 0)	0.267	**	-0.149	
Household welfare	-0.361	***	-0.024	
Number of 0 to 14 year olds	-0.046	*	0.034	
Number of male 15 to 64 year olds	0.021		-0.021	
Number of female 15 to 64 year olds	-0.010		0.001	
Number of 65 year olds and older	0.041		-0.127	
Number of ill persons in household if healthy	-0.040		0.013	
Individual social capital				
Church group memberships	-0.019		0.145	
Finance group memberships	0.208		-0.233	**
Production group memberships	0.780		-0.343	
Private interest group memberships	-0.661		0.328	
Service group memberships	0.212		-1.010	***
Political group memberships	-0.350		-0.054	
Other group memberships	6.627	***	-0.028	
Household social capital				
Household church group memberships	-0.005		-0.029	*
Household finance group memberships	-0.048		0.058	
Household production group memberships	0.182		-0.032	
Household private interest group memberships	0.030		0.037	
Household service group memberships	0.179		0.000	
Household political group memberships	-0.176		0.084	
Other household group memberships	-6.256		-0.019	
Community social capital				
Cluster church groups	-0.001		-0.002	
Cluster finance groups	-0.056	**	0.010	
Cluster production groups	0.065	**	0.008	
Cluster private interest groups	-0.004		-0.014	*
Cluster service groups	-0.034	**	0.027	**
Cluster political groups	0.103	***	-0.027	
Cluster other groups	0.124		-0.040	
Constant	0.097		-0.006	
Observations	878.000		804.000	
LR Chi-square statistic	249.99	***	227.88	***
Pseudo R-square statistic	0.234		0.2333	

Notes: *** indicates coefficients and tests significant at the 1% level; ** indicates coefficients and tests significant at the 5% level; * indicates coefficients and test significant at the 10% level.

In the differences-on-lags model, the curious age coefficient persists. Race now gains significance in the model, with African households reporting worse health this time around. Again, increases in finance group social capital and service group social capital of the household are associated with better health levels, a robust result. Two other robust results

are the significant negative coefficient on the private interest group availability variable and the significant positive coefficient on the service group availability variable, meaning that increased availability of private interest groups and decreased availability of service groups are associated with better health levels. Again, for the latter result, it may be that communities with lower health levels are creating service groups to deal with the problem. An additional result is the cluster availability of church groups becoming significant with a negative coefficient. This means that greater numbers of church groups are associated with a smaller probability of reporting poor health.

As with poverty status, the research can now move on to examine the factors associated with changes in health status over time, using a multinomial probit estimation. The base category is 'no change', and compared with this are the categories 'move out of poor health' and 'move into poor health'. These estimations are presented in Table 4. Because the data is differenced between time periods, and there is no 1993 data on self-rated health, the estimations automatically drop the 1993 data. This means that we cannot test the robustness of the results by repeating the model estimations as was done in all the previous analyses.

As with the poverty status regression, the multinomial probit estimation of the differences-on-lags model fails to reach convergence within the specified 50 iterations, while the differences-on-differences model converges with a significant fit.

In the differences-on-lags model, older individuals are more likely to fall in poor health rather than remain where they are, although this effect decreases as age increases (evident from the significant negative coefficient on the square of age). Females are also less likely to move out of poor health rather than remain at the same health level, while African individuals are less likely to move out of poor health and more likely to move into it than stay at the same health status level. The same bivariate relationship is evident: in 1998 76% of Indians and 74% of Blacks report their health as poor, whereas in 2004 only 36% of Indians report their health as poor while 68% of Africans report their health as poor.

Table 6.4: Self-rated health changes regressions using the 1998 and 2004 data

Multimonial Pprobit	Differences-on-lags				Differences-on-differences			
Health status change	Out of poor health		Into poor health		Out of poor health		Into poor health	
Estimated age	0.015		0.136	**	0.289	*	0.275	
Estimated age squares	-0.001		-0.002	***	-0.004	***	-0.004	***
Gender (female=1, male = 0)	-0.331	*	-0.111		-0.290	*	-0.259	
Race (African=1, Indian = 0)	-0.740	**	1.439	***	-0.853	***	0.492	
Place of residence (rural = 1, urban = 0)	0.314		0.214		-0.140		-0.176	
Years of education	-0.045		0.016		-0.049		0.119	
Marital status (married = 1, otherwise = 0)	-0.350	*	0.314		0.187		0.514	
Household welfare	0.656	***	0.295	*	0.084		-0.081	
Number of 0 to 14 year olds	0.067	*	0.018		-0.044		0.024	
Number of male 15 to 64 year olds	-0.151	**	-0.055		0.064		-0.030	
Number of female 15 to 64 year olds	0.035		0.011		-0.039		0.011	
Number of 65 year olds and older	-0.035		0.047		0.263		0.144	
Number of ill persons in household if healthy	-0.004		0.025		0.088		0.051	
Individual social capital								
Church group memberships	-0.142		0.354		-0.214		-0.082	
Finance group memberships	-0.526	**	-0.426	**	0.298	*	0.094	
Production group memberships	-0.159		-0.256		-0.253		-0.166	
Private interest group memberships	-0.020		-1.298		-1.168	**	0.265	
Service group memberships	0.313		1.193		1.048	**	0.303	
Political group memberships	0.712		-0.029		-0.272		-0.165	
Other group memberships	-1.519		-0.082		0.196		-0.322	
Household social capital								
Household church group memberships	0.073		-0.106		0.047	**	0.056	**
Household finance group memberships	0.235	*	0.076		-0.105		0.053	
Household production group memberships	-0.525		-0.013		0.412		0.170	
Household private interest group memberships	0.081		0.254		0.071		-0.058	
Household service group memberships	-0.471		-1.165	*	-0.093		-0.096	
Household political group memberships	0.114		-0.405		-0.192		0.363	
Other household group memberships	0.970		-30.331		-0.355		-0.198	
Community social capital								
Cluster church groups	-0.025	*	0.019		0.013		0.001	
Cluster finance groups	0.094	**	-0.064	*	-0.042	*	0.014	
Cluster production groups	-0.060		0.112	**	-0.011		-0.011	
Cluster private interest groups	-0.010		-0.023		-0.008		-0.019	
Cluster service groups	0.038	*	-0.141	**	-0.032	*	0.023	
Cluster political groups	-0.062		0.154	**	0.002		-0.028	
Cluster other groups	0.327		0.583		0.041		-0.054	
Constant	-3.544	**	-6.632	***	0.293		-0.882	
Observations			859				788	
Log likelihood			-631.946				-574.119	
Wald's Chi-square statistic							151.12	***

Notes: 1. *** indicates coefficients and tests significant at the 1% level; ** indicates coefficients and tests significant at the 5% level; * indicates coefficients and test significant at the 10% level.

2. The results for the differences-on-lags model estimation are not entirely complete, due to the fact that the number of iterations of the multinomial probit model was kept to a maximum of 50. Without reaching convergence in the specified number of iterations, the model may not be able to provide a goodness-of-fit test statistic, and the coefficients for a number of variables can be given without reliability attached (the shaded cells in the table).

It seems that married individuals are less likely to move out of poor health. Individuals in households with higher levels of welfare are also more mobile in the health distribution than those with lower levels, since the former are more likely to move into or out of poor health. This effect that higher welfares have on moving into poor health may be explained by the presence of disability benefits for ill individuals. Those households having their welfares raised by the benefits are also the households containing individuals who are ill. The effect, however, is much stronger for moving out of poor health as household welfare increases.

A higher number of children in the household raises one's likelihood of moving out of poor health (which is an extension of the result found in the previous estimations). The number of male adults in the household has the opposite effect: a higher level impedes the likelihood of leaving poor health rather than remaining at the same level.

Coming to the social capital coefficients, we notice that the higher the number of financial group memberships of the individual, the less likely that individual is to move out of poor health rather than stay at the same health level. This must not immediately be judged as a suspicious result, however, since it may just be saying that those with financial group memberships never reported their health as fair, poor, or very poor in the first place. This would seem to be the case, since the likelihood of moving into poor health is also negatively associated with individual financial group memberships, meaning that those falling into poor health also have fewer financial group memberships than those staying at the same health level. An additional explanation may be that the sick individuals are turning to financial groups in order to pay for the burden of his/her illness. This is the endogenous relationship that may be present.

Higher levels of household-level service group memberships, as well as higher levels of cluster availability of financial and service group social capital, and lower levels of cluster-level availability of production and political groups are all associated with lower likelihoods of individuals in those areas falling into poor health rather than remain where they are with respect to self-reported health. Greater numbers of church groups at the cluster level, as well as smaller numbers of finance and service groups are associated with a smaller likelihood of leaving poor health rather than report the same health level. As for the

church group availability, again endogeneity may be present in the model, since it may be those who cannot leave poverty that form church groups to deal with this strain.

In the differences-on-differences model, age is again strangely captured in the estimation. Recall that, theoretically, differences between individuals' differences in ages should not exist, and that these differences between the age increases of individuals are only due to differing interview times for different households. The coefficient estimate is therefore meaningless. The differences in the squares of age, however, are interpretable. Since it is older individuals with larger differences in squared ages, we can interpret the significant negative coefficients in the two models as showing that younger individuals' health status are more likely to have changed from poor health to better health, while older individuals' health status remained unchanged. This may be capturing the effects of the HIV/AIDS epidemic on the younger population.[28] With prevalence rates high in this age group, the negative coefficient result may be showing the effects of frequent bouts of illness on changes over time in self-reported health status.

Once more, it is females and Africans that are less likely to move out of poor health (being more likely to report no change in health status).

An interesting result regarding financial social capital is that an increase in memberships (at the individual level) is associated with moving out of poor health after the increase. Individuals with financial group memberships are not only less mobile in this paper's two-category health distribution, but an increase in memberships increases the likelihood that that individual will move to report better health status. Financial group social capital has been shown to not only be vital for the poor as far as welfare is concerned, but also for the poor as far as health is concerned. In addition to these results, increases in service group memberships and decreases in private interest group memberships are associated with increased probabilities of reporting good or better health after reporting poor health initially. Once more, endogeneity may be present. It could be that better health levels allow an individual to join more networks.

[28] It should be noted that these 'younger' individuals are not children, but the younger subset of the key decision-makers, or core persons of the household. These younger ages could be interpreted as those in their 20s or 30s.

Those individuals in households that reported increases church group memberships are also more likely to be mobile (in both directions) in the two-category health distribution. However, it also seems that if there is an increase in service and financial groups at the cluster level, individuals in those clusters are less likely to move out of poor health and more likely to not be mobile in the distribution.

In summary we can say that many of the results appeared as expected, although some turned out to be surprising. Less educated and older individuals as expected reported poor health and so did females, poorer households, and households from rural areas.

Marriage is not related to self-rated health as expected: there is evidence that married individuals report worse self-rated health in the future, and have a smaller likelihood of escaping poor health. This is in direct contrast to what Wu and Schimmile (2005) and Subramanian *et al*. (2005) find, that married individuals report significantly better health than divorced or single individuals. However, the bivariate relationship between self-rated health and marriage is slightly different: the percentage of married individuals reporting poor self-rated health is significantly lower than the percentage of unmarried individuals reporting the same low health levels ($p < 0.01$). It seems that this relationship is diluted in this research when controlling for many other influences on self-rated health.

Another interesting result is that of the household composition. Households with more children see individuals reporting better health in the future, and have individuals that are more likely to report good or very good health after initially reporting poor health. Bolin *et al*. (2003) and Rohrer *et al.* (2004) find that children in the household do not affect self-rated health, although their studies are based in Sweden and the US, respectively, both first world countries.

Regarding social capital, it seems that higher levels of service group memberships as well as increases in these memberships and in memberships of financial groups are beneficial to health. Financial group social capital also helps in being less mobile in the two-category health distribution, and there is evidence that higher levels of financial group membership induce better health. Having more availability of political group social capital initially seems bad for one's health, with more availability associated with worse health levels and a larger likelihood of falling into poor health compared with not being mobile in health

status. Also increased availability of service groups is also associated with worse health levels, and a smaller likelihood of leaving the poor health category than staying in poor or good health. However, if we take into account endogeneity in the models, these results are acceptable. In communities with lower health levels, these groups may be formed in order to combat this problem of poor health. An increase in household-level service group membership is beneficial for health, and helps lower the likelihood of falling into poor health.

Very interesting is the fact that the illness burden on individuals, that is, the number of ill persons in the household if that person is not ill, i.e. it equals zero if the person him- or herself is ill, is never significantly related to that person's self-reported health. There is no psychological burden from the ill persons in the household that is felt by the healthy and that is enough so to cause them to report poor health.

It is clear that, therefore, social capital, in addition to demographic, socioeconomic, and human capital factors that one expects to influence self-rated health, also affects self-rated health particularly at the individual level and to a lesser degree at the household and cluster levels.

VIII: SOCIAL CAPITAL

The analysis of welfare, health and social capital cannot be complete without a test of the direction of causality between social capital and welfare. One way to do so, apart from using the levels-on-lags, levels-on-differences, and differences-on-lags models is to reverse the direction of the regression models with regards to social capital, to show how the variables that are theoretically determined by social capital in turn affect social capital (although, after reviewing the literature on the topic, the agricultural variables included in the welfare and poverty regressions were not included in these models). In essence, this section of the empirical work is a test of endogeneity of the variables in the above empirical models. It is therefore not *per se* only an exploratory venture into finding the determinants of different types of network social capital, but a set of estimations meant to explore some endogeneity issues also noted in the previous sections of the paper.

As mentioned in the methodology section, various individual-level, household-level, and cluster-level social capital measures are chosen to be dependent variables in this section. These variables are the social capital measures thought to be endogenously related to the dependent variables in the models they appear in. Three model types (levels-on-lags, levels-on-differences, and differences-on-lags) are estimated twice (if possible) for each dependent variable, once including the 1993 data and once omitting it, in order to test the robustness of the results. In this section, the second set of estimations (those omitting the 1993 data) will be presented almost immediately after the first set, so that we can in the discussion focus as far as possible on only the robust results.

Before discussing the determinants of memberships in the different group types, it is necessary to show the correlations between individual-level memberships in the different group types (Table 7.1(a)), those between household-level memberships (Table 7.1(b)) and those between the different community-level groups available (Table 7.1(c)). Additionally, it is interesting to note the correlations between individual-level and community-level social capital (Table 7.1(d)), to determine use of available social capital resources amongst individuals. Finally, similar to the preceding correlation table, it is interesting to investigate the correlations between household-level and community-level social capital ((Table 7.1(e)), to determine extent of the use of available social capital resources amongst households. Note that the correlations are reported, the number of observations used to

calculate the correlation, and the correlations significance. The significance is denoted by ***, **, or *, for significance at the 1%, 5%, or 10% levels respectively.

Table 7.1(a). Correlation matrix of individual memberships in different group types

	Church group memberships		Financial group memberships		Production group memberships		Private interest group memberships		Service group memberships		Political group memberships		Other group memberships	
Church group memberships	1													
	7058													
Financial group memberships	0.256	***	1											
	7058		7058											
Production group memberships	0.093	***	0.124	***	1									
	7058		7058		7058									
Private interest group memberships	0.045	***	0.001		0.034	***	1							
	7058		7058		7058		7058							
Service group memberships	0.090	***	0.074	***	0.093	***	0.084	***	1					
	7058		7058		7058		7058		7058					
Political group memberships	0.078	***	0.086	***	0.083	***	0.033	***	0.116	***	1			
	7058		7058		7058		7058		7058		7058			
Other group memberships	0.070	***	-0.013		0.005		0.042	***	0.099	***	0.047	***	1	
	7058		7058		7058		7058		7058		7058		7058	

Table 7.1(b). Correlation matrix of household memberships in different group types

	Church group memberships		Financial group memberships		Production group memberships		Private interest group memberships		Service group memberships		Political group memberships		Other group memberships	
Church group memberships	1													
	3042													
Financial group memberships	0.214	***	1											
	3042		3042											
Production group memberships	0.095	***	0.134	***	1									
	3042		3042		3042									
Private interest group memberships	0.145	***	0.114	***	0.084	***	1							
	3042		3042		3042		3042							
Service group memberships	0.149	***	0.085	***	0.095	***	0.076	***	1					
	3042		3042		3042		3042		3042					
Political group memberships	0.080	***	0.057	***	0.105	***	0.144	***	0.183	***	1			
	3042		3042		3042		3042		3042		3042			
Other group memberships	0.080	***	-0.033	*	-0.009		0.041	**	0.103	***	0.057	***	1	
	3042		3042		3042		3042		3042		3042		3042	

Table 7.1(c). Correlation matrix of cluster-level access to different group types[29]

	Church group availability		Financial group availability		Production group availability		Private interest group availability		Service group availability		Political group availability		Other group availability	
Church group availability	1													
	3029													
Financial group availability	0.335	***	1											
	3029		3042											
Production group availability	0.221	***	0.706	***	1									
	3029		3042		3042									
Private interest group access	0.582	***	0.548	***	0.426	***	1							
	3029		3042		3042		3042							
Service group availability	0.385	***	0.356	***	0.475	***	0.364	***	1					
	3016		3029		3029		3029		3029					
Political group availability	0.237	***	0.309	***	0.302	***	0.257	***	0.404	***	1			
	3015		3015		3015		3015		3002		3015			
Other group availability	0.198	***	0.154	***	0.209	***	0.213	***	0.181	***	-0.022		1	
	3029		3042		3042		3042		3029		3015		3042	

Table 7.1(d). Correlation matrix of individual membership in, and cluster-level availability of different group types

	Church group memberships		Financial group memberships		Production group memberships		Private interest group memberships		Service group memberships		Political group memberships		Other group memberships	
Church group availability	0.093	***	-0.001		0.019		0.106	***	0.010		0.012		0.076	***
	6949		6949		6949		6949		6949		6949		6949	
Financial group availability	0.208	***	0.118	***	0.031	***	0.028	**	0.018		0.022	*	0.006	
	6982		6982		6982		6982		6982		6982		6982	
Production group availability	0.233	***	0.059	***	0.043	***	0.004		0.019		0.004		0.020	
	6982		6982		6982		6982		6982		6982		6982	
Private interest group availability	0.163	***	0.017		0.016		0.076	***	0.006		0.011		0.045	***
	6982		6982		6982		6982		6982		6982		6982	
Service group availability	0.196	***	-0.010		0.058	***	0.046	***	0.053	***	0.030	**	0.042	***
	6945		6945		6945		6945		6945		6945		6945	
Political group availability	0.152	***	0.065	***	0.037	***	0.018		0.003		0.012		-0.004	
	6899		6899		6899		6899		6899		6899		6899	
Other group availability	0.022	*	-0.062	***	-0.009		0.046	***	0.002		-0.006		0.069	***
	7020		7020		7020		7020		7020		7020		7020	

[29] Note that the correlations in Table 7.1(c) are drawn from the cluster-level social capital variables as they appear in the household welfare dynamics and poverty dynamics models. If the correlations are drawn from the cluster-level social capital variables as they appear in the individual self-rated health models, then every group type's availability is significantly ($p<0.001$) and positively correlated to every other group type's availability, and the number of observations from which the correlations are drawn ranges from between 6868 and 7027.

Table 7.1(e). Correlation matrix of household membership in, and cluster-level availability of different group types

	Church group memberships		Financial group memberships		Production group memberships		Private interest group memberships		Service group memberships		Political group memberships		Other group memberships	
Church group availability	0.164	***	0.073	***	0.040	**	0.091	***	0.037	**	0.046	**	0.086	***
	3029		3029		3029		3029		3029		3029		3029	
Financial group availability	0.257	***	0.203	***	0.046	**	0.060	***	0.043	**	0.072	***	0.008	
	3042		3042		3042		3042		3042		3042		3042	
Production group availability	0.313	***	0.116	***	0.039	**	0.042	**	0.042	**	0.049	***	0.024	
	3042		3042		3042		3042		3042		3042		3042	
Private interest group availability	0.260	***	0.116	***	0.031	*	0.113	***	0.045	**	0.053	***	0.062	***
	3042		3042		3042		3042		3042		3042		3042	
Service group availability	0.256	***	0.027		0.072	***	0.090	***	0.090	***	0.065	***	0.062	***
	3029		3029		3029		3029		3029		3029		3029	
Political group availability	0.207	***	0.100	***	0.041	**	0.031	*	0.030	*	0.020		-0.005	
	3015		3015		3015		3015		3015		3015		3015	
Other group availability	0.034	*	-0.053	***	-0.010		0.022		-0.008		0.018		0.141	***
	3042		3042		3042		3042		3042		3042		3042	

Taking a brief look at the correlation matrices presented in Tables 7.1(a), (b), (c), (d), as expected, we notice that memberships in groups at both the individual and household levels, as well as availability groups, are highly correlated across the different group types. One exception though, are the 'other' categories. Another exception is the correlation between financial and private interest individual group memberships (Table 7.1(a)). These two are statistically independent from each other at a bivariate level. The correlations between cluster-level availability and household memberships are high (Table 7.1(e)), while those between cluster-level availability and individual memberships seem to be quite a lot lower (Table 7.1(d)). It is reasonable to assume that households are more able to follow the trends in cluster-level groups than individuals are. This is because it may be too difficult for one individual to join many groups if even if many are available, whereas for a household to take advantage of numerous available groups they would simply have to ensure that different household members join different groups. What is expected from Tables 7.1(d) and (e), though, is the correlations to be highest in between the availability of, and memberships in the same group type (i.e. along the diagonals). This is not always the case. In fact, for political groups, both individual-level and household-level memberships do not significantly correlate with the availability of these groups in the community. One explanation for this could be the concentration of memberships in few political groups, as is the case in South Africa.

Figure 7.1(a). Individual church group memberships by year

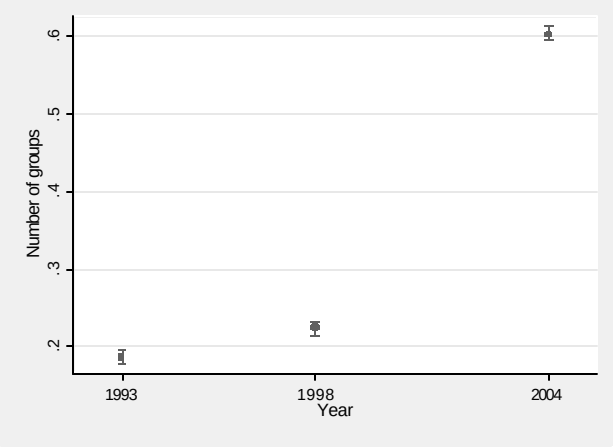


Figure 7.1(b). Household church group memberships by year

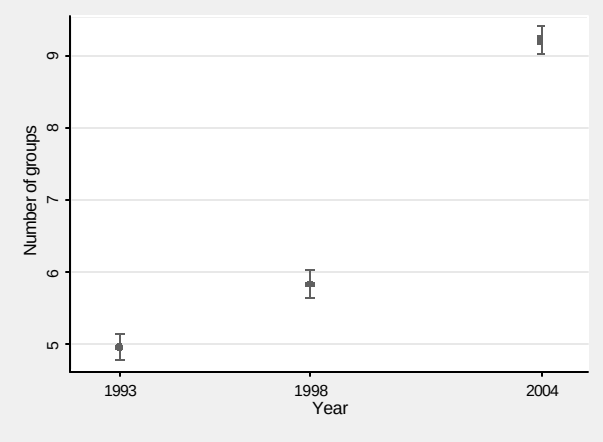


Figure 7.1(c). Availability of church groups by year

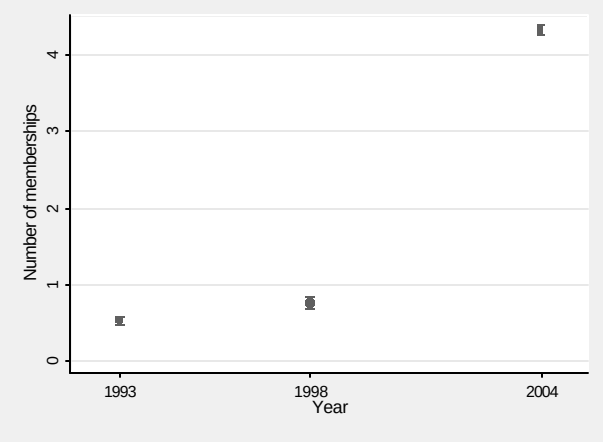


Figure 7.2(a). Individual financial group memberships by year

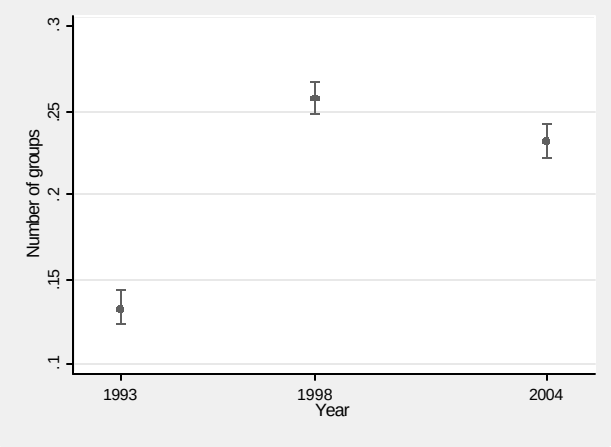


Figure 7.2(b). Household financial group memberships by year

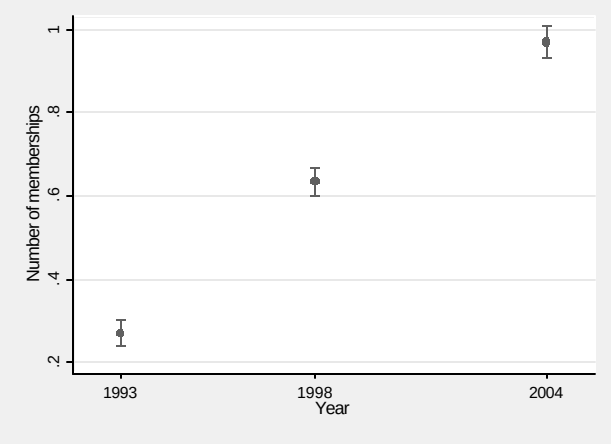


Figure 7.2(c). Availability of financial groups by year

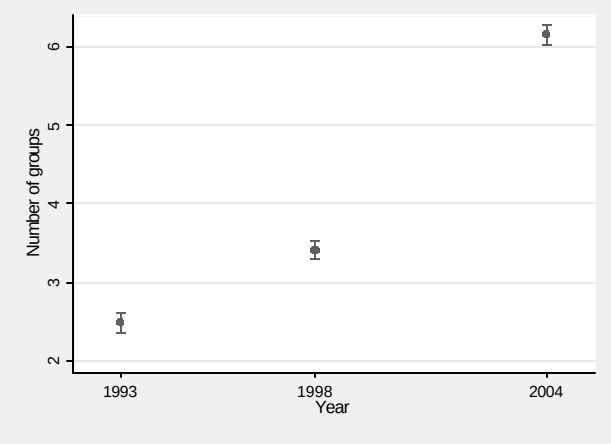


Figure 7.3(a). Individual production group memberships by year

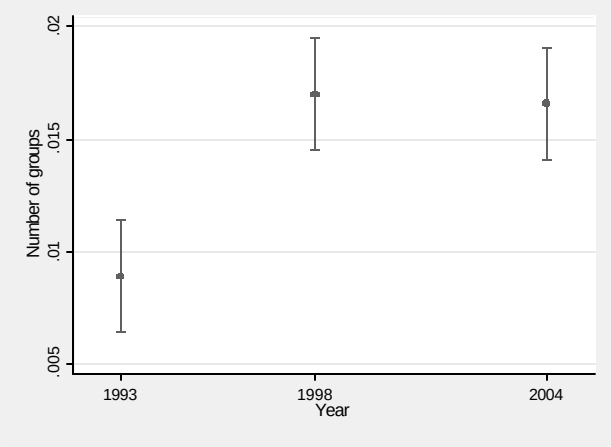


Figure 7.3(b). Household production group memberships by year

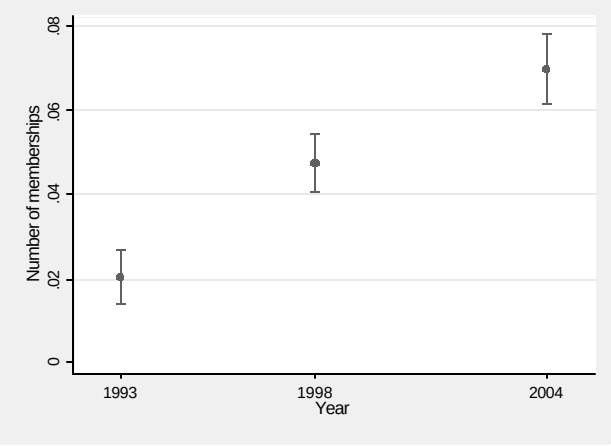


Figure 7.3(c). Availability of production groups by year

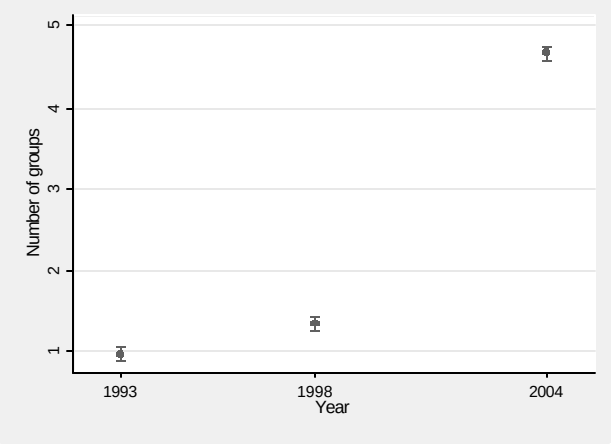


Figure 7.4(a). Individual private interest group memberships by year

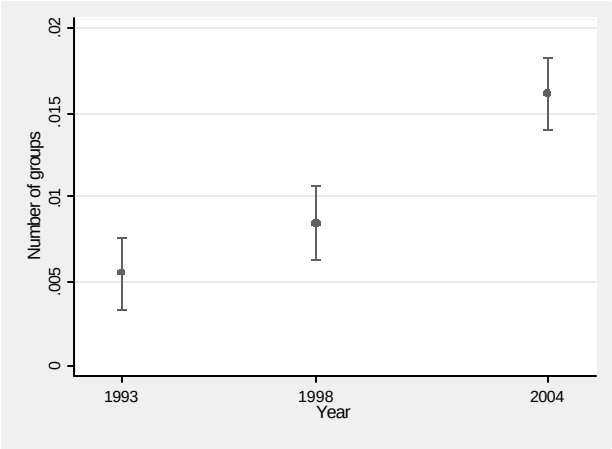


Figure 7.4(b). Household private interest group memberships by year

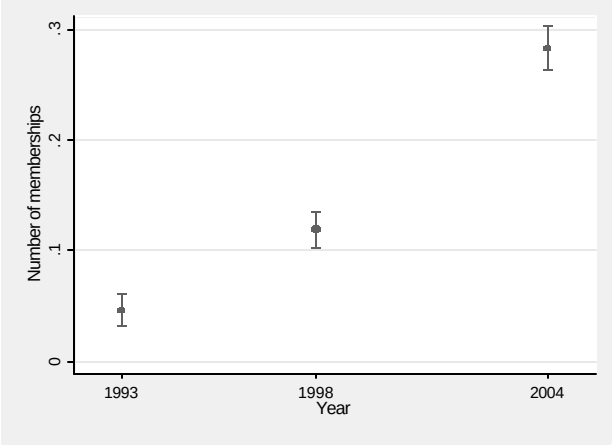


Figure 7.4(c). Availability of private interest groups by year

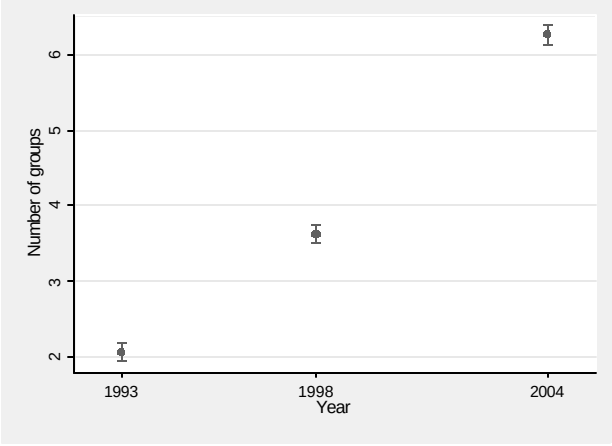


Figure 7.5(a). Individual service group memberships by year

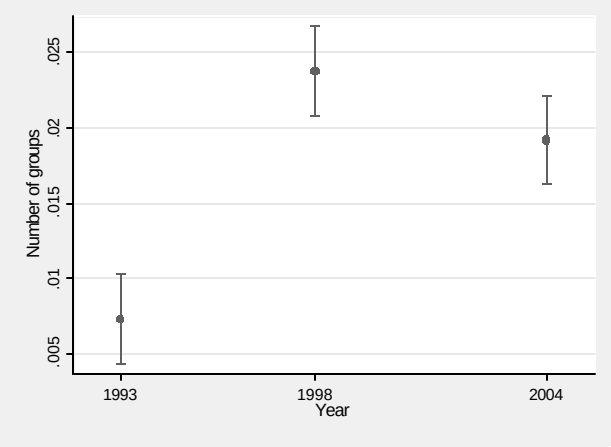


Figure 7.5(b). Household service group memberships by year

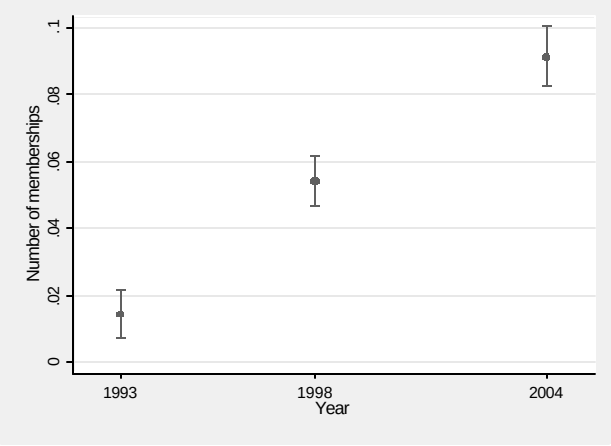


Figure 7.5(c). Availability of service groups by year

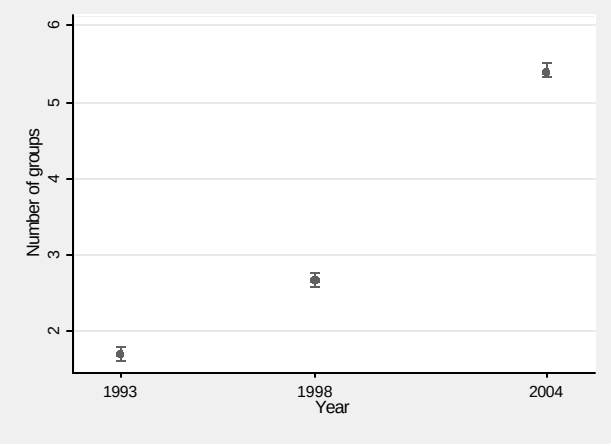


Figure 7.6(a). Individual political group memberships by year

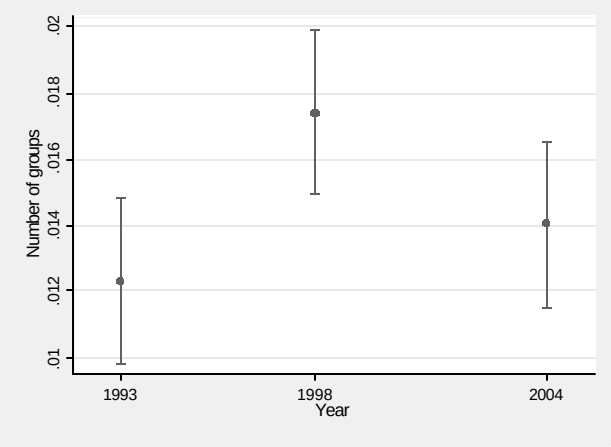


Figure 7.6(b). Household political group memberships by year

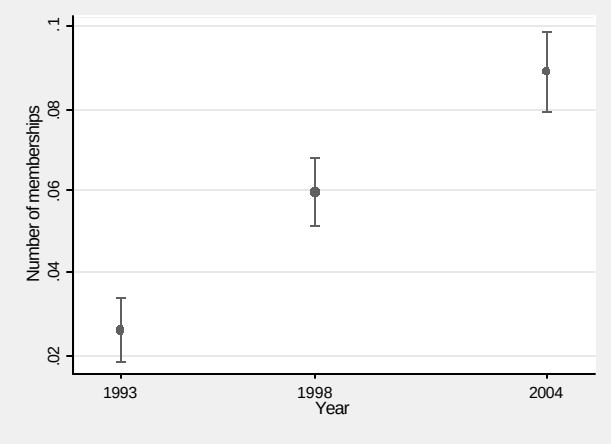
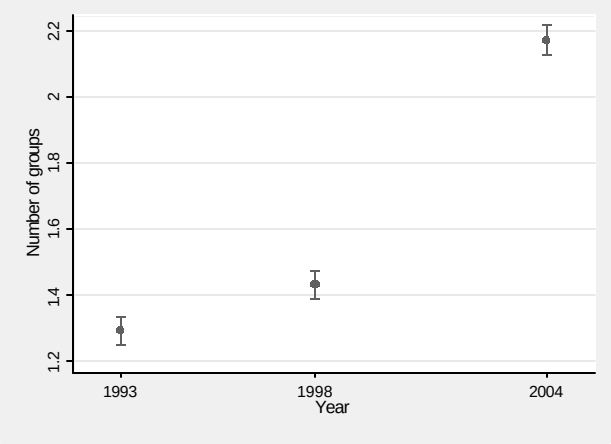


Figure 7.6(c). Availability of political groups by year



Before continuing to the social capital regressions, it is useful to examine the trends in memberships and availability of groups over time. These are presented in Figures 7.1 to 7.6. We can notice from the figures that household-level memberships in every group type and the community-level availability of every group type have increased significantly over time. The same cannot be said for individual group memberships, where memberships increased significantly between 1993 and 1998, but did not further increase by a statistically significant margin. The only group type in which a continuous significant (upward) trend exists in individual memberships is church groups.

Moving to the social capital regressions testing instances of endogeneity from the previous analytical sections, it is necessary to recount how the dependent variables in the following regressions are selected. In the previously estimated models, social capital variables that are significant in the levels-on-levels or differences-differences (non-multinomial probit) models of welfare, poverty or health, are possibly representing endogenous relationships. It is these social capital variables that are chosen to be dependent variables in the regressions in this section. The dependent variables of the original models in which these social capital variables were significant are now used as independent variables. Thus, the dependent measures will be as follows.

- In regressions including household welfare as an independent measure:
    - Household financial group social capital
    - Household service group social capital
    - Household political group social capital
- In regressions including household poverty as an independent measure:
    - Household financial group social capital
    - Household political group social capital
- In regressions including individual health as an independent measure:
    - Individual service group social capital
    - Household financial group social capital
    - Household political group social capital
    - Community church group social capital
    - Community financial group social capital

These variables are analyzed in levels-on-lags, levels-on-differences, and differences-on-lags models in order to try to capture any causal relationship running from welfare, poverty, or self-rated health to social capital. This will confirm or refute the existence of endogeneity in the original welfare, poverty, and self-rated health models for the social capital variables under investigation in this section.

In order to determine robust results for the social capital models containing welfare or poverty as an independent variable, these models are re-estimated without the 1993 data, as done in previous empirical sections. Unfortunately, because self-rated health is not measured in 1993, and because either lags or differences of the independent variables are included in these models, the models with self-rated health as a regressor can only be estimated without the 1993 data. Note also that the discussions of the estimation results exclude the coefficient results for the social capital independent variables, due to the high correlations that were found in Tables 7.1(a)-(e). These high correlations could mean that collinearity may exist in the independent social capital variables, rendering the coefficient results unreliable.

The first models to be estimated are for household-level financial social capital, with household welfare included as a dependent variable. The results of the estimations including the 1993, 1998, and 2004 data are presented in Table 7.2, while the estimations excluding the 1993 data are presented in Table 7.3. The goodness-of-fit of the models estimations is weak, although the model is significant in every estimation except the differences-on-lags estimation excluding the 1993 data. The R^2 statistics are low, meaning that there are several determinants of financial group membership that are not included in the models that are presented here: i.e. the reverse of the welfare or poverty models (not including agricultural asset controls). Only in the difference-on-lags model is there a significant time indicator (2004). In this case it means that differences in financial group social capital are significantly lower between 1998 and 2004 than between 1993 and 1998, after controlling for the other variables in the model.

What one should immediately notice is the welfare coefficients. In the levels-on-differences models the coefficients are significant, positive, and robust. This means an increases in welfare is associated with higher future levels of memberships. Importantly, though, the coefficients for the levels-on-lags and differences-on-lags models are not robust, meaning

that the causal effect of welfare on financial group social capital is relatively weak. This is again evidence that the causal effect of financial group social capital on welfare is stronger than the causal effect of welfare on financial group social capital.

Table 7.2. Household financial group social capital regressions testing the association with household welfare, using the 1993, 1998, and 2004 data

GLS: RE	Levels-on-lags		Levels-on-differences		Differences-on-lags	
Year (2004 = 1, 1998 = 0)	0.043		0.017		-0.197	***
Household welfare	0.147	**	0.157	***	-0.011	
Head's years of education	0.010		-0.002		0.009	
Head gender (female = 1, male = 0)	-0.080		0.172		-0.050	
Head's estimated age	0.003		-0.051	**	0.026	*
Square of the head's estimated age	0.000		0.000	**	0.000	*
Number of 0 to 14 year olds	0.033	*	-0.024		0.023	
Number of males 15 to 64 years old	-0.057		0.057		-0.059	*
Number of females 15 to 64 years old	-0.032		0.051		-0.034	
Number of 65 year olds and older	0.067		-0.019		0.000	
Race (African = 1, Indian = 0)	1.167	***	1.093	***	0.313	**
Place of residence (rural = 1, urban = 0)	-0.239	**	-0.318	***	0.130	
Household total years of education	0.010	**	0.007		0.006	
Number of ill persons in household	0.018		-0.003		-0.013	
Household social capital						
Household church group memberships	0.026		0.040	**	-0.040	
Household production group memberships	0.662	***	-0.035		0.044	
Household private interest group memberships	-0.086		0.163	***	-0.115	*
Household service group memberships	-0.229		0.312	**	-0.473	***
Household political group memberships	0.025		-0.154		0.062	
Other household group memberships	-0.150		-0.152		0.092	
Community social capital						
Cluster church groups	0.015	**	0.014	**	0.012	*
Cluster finance groups	0.022		0.029	***	-0.020	
Cluster production groups	0.006		-0.035	***	0.020	
Cluster private interest groups	0.008		0.013	*	0.014	
Cluster service groups	-0.019	*	0.005		-0.003	
Cluster political groups	-0.045	**	0.001		-0.009	
Cluster other groups	-0.396	*	-0.036		-0.235	
Constant	-1.546	***	-0.125		-0.629	
Observations	1443		1142		1443.000	
Groups	913		808		913.000	
R-square statistic: within	0.009		0.093		0.045	
between	0.179		0.183		0.030	
overall	0.132		0.158		0.037	
Wald's Chi-square statistic	215.26	***	209.16	***	53.760	***
LM test for RE	3.07	*	11.43	***	37.59	***

Notes: *** indicates coefficients and tests significant at the 1% level; ** indicates coefficients and tests significant at the 5% level; * indicates coefficients and test significant at the 10% level.

Table 7.3. Household financial group social capital regressions testing the association with household welfare, using the 1998 and 2004 data

	OLS		OLS		OLS	
	Levels-on-lags		Levels-on-differences		Differences-on-lags	
Household welfare	0.092		0.360	**	-0.157	
Head's years of education	0.024		-0.088		0.025	
Head gender (female = 1, male = 0)	-0.098		0.794		-0.043	
Head's estimated age	0.032		-0.059		0.061	*
Square of the head's estimated age	0.000		0.000		-0.001	*
Number of 0 to 14 year olds	0.015		0.091		0.020	
Number of males 15 to 64 years old	-0.115	*	0.363	***	-0.130	*
Number of females 15 to 64 years old	0.007		0.208	*	-0.036	
Number of 65 year olds and older	0.041		0.020		-0.089	
Race (African = 1, Indian = 0)	1.061	***	1.408	***	0.068	
Place of residence (rural = 1, urban = 0)	0.004		-0.227		0.308	
Household total years of education	0.010		-0.019		0.007	
Number of ill persons in household	-0.029		0.071		-0.055	
Household social capital						
Household church group memberships	0.036		0.019		-0.040	
Household production group memberships	0.628	**	-0.268		0.034	
Household private interest group memberships	-0.090		0.182	**	-0.116	
Household service group memberships	-0.408	*	0.464	*	-0.678	***
Household political group memberships	0.049		-0.374		0.220	
Other household group memberships	-0.084		-0.103		0.245	
Community social capital						
Cluster church groups	0.020		0.009		0.025	*
Cluster finance groups	0.039		0.035	**	-0.005	
Cluster production groups	0.001		-0.048	**	0.009	
Cluster private interest groups	0.015		0.025	*	0.020	
Cluster service groups	-0.024		-0.002		-0.003	
Cluster political groups	-0.074		0.002		-0.055	
Cluster other groups	-0.460		0.023		-0.427	
Constant	-1.990		-0.251		-0.676	
Observations	617		363		617	
R-square statistic	0.104		0.195		0.056	
Adjusted R-square statistic	0.065		0.133		0.015	
F statistic	2.63	***	3.13	***	1.35	

Notes: *** indicates coefficients and tests significant at the 1% level; ** indicates coefficients and tests significant at the 5% level; * indicates coefficients and test significant at the 10% level.

Regarding the other coefficients in Tables 7.2 and 7.3, older household heads are more likely to increase household financial group memberships (note the positive and significant coefficients in the differences on lags models in Tables 7.2 and 7.3). The larger the number of adult males in the household the greater the decline over time in household membership in financial groups. African households are more likely to have higher levels of financial group memberships now and in future, compared with Indian households. Finally, another

interesting result to note is the fact that an increase in availability of financial groups in the community leads to more memberships in these groups at the household level.

Table 7.4. Financial social capital regressions for the poor and non-poor using the 1993, 1998, and 2004 data

GLS:RE	Levels-on-levels			
Year (1998)	Poor		Non-poor	
2004	-0.005		-0.040	
Household welfare	0.145	*	0.098	
Head's years of education	-0.010		0.012	
Head gender (female = 1, male = 0)	0.048		-0.191	*
Head's estimated age	-0.020		0.032	
Square of the head's estimated age	0.000		0.000	
Number of 0 to 14 year olds	0.036	*	0.052	*
Number of males 15 to 64 years old	-0.044		-0.018	
Number of females 15 to 64 years old	-0.042		0.032	
Number of 65 year olds and older	-0.040		0.215	
Race (African = 1, Indian = 0)	1.043	*	1.148	***
Place of residence (rural = 1, urban = 0)	-0.331	**	-0.115	
Household total years of education	0.008		0.002	
Number of ill persons in household	0.096	*	-0.009	
Household social capital				
Household church group memberships	0.010		0.020	
Household production group memberships	0.023		1.281	***
Household private interest group memberships	-0.008		-0.118	
Household service group memberships	-0.124		-0.278	
Household political group memberships	-0.016		0.059	
Other household group memberships	0.015		-0.076	
Community social capital				
Cluster church groups	0.022	**	0.018	*
Cluster finance groups	-0.014		0.045	*
Cluster production groups	0.010		0.021	
Cluster private interest groups	0.024		0.001	
Cluster service groups	-0.062	**	-0.009	
Cluster political groups	0.006		-0.073	*
Cluster other groups	-0.246		-0.246	
Constant	-0.922		-1.833	*
Observations	585		858	
Groups	473		620	
R-square statistic: within	0.001		0.036	
between	0.104		0.194	
overall	0.082		0.201	
Wald's Chi-square statistic	49.66	***	164.94	***
LM test for RE	0.52		0.02	

Notes: *** indicates coefficients and tests significant at the 1% level; ** indicates coefficients and tests significant at the 5% level; * indicates coefficients and test significant at the 10% level.

To briefly examine more in detail the relationship between welfare and financial network social capital, a levels-on-lags social capital model can be estimated for the poor and the non-poor (Table 7.4). This is similar to the analysis made in section V, the poverty dynamics analysis section. However, in that case the dependent variable was household welfare, and financial group social capital was a regressor (and in this case the dependent variables are lagged to determine causality). In Table 7.4, the tables are turned and financial group social capital is the dependent variable in models with household welfare as an independent variable.

The most important thing to notice in these estimations is the fact that welfare levels determine financial group social capital for the poor. This is not a robust result, however, since the significance is lost if the 1993 data is dropped. This result means that for the poor there is weak evidence that previous welfare levels are associated with financial group memberships in the present. These results coupled with the conclusions drawn earlier allow this paper to state that for the poor, higher welfare levels lead to increased memberships of financial groups for the poor, and those memberships in turn help the poor raise welfare levels.

Moving on to the service group social capital regressions presented in Tables 7.5 and 7.6 below (with welfare again as a dependent variable), we find the following. The R^2 statistics again are low, albeit that all but one of the estimations are significant with respect to overall fit (the estimation of the differences-on-lags model excluding the 1993 data is insignificant).

Table 7.5. Household service group social capital regressions testing the association with household welfare using the 1993, 1998, and 2004 data

GLS:RE	Levels-on-lags		Levels-on-differences		Differences-on-lags	
Year (2004 = 1, 1998 = 0)	0.004		-0.074	***	-0.028	
Household welfare	0.021		0.023	*	-0.005	
Head's years of education	0.003		0.012	**	0.001	
Head gender (female = 1, male = 0)	-0.042	**	0.013		-0.018	
Head's estimated age	-0.005	*	0.007		-0.008	**
Square of the head's estimated age	0.000		0.000		0.000	**
Number of 0 to 14 year olds	0.004		0.005		-0.001	
Number of males 15 to 64 years old	0.000		-0.003		0.001	
Number of females 15 to 64 years old	-0.006		-0.005		0.001	
Number of 65 year olds and older	0.014		-0.016		-0.007	
Race (African = 1, Indian = 0)	0.048		0.010		0.051	
Place of residence (rural = 1, urban = 0)	0.070	***	0.057	***	0.015	
Household total years of education	0.002	**	-0.001		0.001	
Number of ill persons in household	0.003		-0.004		0.006	
Household social capital						
Household church group memberships	-0.004		0.017	***	0.000	
Household finance group memberships	0.001		0.016	**	-0.019	*
Household production group memberships	0.041		0.037		-0.039	
Household private interest group memberships	-0.023		0.017		-0.016	
Household political group memberships	0.008		0.176	***	-0.119	***
Other household group memberships	0.166	*	0.077	**	0.147	
Community social capital						
Cluster church groups	-0.002		0.002		-0.001	
Cluster finance groups	0.002		-0.005	**	0.001	
Cluster production groups	-0.005		0.005		-0.001	
Cluster private interest groups	-0.002		-0.001		0.001	
Cluster service groups	0.005	*	0.005	*	-0.006	**
Cluster political groups	-0.001		-0.010	*	0.000	
Cluster other groups	0.037		-0.006		0.077	
Constant	-0.048		-0.087	***	0.207	
Observations	1443		1142		1443	
Groups	913		808		913	
R-square statistic: within	0.006		0.124		0.044	
between	0.063		0.103		0.028	
overall	0.054		0.110		0.033	
Wald's Chi-square statistic	73.5	***	137.45	***	48.37	***
LM test for RE	1.82		8.51	***	151.54	***

Notes: *** indicates coefficients and tests significant at the 1% level; ** indicates coefficients and tests significant at the 5% level; * indicates coefficients and test significant at the 10% level.

Table 7.6. Household service group social capital regressions testing the association with household welfare using the 1993 and 1998 data

	OLS		OLS		OLS	
	Levels-on-lags		Levels-on-differences		Differences-on-lags	
Household welfare	0.015		-0.002		-0.048	
Head's years of education	0.008		0.009		0.007	
Head gender (female = 1, male = 0)	-0.050	***	-0.085		-0.023	
Head's estimated age	-0.007		0.005		-0.009	
Square of the head's estimated age	0.000	*	0.000		0.000	*
Number of 0 to 14 year olds	0.015	**	-0.006		-0.001	
Number of males 15 to 64 years old	0.011		-0.012		0.013	
Number of females 15 to 64 years old	-0.012		0.006		0.000	
Number of 65 year olds and older	-0.070	**	0.034		-0.079	**
Race (African = 1, Indian = 0)	0.026		-0.024		0.012	
Place of residence (rural = 1, urban = 0)	0.067	**	0.088	**	-0.018	
Household total years of education	0.002		-0.002		0.001	
Number of ill persons in household	-0.011		0.000		-0.018	
Household social capital						
Household church group memberships	-0.007		0.018	***	-0.017	
Household finance group memberships	0.016		0.008		-0.015	
Household production group memberships	0.025		-0.016		-0.054	
Household private interest group memberships	-0.025		0.016		-0.017	
Household political group memberships	-0.015		0.169	***	-0.136	***
Other household group memberships	0.169		0.090	**	0.033	
Community social capital						
Cluster church groups	-0.003		0.003	*	0.001	
Cluster finance groups	0.013	**	-0.008	***	0.004	
Cluster production groups	-0.010		0.007	**	-0.001	
Cluster private interest groups	0.000		0.001		0.003	
Cluster service groups	0.004		0.004		-0.006	
Cluster political groups	-0.007		-0.007		0.000	
Cluster other groups	0.028		0.009		0.043	
Constant	-0.047		-0.080	*	0.428	
Observations	617		363		617	
R-square statistic	0.0937		0.2188		0.0563	
Adjusted R-squared statistic	0.0537		0.1583		0.0148	
F statistic	2.34	***	3.62	***	1.35	

Notes: *** indicates coefficients and tests significant at the 1% level; ** indicates coefficients and tests significant at the 5% level; * indicates coefficients and test significant at the 10% level.

Most importantly, we can note that household welfare is not robustly (significantly in both estimations of any model, with and without the 1993 data) associated with service group social capital. This means that there is no endogenous relationship between household service group social capital and household welfare in the welfare models estimated in section IV. We can conclude that causality runs from service group social capital to household welfare.

Additionally, households headed by females hold fewer service group memberships in the future, while households with fewer children also hold fewer service group memberships. Rural households have more service group memberships presently and later in time, undoubtedly because most welfare-enhancing developments are being carried out in rural areas to try and relieve poverty. Service groups, after all, include development committees and water committees, groups that may be established in rural areas to better the welfares of households in that area.

Finally, we move on to the political social capital analysis, using welfare as an independent variable (Tables 7.7 and 7.8). The R^2 statistics are again low in these estimations, leaving us with the same conclusion as for financial and service group social capital: that these models, the reversals of the welfare models, do not include a majority of the factors that are important in determining political group social capital. The model overall fits, however, are significant in every estimation except for the differences-on-lags model excluding the 1993 data.

Again, as with the service group social capital model above, welfare is not significantly affecting political group social capital in the presented models. This means that causality is indeed running from political group social capital to household welfare in the original models estimated in section IV, the welfare analysis section.

Other robust non-social capital coefficient estimates also appear in Tables 7.7 and 7.8. Higher numbers of elderly in the household are associated with a decline in political group memberships. Interestingly enough, better educated households hold more political memberships later in time, and are also associated with increases memberships of these organizations. However, increases in education are associated with lower future levels of membership. Recalling the bivariate independence of household political group memberships from the availability of these groups at the cluster level, we can now note that there is no significant relationship between memberships in, and availability of, political groups, even in a multivariate framework. This may be due to the fact that memberships in political groups in South Africa, as mentioned above, are normally highly concentrated in a few political groups.

Table 7.7. Household political group social capital regressions testing the association with household welfare using the 1993, 1998, and 2004 data

GLS:RE	Levels-on-lags		Levels-on-differences		Differences-on-lags	
Year (2004 = 1, 1998 = 0)	-0.007		0.002		-0.023	
Household welfare	0.019		0.007		0.009	
Head's years of education	-0.004		-0.005		-0.004	
Head gender (female = 1, male = 0)	0.035	*	-0.032		0.029	
Head's estimated age	0.000		-0.005		0.002	
Square of the head's estimated age	0.000		0.000		0.000	
Number of 0 to 14 year olds	0.001		-0.008		0.003	
Number of males 15 to 64 years old	-0.003		0.003		-0.004	
Number of females 15 to 64 years old	0.001		0.017		-0.011	
Number of 65 year olds and older	0.006		-0.001		-0.035	*
Race (African = 1, Indian = 0)	-0.027		0.011		-0.023	
Place of residence (rural = 1, urban = 0)	-0.010		-0.036		0.026	
Household total years of education	0.002	**	-0.002	*	0.002	**
Number of ill persons in household	-0.008		0.016	*	-0.006	
Household social capital						
Household church group memberships	0.017	**	0.002		0.000	
Household finance group memberships	0.016		-0.015	*	0.019	*
Household production group memberships	-0.045		0.136	***	-0.058	
Household private interest group memberships	-0.004		0.054	***	-0.033	**
Household service group memberships	0.158	***	0.077	**	-0.011	
Household political group memberships						
Other household group memberships	0.213	**	0.046		0.107	
Cluster social capital						
Cluster church groups	0.000		0.001		0.000	
Cluster finance groups	0.007	*	0.006	**	0.005	
Cluster production groups	-0.002		-0.001		-0.004	
Cluster private interest groups	-0.006	**	0.004	**	-0.004	
Cluster service groups	0.002		0.001		0.003	
Cluster political groups	-0.004		0.000		-0.005	
Cluster other groups	-0.061		-0.017		-0.052	
Constant	-0.073		0.077	**	-0.065	
Observations	1443		1142		1443	
Groups	913		808		913	
R-square statistic: within	0.013		0.148		0.025	
between	0.071		0.032		0.031	
overall	0.057		0.069		0.025	
Wald's Chi-square statistic	83.6	***	87.26	***	36.87	*
LM test for RE	52.52	***	97.56	***	51.11	***

Notes: *** indicates coefficients and tests significant at the 1% level; ** indicates coefficients and tests significant at the 5% level; * indicates coefficients and test significant at the 10% level.

Table 7.8. Household political group social capital regressions testing the association with household welfare using the 1993 and 1998 data

	OLS		OLS		OLS	
	Levels-on-lags		Levels-on-differences		Differences-on-lags	
Household welfare	0.018		-0.008		-0.018	
Head's years of education	-0.006		0.017		-0.002	
Head gender (female = 1, male = 0)	0.035		0.026		0.032	
Head's estimated age	0.005		0.010		0.007	
Square of the head's estimated age	0.000		0.000		0.000	
Number of 0 to 14 year olds	-0.002		-0.025	*	-0.001	
Number of males 15 to 64 years old	-0.012		0.046	*	-0.007	
Number of females 15 to 64 years old	-0.013		0.049	*	-0.029	*
Number of 65 year olds and older	-0.050		-0.016		-0.121	***
Race (African = 1, Indian = 0)	-0.010		0.034		-0.009	
Place of residence (rural = 1, urban = 0)	0.008		-0.012		0.065	
Household total years of education	0.004	**	-0.008	***	0.003	*
Number of ill persons in household	0.002		0.040	*	-0.011	
Household social capital						
Household church group memberships	0.016		0.003		-0.007	
Household finance group memberships	0.007		-0.013		0.029	
Household production group memberships	-0.039		0.201	***	-0.054	
Household private interest group memberships	-0.013		0.056	***	-0.032	
Household service group memberships	0.150	***	0.059		0.017	
Other household group memberships	0.248		0.048		0.214	
Community social capital						
Cluster church groups	0.000		0.001		-0.001	
Cluster finance groups	0.007		0.006		0.002	
Cluster production groups	-0.001		-0.003		-0.004	
Cluster private interest groups	-0.006		0.006	**	-0.004	
Cluster service groups	-0.002		0.002		0.005	
Cluster political groups	-0.004		-0.002		-0.007	
Cluster other groups	-0.050		-0.011		-0.018	
Constant	-0.224		0.027		-0.090	
Observations	617		363		617	
R-square statistic	0.065		0.171		0.047	
Adjusted R-square statistic	0.024		0.107		0.005	
F statistic	1.58	**	2.67	***	1.12	

Notes: *** indicates coefficients and tests significant at the 1% level; ** indicates coefficients and tests significant at the 5% level; * indicates coefficients and test significant at the 10% level.

This section now moves on to the analysis of endogeneity in the poverty models estimated in section V. The first social capital variable in the poverty models in that section which displays a possible endogenous relationship with poverty is household finance group social capital. Therefore, financial group social capital is now regressed on poverty, among other things, in levels-on-lags, levels-on-differences, and differences-on-lags models, with and without the 1993 data, in order to determine whether there really is a robust endogenous

relationship between financial group social capital and poverty in the poverty models. The results of these estimations are presented in Tables 7.9 and 7.10 below.

Once more, the R^2 statistics are relatively low. Apart from the differences-on-lags model, all models perform adequately in terms of overall fit. It is thus clear that the reversal of the poverty model does not, similar to the reverse of the welfare models, provide close to all of the determinants of financial group social capital. These low R^2 statistics are expected, though, after having already estimated the financial group social capital models with welfare as a dependent variable, since the welfare and poverty models (and thus the reversals of these models) are very similar.

Note that the year indicator (1998) is significant only in the differences-on-lags model (Table 7.9). This once more means that differences in household financial group memberships are significantly lower between 1998 and 2004 than between 1993 and 1998.

Poverty in these models does not robustly (significantly over both estimations of any model) explain membership in financial groups. This means that causality in the poverty model estimated in section V runs from financial social capital to poverty, i.e. memberships in financial groups help households escape poverty. This conclusion, however, initially seems to contradict the conclusions drawn in section V after estimating the multinomial probit models for change in poverty status. After these latter estimations it was concluded that financial group memberships do not help a household move out of poverty, and do not prevent households from falling into poverty (compared with staying poor or non-poor). These two seemingly different conclusions can be brought together, however, because the multinomial probits' comparison category is 'no change'. Essentially, then, we can assume that the financial group memberships are making sure the non-poor stay out of poverty. Along with the additional summary from the reversed welfare models earlier in this section, we can state that financial group memberships a) allow poor households to raise their welfare levels (provided an initial welfare level is attained in order to gain membership), and b) allow non-poor households to remain non-poor.

Table 7.9. Household finance group social capital regressions testing the association with poverty, using the 1993, 1998, and 2004 data

GLS: RE	Levels-on-lags		Levels-on-differences		Differences-on-lags	
Year (1998 = 1, 2004 = 0)	-0.043		-0.080		0.201	***
Household is poor (yes = 1, no = 0)	-0.194	**	-0.109		0.032	
Head's years of education	0.012		0.003		0.009	
Head gender (female = 1, male = 0)	-0.085		0.167		-0.050	
Head's estimated age	0.004		-0.047	**	0.026	*
Square of the head's estimated age	0.000		0.000	**	0.000	*
Number of 0 to 14 year olds	0.031	*	-0.026		0.022	
Number of males 15 to 64 years old	-0.056		0.058		-0.060	*
Number of females 15 to 64 years old	-0.030		0.051		-0.036	
Number of 65 year olds and older	0.064		-0.029		0.000	
Race (African = 1, Indian = 0)	1.117	***	1.054	***	0.312	**
Place of residence (rural = 1, urban = 0)	-0.241	***	-0.333	***	0.128	
Household total years of education	0.010	***	0.007		0.006	
Number of ill persons in household	0.016		-0.005		-0.012	
Household social capital						
Household church group memberships	0.027		0.038	**	-0.039	
Household production group memberships	0.663	***	-0.030		0.046	
Household private interest group memberships	-0.089		0.167	***	-0.114	
Household service group memberships	-0.216		0.334	***	-0.473	***
Household political group memberships	0.034		-0.151		0.061	
Other household group memberships	-0.117		-0.159		0.089	
Community social capital						
Cluster church groups	0.016	**	0.014	**	0.012	*
Cluster finance groups	0.022		0.030	***	-0.020	
Cluster production groups	0.004		-0.035	***	0.021	
Cluster private interest groups	0.008		0.014	*	0.014	
Cluster service groups	-0.016		0.004		-0.004	
Cluster political groups	-0.049	**	0.003		-0.009	
Cluster other groups	-0.409	*	-0.042		-0.233	
Constant	-0.461		-0.027		-0.914	**
Observations	1443		1142		1443	
Groups	913		808		913	
R-square statistic: within	0.014		0.083		0.044	
between	0.176		0.182		0.031	
overall	0.133		0.155		0.037	
Wald's Chi-square statistic	215.48	***	203.75	***	53.9	***
LM test for RE	3.38	*	10.64	***	37.86	***

Notes: *** indicates coefficients and tests significant at the 1% level; ** indicates coefficients and tests significant at the 5% level; * indicates coefficients and test significant at the 10% level.

Table 7.10. Household finance group social capital regressions testing the association with poverty, using the 1998 and 2004 data

OLS	Levels-on-lags		Levels-on-differences		Differences-on-lags	
Household is poor (yes = 1, no = 0)	-0.125		-0.311		0.158	
Head's years of education	0.025		-0.061		0.022	
Head gender (female = 1, male = 0)	-0.104		0.697		-0.032	
Head's estimated age	0.032		-0.048		0.060	*
Square of the head's estimated age	0.000		0.000		-0.001	*
Number of 0 to 14 year olds	0.014		0.086		0.024	
Number of males 15 to 64 years old	-0.116	*	0.350	***	-0.126	*
Number of females 15 to 64 years old	0.008		0.200	*	-0.036	
Number of 65 year olds and older	0.039		-0.015		-0.081	
Race (African = 1, Indian = 0)	1.021	***	1.221	***	0.154	
Place of residence (rural = 1, urban = 0)	0.007		-0.210		0.314	
Household total years of education	0.011		-0.019		0.006	
Number of ill persons in household	-0.030		0.065		-0.053	
Household social capital						
Household church group memberships	0.035		0.016		-0.041	
Household production group memberships	0.629	**	-0.247		0.026	
Household private interest group memberships	-0.089		0.187	**	-0.120	
Household service group memberships	-0.403	*	0.508	*	-0.694	***
Household political group memberships	0.058		-0.368		0.204	
Other household group memberships	-0.051		-0.119		0.193	
Community social capital						
Cluster church groups	0.020		0.009		0.025	*
Cluster finance groups	0.039		0.037	**	-0.005	
Cluster production groups	0.000		-0.046	**	0.010	
Cluster private interest groups	0.016		0.026	*	0.020	
Cluster service groups	-0.021		-0.003		-0.006	
Cluster political groups	-0.076		0.006		-0.053	
Cluster other groups	-0.473		0.015		-0.407	
Constant	-1.312		-0.009		-1.794	*
Observations	617		363		617	
R-squared	0.104		0.187		0.055	
Adjusted R-squared	0.065		0.124		0.014	
F statistic	2.64	***	2.97	***	1.32	

Notes: *** indicates coefficients and tests significant at the 1% level; ** indicates coefficients and tests significant at the 5% level; * indicates coefficients and test significant at the 10% level.

Regarding the other robust non-social capital independent variable coefficient estimates, standing out are similar items to those in tables 7.2 and 7.3 (the financial group social capital regressions on household welfare, among other things). Households with older heads are more likely to increase memberships in financial groups, while households with a greater number of male adults are more likely to decrease memberships. African households are more likely to have higher levels of financial group memberships in the future.

As for community or cluster-level social capital, it is interesting to note that increases in availability of financial groups cause higher levels of financial group memberships in households, as is the case in the household financial group social capital regressions on welfare (among other things) presented in Tables 7.2 and 7.3.

This analysis can now move on to the only other reversed poverty estimation: the regression of household political group memberships on household poverty, among other things. This is done in order to clear up any questions that arose concerning an endogenous relationship between political group social capital and household poverty from the estimations in section V. The estimation results are presented in Tables 7.11 and 7.12.

Notice again that the R^2 statistics are low, but that every model has a significant overall fit apart from the differences-on-lags model estimated without the 1993 data. The year indicator is insignificant in this multivariate analysis.

Important to note at once is the non-significance of any poverty coefficient in the estimations. We may therefore conclude that the poverty-political social capital association that exists in the poverty models in section V is not endogenous: membership in political groups causes a decrease in the likelihood of a household being poor. Keeping in mind that political group memberships did not increase (or decrease) the likelihoods that households escaped from or fell into poverty compared with staying poor or non-poor (note the multinomial probit models in section V), this latest result means that political group memberships enable a household to remain out of poverty.

Table 7.11. Household political group social capital regressions testing the association with poverty, using the 1993, 1998, and 2004 data

GLS: RE	Levels-on-lags		Levels-on-differences		Differences-on-lags	
Year (1998 = 1, 2004 = 0)	0.008		-0.006		0.021	
Household is poor (yes = 1, no = 0)	-0.019		0.000		-0.024	
Head's years of education	-0.003		-0.005		-0.004	
Head gender (female = 1, male = 0)	0.034	*	-0.033		0.029	*
Head's estimated age	0.000		-0.005		0.001	
Square of the head's estimated age	0.000		0.000		0.000	
Number of 0 to 14 year olds	0.000		-0.008		0.003	
Number of males 15 to 64 years old	-0.003		0.003		-0.003	
Number of females 15 to 64 years old	0.001		0.016		-0.011	
Number of 65 year olds and older	0.006		-0.002		-0.035	
Race (African = 1, Indian = 0)	-0.035		0.009		-0.023	
Place of residence (rural = 1, urban = 0)	-0.011		-0.037		0.027	
Household total years of education	0.002	**	-0.002	*	0.002	**
Number of ill persons in household	-0.008		0.016	*	-0.006	
Household social capital						
Household church group memberships	0.018	**	0.002		0.000	
Household finance group memberships	0.016		-0.015	*	0.018	*
Household production group memberships	-0.045		0.137	***	-0.058	
Household private interest group memberships	-0.004		0.055	***	-0.033	**
Household service group memberships	0.160	***	0.078	**	-0.010	
Other household group memberships	0.216	**	0.046		0.109	
Community social capital						
Cluster church groups	0.000		0.001		0.000	
Cluster finance groups	0.007	*	0.006	**	0.005	
Cluster production groups	-0.003		-0.002		-0.005	
Cluster private interest groups	-0.006	**	0.004	**	-0.004	
Cluster service groups	0.002		0.001		0.004	
Cluster political groups	-0.004		0.000		-0.005	
Cluster other groups	-0.062		-0.018		-0.054	
Constant	0.048		0.082	**	-0.014	
Observations	1443		1142		1443	
Groups	913		808		913	
R-square statistic: within	0.015		0.147		0.027	
between	0.069		0.032		0.030	
overall	0.057		0.069		0.026	
Wald's Chi-square statistic	83.04	**	87.04	***	38.06	*
LM test for RE	53.07	***	97.44	***	51.28	***

Notes: *** indicates coefficients and tests significant at the 1% level; ** indicates coefficients and tests significant at the 5% level; * indicates coefficients and test significant at the 10% level.

Table 7.12. Household political group social capital regressions testing the association with poverty, using the 1998 and 2004 data

OLS	Levels-on-lags		Levels-on-differences		Differences-on-lags	
Household is poor (yes = 1, no = 0)	-0.031		0.002		-0.029	
Head's years of education	-0.006		0.017		-0.004	
Head gender (female = 1, male = 0)	0.034		0.028		0.033	
Head's estimated age	0.005		0.010		0.006	
Square of the head's estimated age	0.000		0.000		0.000	
Number of 0 to 14 year olds	-0.002		-0.024	*	0.000	
Number of males 15 to 64 years old	-0.012		0.047	*	-0.004	
Number of females 15 to 64 years old	-0.012		0.050	*	-0.026	
Number of 65 year olds and older	-0.049		-0.015		-0.115	***
Race (African = 1, Indian = 0)	-0.016		0.037		0.020	
Place of residence (rural = 1, urban = 0)	0.010		-0.013		0.075	
Household total years of education	0.004	**	-0.008	***	0.003	
Number of ill persons in household	0.002		0.040	*	-0.011	
Household social capital						
Household church group memberships	0.016		0.003		-0.008	
Household finance group memberships	0.007		-0.014		0.025	
Household production group memberships	-0.039		0.200	***	-0.057	
Household private interest group memberships	-0.013		0.056	***	-0.034	
Household service group memberships	0.150	***	0.059		0.010	
Other household group memberships	0.255	*	0.049		0.211	
Community social capital						
Cluster church groups	0.000		0.001		-0.001	
Cluster finance groups	0.007		0.006		0.002	
Cluster production groups	-0.001		-0.003		-0.005	
Cluster private interest groups	-0.006		0.006	**	-0.003	
Cluster service groups	-0.001		0.002		0.006	
Cluster political groups	-0.004		-0.002		-0.008	
Cluster other groups	-0.053		-0.010		-0.017	
Constant	-0.086		0.022		-0.190	
Observations	617		363		617	
R-squared	0.066		0.171		0.047	
Adjusted R-squared	0.024		0.107		0.005	
F statistic	1.59	**	2.66	***	1.13	

Notes: *** indicates coefficients and tests significant at the 1% level; ** indicates coefficients and tests significant at the 5% level; * indicates coefficients and test significant at the 10% level.

As for the other robust (non-social capital) coefficients, we have that better educated households have greater numbers of political group memberships groups in future, although increases in years of education are associated with lower levels of political group memberships later on. This may be representing a choice that the household makes: either investing time in increasing education levels or investing time to be active in political networks. An increase in the number of ill persons in the household is also associated with higher levels of political social capital. It may be that households are acquiring memberships in these groups in order to cope with the burden of illness (an endogenous relationship).

Table 7.13. Individual service group social capital regressions testing the association with self-rated health

OLS	Levels-on-lags		Levels-on-differences		Differences-on-lags	
Individual service group memberships						
Self-rated health (fair/poor/very poor = 1, good/very good = 0)	-0.016	*	-0.010		-0.008	
Estimated age	0.000		0.017		-0.002	
Estimated age squares	0.000		0.000		0.000	
Gender (female = 1, male = 0)	-0.018	**	-0.036	**	0.029	***
Race (African = 1, Indian = 0)	-0.016		0.013		-0.023	
Place of residence (rural = 1, urban = 0)	0.015		0.028		0.012	
Years of education	0.003	**	0.014	*	0.001	
Marital status (married = 1, otherwise = 0)	0.011		-0.004		0.025	**
Household welfare	-0.005		-0.004		-0.005	
Number of 0 to 14 year olds	0.002		-0.008	**	0.004	
Number of male 15 to 64 year olds	0.008	***	-0.013	***	0.008	**
Number of female 15 to 64 year olds	0.001		-0.003		0.001	
Number of 65 year olds and older	-0.006		0.001		0.003	
Number of ill persons in household if healthy	0.006		-0.009		-0.003	
Individual social capital						
Church group memberships	0.035	***	-0.032	**	-0.012	
Finance group memberships	0.010		0.007		-0.020	
Production group memberships	0.080	**	-0.047		-0.099	**
Private interest group memberships	0.013		-0.063		-0.106	**
Political group memberships	-0.057	**	-0.008		-0.182	***
Other group memberships	0.115		0.068		0.064	
Household social capital						
Household finance group memberships	-0.009	**	0.004	*	0.004	
Household church group memberships	-0.002		-0.006		0.013	
Household production group memberships	-0.049	**	0.011		0.064	**
Household private interest group memberships	-0.005		0.014	*	-0.002	
Household political group memberships	0.061	***	0.150	***	-0.468	***
Household service group memberships	0.014		0.049	**	0.054	***
Other household group memberships	-0.016		0.045		0.026	
Community social capital						
Cluster church groups	-0.001		0.000		-0.001	
Cluster finance groups	0.006	***	-0.002	*	0.006	**
Cluster production groups	-0.005	**	0.001		-0.006	**
Cluster private interest groups	0.000		0.001		0.000	
Cluster service groups	0.001		0.000		0.001	
Cluster political groups	-0.001		-0.004		0.000	
Cluster other groups	0.018		0.002		0.008	
Constant	0.013		-0.052		0.043	
Observations	1610		788		1610	
R-squared	0.065		0.211		0.377	
Adjusted R-squared	0.045		0.175		0.364	
F statistic	3.2	***	5.91	***	28.08	***

Notes: *** indicates coefficients and tests significant at the 1% level; ** indicates coefficients and tests significant at the 5% level; * indicates coefficients and test significant at the 10% level.

Having verified endogeneity to be present the social capital results in the poverty models, this section can now examine endogeneity in the self-rated health models estimated in section VI. The first social capital variable in these models which displays a possible endogenous relationship with self-rated health is individual service group social capital. Individual service group social capital social capital is now regressed on self-rated health, among other things, in the levels-on-lags, levels-on-differences, and differences-on-lags models in order to determine whether there really is an endogenous relationship between individual service group social capital and self-rated health in the self-rated health models.

Notice first that the model estimations in Table 7.13 have significant overall fits, and the levels-on-differences and differences-on-lags models have high R^2 statistics. These high R^2 statistics may be taking account, though, of the high correlations that are found between the memberships in different group types at the individual level, as can be seen in Table 7.1(a).

Immediately one can also notice that self-rated health is significant in the levels-on-lags model estimation in Table 7.13. This means that, in the original self-rated health models, increases in and higher levels of service group social capital are caused by better self-rated health. In other words, the relationship is endogenous in these original models, meaning that it is the case the poor health (good health) is causing individuals to invest less (more) in service groups.

There are a few other coefficient results that are interesting to note. Women have low levels of membership in service groups in future, although they are more likely to increase memberships. This result is not necessarily counter-intuitive, since it may simply mean that even after the increases in membership in service groups, females are still more likely to have fewer memberships in service groups than males. Better educated individuals and those who have recently increased their education have higher levels of membership in service groups. Married individuals are also more likely to increase their service group memberships. An increase in the numbers of children and male adults in a household leads to lower levels of service group memberships among individuals in that household, although (an already-established) higher level of male adults in a household cause increases in, and higher levels of that household's residents' memberships in service groups

Table 7.14. Household finance group social capital regressions testing the association with self-rated health

OLS	Levels-on-lags		Levels-on-differences		Differences-on-lags	
Household financial group memberships						
Self-rated health (fair/poor/very poor = 1, good/very good = 0)	-0.008		0.122		-0.030	
Estimated age	0.026		-0.149		0.037	
Estimated age squares	0.000		0.000		0.000	
Gender (female = 1, male = 0)	-0.032		-0.019		0.260	**
Race (African = 1, Indian = 0)	1.151	***	1.484	***	0.655	***
Place of residence (rural = 1, urban = 0)	-0.088		-0.531	***	0.116	
Years of education	0.043	**	-0.064		0.043	**
Marital status (married = 1, otherwise = 0)	0.016		-0.119		0.096	
Household welfare	0.151	*	0.257	***	0.032	
Number of 0 to 14 year olds	0.026		0.010		0.039	
Number of male 15 to 64 year olds	-0.030		0.108	**	-0.056	
Number of female 15 to 64 year olds	0.057		0.034		0.000	
Number of 65 year olds and older	0.166	*	-0.032		-0.125	
Number of ill persons in household if healthy	-0.161	**	0.206	***	-0.163	**
Individual social capital						
Church group memberships	0.029		-0.365	***	0.225	
Finance group memberships	0.161	*	0.642	***	-0.927	***
Production group memberships	0.601		0.038		1.240	***
Private interest group memberships	0.172		-0.799	**	0.573	
Service group memberships	0.115		-0.161		0.413	
Political group memberships	0.031		0.058		0.190	
Other group memberships	-0.234		0.213		-0.245	
Household social capital						
Household church group memberships	0.050		0.055	***	-0.027	
Household production group memberships	0.446		-0.414	*	-0.177	
Household private interest group memberships	-0.129		0.271	***	-0.211	**
Household service group memberships	-0.573	**	0.348	*	-0.872	***
Household political group memberships	0.063		-0.274		0.090	
Other household group memberships	0.105		-0.137		0.278	
Community social capital						
Cluster church groups	0.025	**	0.011	*	0.028	***
Cluster finance groups	0.048	**	0.012		0.016	
Cluster production groups	-0.010		-0.043	***	0.013	
Cluster private interest groups	0.011		0.023	***	0.008	
Cluster service groups	-0.023		0.002		-0.019	
Cluster political groups	-0.100	***	0.004		-0.096	***
Cluster other groups	-0.528	**	0.023		-0.458	**
Constant	-2.293	**	0.438		-1.934	**
Observations	1126		788		1126	
R-squared	0.129		0.234		0.140	
Adjusted R-squared	0.102		0.199		0.113	
F statistic	4.74	***	6.75	***	5.21	***

Notes: *** indicates coefficients and tests significant at the 1% level; ** indicates coefficients and tests significant at the 5% level; * indicates coefficients and test significant at the 10% level.

The next case of possible endogeneity arises with respect to the household-level financial group social capital in the self-rated health regressions in section VI. It is necessary, therefore, to regress household-level financial group social capital on individual self-rated

health in levels-on-lags, levels-on-differences, and differences-on-lags models in order to identify whether or not endogeneity is truly present in the self-rated health models. These regressions are presented in Table 7.14.

The model fits are significant again, and the R^2 statistics are reasonable. Immediately one can see that the self-rated health of individuals in a household does not affect the household's membership levels in financial groups. This means that in the self-rated health models in section VI, it is household financial group social capital that leads to worse self-rated health in the household's residents. This relationship may exist due to the groups that make up the financial group category: stokvels (savings clubs), and burial societies. The latter may be the cause of the poor ratings of health among individuals in households with more financial group memberships. An individual may build an awareness of his or her own morbidity when his or her household acquires memberships in burial societies.

Apart from this result, females are more likely to be in households that increase membership in financial groups. African individuals are also more likely to be in households with higher levels of, and increases in memberships in these groups in future. Individuals living in rural areas are also more likely to be a part of households with higher levels of financial group memberships.

Household welfare is shown here once more to determine household-level financial group social capital. Higher levels of welfare and increases in welfare cause more memberships. An increase in the number of male adults, as well as greater numbers of elderly in the household cause more memberships in financial groups at the household level. A higher level of household morbidity, in turn, causes lower levels of membership in future, while increases in morbidity cause higher levels of memberships in these groups.

This thesis can now move to the analysis of endogeneity in the relationship between self-rated health and household service group social capital in the self-rated health models estimated in section VI. This requires the regression of household service group social capital on individual self-rated health (among other things) in levels-on-lags, levels-on-differences, and differences-on-lags models. The results of these estimations are presented in Table 7.15.

Table 7.15. Household service group social capital regressions testing the association with self-rated health

OLS	Levels-on-lags		Levels-on-differences		Differences-on-lags	
Household service group memberships						
Self-rated health (fair/poor/very poor = 1, good/very good = 0)	0.007		-0.018		-0.022	
Estimated age	-0.007		0.027		-0.006	
Estimated age squares	0.000	*	0.000		0.000	
Gender (female = 1, male = 0)	-0.012		-0.039	*	-0.057	**
Race (African = 1, Indian = 0)	0.017		0.041		0.015	
Place of residence (rural = 1, urban = 0)	0.062	**	0.043		0.020	
Years of education	0.010	***	0.007		0.011	***
Marital status (married = 1, otherwise = 0)	0.040	*	0.047		0.003	
Household welfare	0.008		0.003		-0.018	
Number of 0 to 14 year olds	0.014	***	0.000		0.004	
Number of male 15 to 64 year olds	0.024	***	-0.018	**	0.024	***
Number of female 15 to 64 year olds	0.004		-0.008		0.008	
Number of 65 year olds and older	-0.034	*	0.007		-0.043	*
Number of ill persons in household if healthy	-0.005		-0.002		-0.003	
Individual social capital						
Church group memberships	0.044		-0.054	***	0.047	
Finance group memberships	-0.009		-0.010		0.025	
Production group memberships	-0.078		0.023		0.174	*
Private interest group memberships	-0.002		-0.064		0.009	
Service group memberships	0.080	*	0.440	***	-0.943	***
Political group memberships	-0.040		-0.173	***	0.032	
Other group memberships	-0.189		-0.018		0.076	
Household social capital						
Household finance group memberships	-0.019	*	0.015	***	-0.023	*
Household church group memberships	0.028	**	-0.002		-0.002	
Household production group memberships	0.079		-0.028		-0.130	**
Household private interest group memberships	-0.032	*	0.016		-0.022	
Household political group memberships	-0.013		0.204	***	-0.094	**
Other household group memberships	0.354	**	0.070	*	0.066	
Community social capital						
Cluster church groups	-0.002		0.001		-0.001	
Cluster finance groups	0.010	**	-0.004	**	0.007	
Cluster production groups	-0.009	*	0.000		-0.004	
Cluster private interest groups	-0.002		0.004	***	0.000	
Cluster service groups	0.005	*	0.002		0.002	
Cluster political groups	-0.009		-0.001		-0.009	
Cluster other groups	0.018		-0.002		0.033	
Constant	-0.032		-0.105		0.186	
Observations	1126		788		1126	
R-squared statistic	0.096		0.308		0.282	
Adjusted R-squared statistic	0.067		0.277		0.259	
F statistic	3.39	***	9.85	***	12.59	***

Notes: *** indicates coefficients and tests significant at the 1% level; ** indicates coefficients and tests significant at the 5% level; * indicates coefficients and test significant at the 10% level.

The model fits are again significant, and the R^2 statistics are particularly high for the levels-on-differences and differences-on-lags models (though, again, this may be due to the correlations between social capital types, as presented in Tables 7.1(a)-(e)).

Once more, self-rated health is not significant in the model estimations. This means that relationship found between household service group memberships and individual self-rated health is not endogenous in the self-rated health models. Essentially this means that households with more service group memberships cause worse health among that household's residents. There are two possible reasons for this result. *Firstly*, it could be that service group memberships in the household are also building the awareness of morbidity of the household's residents, as in the case of household financial group memberships. *Secondly*, the memberships could be placing actual strain on the household's residents' health levels. If service groups take up a caregiver's time, for example, those dependent on that caregiver's assistance to remain healthy, suffer.

There are other, non-social capital results that are of interest in Table 7.15. Older individuals are more likely to be a part of households with more service group memberships in future, although the effect of this is very small (note the small significant coefficient of the age squared variable). Women are more likely to be a part of households that decrease service group memberships and that have lower levels of membership in the future. Individuals in rural areas are more likely to be a part of households with fewer service group memberships in future. Higher numbers of children and male adults (and increases in the number of male adults), as well as fewer elderly in the household (and decreases in the number of elderly) cause higher levels of membership in service groups in the future. Finally, an increase in the number of male adults causes lower levels of service group memberships.

This thesis can then move on to examine any endogeneity present between individual self-rated health and community social capital in the self-rated health models presented in section VI. The first possibly endogenous association is between self-rated health and cluster-level church groups. Similar to the regressions presented above, a model of community church social capital can be regressed on self-rated health (among other things), in the level-on-lags, levels-on-differences, and differences-on-lags models in order to find if the relationship truly was endogenous in the self-rated health section (Table 7.16).

Table 7.16. Community church group social capital regressions testing the association with self-rated health

OLS	Levels-on-lags		Levels-on-differences		Differences-on-lags	
Cluster-level availability of church groups						
Self-rated health (fair/poor/very poor = 1, good/very good = 0)	-1.207	**	-0.419		-0.553	
Estimated age	0.003		-0.059		0.017	
Estimated age squares	0.000		0.004	*	0.000	
Gender (female = 1, male = 0)	-0.222		-0.359		-0.072	
Race (African = 1, Indian = 0)	-16.946	***	-7.600	***	-10.120	***
Place of residence (rural = 1, urban = 0)	2.018	***	0.215		0.560	
Years of education	0.099		0.662	*	-0.153	**
Marital status (married = 1, otherwise = 0)	-0.387		0.018		0.057	
Household welfare	0.232		-0.036		0.458	
Number of 0 to 14 year olds	0.293	***	0.353	**	0.182	*
Number of male 15 to 64 year olds	0.149		0.813	***	-0.164	
Number of female 15 to 64 year olds	0.043		-0.313		0.126	
Number of 65 year olds and older	-0.075		-0.824		0.143	
Number of ill persons in household if healthy	-0.185		-0.660	*	-0.125	
Individual social capital						
Church group memberships	-1.536	**	0.263		-0.403	
Finance group memberships	0.469		-0.365		0.042	
Production group memberships	1.491		-0.846		0.218	
Private interest group memberships	0.935		4.215	*	-2.497	
Service group memberships	0.122		-2.043		0.854	
Political group memberships	0.535		-1.321		0.386	
Other group memberships	-2.727		2.732		-1.124	
Household social capital						
Household church group memberships	0.015		0.027		-0.149	
Household finance group memberships	-0.043		0.423	*	-0.222	
Household production group memberships	-1.380		-1.214		-1.584	
Household private interest group memberships	-0.587		-0.279		-0.234	
Household service group memberships	-1.730		1.985	*	-1.124	
Household political group memberships	1.385		0.008		1.064	
Other household group memberships	3.792		-0.202		5.437	
Community social capital						
Cluster finance groups	1.494	***	0.474	***	1.169	***
Cluster production groups	-0.409	***	-0.273	***	-0.410	***
Cluster private interest groups	0.385	***	0.704	***	0.196	***
Cluster service groups	1.272	***	-0.611	***	0.873	***
Cluster political groups	0.192		0.662	***	-0.034	
Cluster other groups	-12.983	***	-0.945		-17.763	***
Constant	11.531	***	12.502	***	3.668	
Observations	1590		788		1590	
R-squared	0.542		0.463		0.410	
Adjusted R-squared	0.532		0.439		0.397	
F statistic	54.02	***	19.12	***	31.79	***

Notes: *** indicates coefficients and tests significant at the 1% level; ** indicates coefficients and tests significant at the 5% level; * indicates coefficients and test significant at the 10% level.

The estimations in the table have extremely high R^2 statistics, and excellent overall fits. Glancing at the results, however, this is clearly due to the correlations between different the numbers of groups of different types at the cluster level (as presented in Table 7.1(e)).

Note that the self-rated health is significant in the levels-on-lags model estimation. This means that endogeneity was present in the self-rated health regression in section VI. Essentially, the result presented there associated higher numbers of church groups with better self-rated health. It is clear now, though, that it is in fact better health levels among individuals in a community that leads to increases in the number of church groups available.

Apart from this result, older individuals are more likely to be a part of communities which have more church groups available (note the positive and significant coefficient for age squared in the levels-on-differences model). Additionally, Africans are (highly) less likely to be in communities with greater numbers of church groups, while individuals in rural areas, however, are more likely to have greater numbers of church groups. Better educated individuals are more likely part of a community that will increase the number of church groups available, although increases in the education levels of community members leads to a decrease in church groups in that community. This may be an example of a trade-off between time spent on bettering education levels, and time spent in developing (church-oriented) support groups. Better educated communities, however, have already made this trade-off (having chosen education), and are now able to spend more time on the support groups. An increase in, and higher levels of the number of children in an individual's household makes it more likely that the individual is part of a community in which there are greater numbers of church groups. The same is true for individuals in households where the number of male adults increases. An increase in the morbidity burden on healthy individuals means that those individuals are more likely to be part of communities that have fewer church groups. This is representing the burden of care: these healthy individuals have less time to form support groups even when they are healthy, since there are ill individuals in their households who they may have to care for.

The final test of a possible endogenous relationship is the test of the association between individual self-rated health and community finance groups in the self-rated health regression in section VI. The regressions used to test this relationship are presented in Table 7.17. These are the results of the levels-on-levels, levels-on-differences, and differences-on-lags model estimations of community financial groups on self-rated health (among other things)

Table 7.17. Community finance group social capital regressions testing the association with self-rated health

OLS	Levels-on-lags		Levels-on-differences		Differences-on-lags	
Cluster-level availability of finance groups						
Self-rated health (fair/poor/very poor = 1, good/very good = 0)	-0.544		0.443		-0.828	**
Estimated age	0.077		-0.587		0.120	
Estimated age squares	-0.001		0.001		-0.001	
Gender (female = 1, male = 0)	0.020		-0.006		-0.121	
Race (African = 1, Indian = 0)	6.793	***	7.924	***	3.750	***
Place of residence (rural = 1, urban = 0)	-1.602	***	-1.124	*	-1.310	***
Years of education	-0.069		-0.128		-0.173	***
Marital status (married = 1, otherwise = 0)	0.194		-0.010		0.171	
Household welfare	0.180		-0.046		0.150	
Number of 0 to 14 year olds	-0.114		-0.231	*	-0.030	
Number of male 15 to 64 year olds	0.209	*	-0.200		0.123	
Number of female 15 to 64 year olds	0.222	*	0.185		0.123	
Number of 65 year olds and older	-0.171		0.498		-0.198	
Number of ill persons in household if healthy	0.067		-0.136		0.104	
Individual social capital						
Church group memberships	-0.772		-0.201		-1.089	**
Finance group memberships	0.394		0.250		0.489	
Production group memberships	-0.181		1.273		0.206	
Private interest group memberships	3.720	**	-1.221		3.808	**
Service group memberships	-0.192		-0.338		-0.174	
Political group memberships	-0.990		0.928		-1.004	
Other group memberships	0.088		0.066		0.777	
Household social capital						
Household church group memberships	0.613	***	-0.094		0.746	***
Household finance group memberships	-0.576	**	0.206		-0.813	***
Household production group memberships	-0.851		-0.074		-0.555	
Household private interest group memberships	-1.112	***	-0.043		-1.080	***
Household service group memberships	0.133		-0.531		-0.248	
Household political group memberships	1.067	*	-0.050		1.169	*
Other household group memberships	0.213		0.598		-0.714	
Community social capital						
Cluster church groups	0.272	***	0.209	***	0.212	***
Cluster production groups	0.839	***	0.520	***	0.229	***
Cluster private interest groups	0.127	***	0.196	***	0.055	
Cluster service groups	-0.077	*	0.216	***	0.008	
Cluster political groups	1.020	***	-0.658	***	0.618	***
Cluster other groups	-2.030	***	-0.055		-3.114	***
Constant	-6.319	**	1.225		-5.140	*
Observations	1613		788		1613	
R-squared	0.355		0.5341		0.156	
Adjusted R-squared	0.341		0.513		0.138	
F statistic	25.57	***	25.38	***	8.6	***

Notes: *** indicates coefficients and tests significant at the 1% level; ** indicates coefficients and tests significant at the 5% level; * indicates coefficients and test significant at the 10% level.

One can note once more from Table 7.17 that the R^2 statistics are again high (except for the differences-on-lags model), and the fits are significant. Undoubtedly, part of the reason for the high R^2 statistics is the correlation between community groups of different types, as was the case for the community church group regressions above.

The results of the estimation are very interesting. Individuals with poor self-rated health are more likely to cause their communities to decrease financial group memberships (note the negative and significant coefficient of self-rated health in the differences-on-lags model). However, the original self-rated health model including community financial groups as a regressor (in section VI), found that communities with more financial groups are associated with individuals with poor self-rated health. This result may seem initially counter-intuitive, but a careful explanation of this phenomenon can be offered. It is possible that communities containing individuals reporting poor health are those in which there are more burial societies and stokvels (which enable community members to cope with the financial strain of poor health). Another explanation could be that communities with relatively rich individuals may be taking advantage of formal financial institutions instead of the relatively less commercial stokvels and burial societies. However, it seems that, because of the poor health levels in these communities, the number of financial groups has been decreasing, although not down to a level low enough where the negative relationship between poor self-rated health and community financial groups would be lost. In other words, communities with ill individuals still have relatively more financial groups than those without, although the numbers of these groups are decreasing in these ill communities.

As for the other results in Table 7.16, African individuals are (highly) more likely to be in communities with more financial networks, although, those in rural areas are more likely to be in communities with fewer financial networks available. Individuals in households that have had an increase in the numbers of children are more likely to be in communities that have a higher number of financial groups. Contrastingly, individuals in households with higher numbers of adults are part of communities with fewer financial groups in the future.

In conclusion, this section has accomplished its task: to confirm or refute the existence of endogenous association with social capital in the models from the previous empirical sections. It has been shown that endogeneity does exist in some cases, but that there is no consistent evidence of associations between social capital on the one hand and welfare,

poverty and health on the other hand. For example, individual-level service group social capital, community church group social capital, and community finance group social capital are all determined by, among other things, individual self-rated health, but only in select cases. Poor individual health causes lower levels of individual service group memberships in future, a lower availability of community church groups in future, as well as declines in the availability of community financial groups.

The only exception perhaps is household membership of financial groups, where membership increased as household welfare increased (note the significant and positive coefficient in the levels-on-differences model, with and without the 1993 data). When the regressions were run separately for the poor and non-poor, moreover, there was evidence again that household financial group social capital was associated positively and significantly with household welfare, but only for the poor. Thus, we can conclude that there is a cyclical relationship between household welfare and financial group social capital (with higher welfare levels leading to more financial group memberships which lead to higher welfare levels again), in households in general as well as in poor household in particular. Coupled with the conclusions from the poverty analysis, we can state therefore that it is financial groups that households can use to raise their welfare levels (although the poor benefit the most), although higher levels of welfare are also required to benefit from household financial social capital.

VIII CONCLUSION

1. SUMMARY

Literature from the past decade provides evidence that suggests that social capital may be a useful tool in combating poverty and ill-health. Whether at the community level, household level, or individual level, social capital has been shown to influence a number of welfare and health variables, mostly in a positive way, in both developing and developed countries.

In KwaZulu-Natal, individual-, household- and community-level network social capital have increased significantly between 1993 and 1998, following the establishment of the new South Africa in 1994. This presents some evidence of the reported positive relationship between social capital and democratization. The analyses in this thesis have been directed at the possible links that different types of networks have with improvements in household welfare, poverty and self-rated health during this period. These findings can then be employed to reach separate conclusions regarding the link each type of social capital network has with welfare, poverty and health, so as to be able to make different policy recommendations on how these networks can be employed to achieve improved welfare and health.

It is evident from the analyses presented in this thesis that it is not only household demographics, human capital, and physical capital that determine welfare levels and poverty in households, but also social capital. More specifically, the results presented here provide evidence of several significant relationships between types of network social capital and welfare, poverty and health in KwaZulu-Natal.

Higher welfare levels are associated with higher levels of household-level financial group, service group, and political group social capital. The poor benefit more from the financial network social capital, while the non-poor benefit more from the service group social capital and political group social capital. An increase in financial social capital is also associated with increases in welfare and higher levels of welfare later. Likewise, higher levels of financial social capital and increases in financial social capital are also associated with smaller likelihoods of being poor, as are higher levels of political group memberships. An increase in church group memberships is associated with a smaller chance of falling

into poverty over time, compared with staying poor or non-poor. Households with higher levels of financial and political social capital are also less likely to be chronically poor. In the case of financial social capital, however, higher initial levels of welfare are required to be able to benefit from these social capital networks. However, there is no consistent evidence that morbidity levels impact significantly on household welfare or poverty. The same is true for cluster-level availability of social capital: there is little evidence suggesting that availability of groups has an effect on household welfare or poverty.

This thesis also revealed some evidence of the existence of the pooling phenomenon in social capital, where individuals of similar socio-economic status form a group that seems to bar individuals of lower socio-economic status from benefiting from that group. For service group and political group social capital the welfare enhancing benefits of being members of these networks are exclusively evident among the non-poor. Among the poor, in turn, finance group social capital is important in enhancing the welfare of members of that group. There is little evidence, however, of copying phenomena. Only in one instance is there very weak evidence that the poor benefit from household-level financial group social capital insofar as increases in such memberships are associated with a significantly higher probability of escaping poverty.

Looking at social capital in the health analysis several more significant results appear. Increases in financial group and service group social capital at the individual level are associated with increases in individuals' self-reported health levels. Higher levels of service group memberships are also associated with better self-reported health. This association, however, is endogenous in the self-rated health models. This means it is more likely that better health causes an increase in memberships, rather than an increase in memberships causing better health. Individuals are also more likely to report an improvement in their health status following an increase in financial or service group memberships at the household level. Higher levels of financial social capital are also associated with a lack of movement into and out of the category of individuals reporting fair, poor, or very poor health. Communities containing individuals with poor health levels are also more likely to witness a decline in the availability of financial and church groups.

Taking into account the extensive body of literature on the topic of social capital and its relationship with welfare or health, as well as the evidence provided by this study, one can

therefore conclude that social ties in the form of voluntary associations are anything but a 'ball-and-chain', and in many cases, can be considered a 'life-line'.

2. FURTHER RESEARCH

This thesis has attempted to determine the consequences of investing in different types of network social capital. These analyses suggest further avenues of research into determining the causes, or determinants, of different network types.

The interesting results in this paper are not only the robust significant regression coefficients presented in the previous chapters, but also the coefficients that are not significant in the regressions. The group types that fail to achieve significant relationships with welfare and health need not be overlooked. Knowing that memberships in a certain group type do not affect welfare or health levels, or exposure to poverty for that matter, is as much an important result as knowing they do, for two reasons. *Firstly*, one can ask the question as to what, indeed, the group's purpose is if it is not trying to raise welfare or health levels among its members. Improvements in welfare and self-rated health are not the only outcomes that are sought when joining voluntary organizations, and further research into the different network types could yield these outcomes. *Secondly*, if it is a group type that should be associated with health or wealth, and the relationship is not evident, one can ask the question as to why the relationship is not clear. Again, research into the different group types could provide the reasons why these groups do not perform as expected.

The social capital network types that failed to influence welfare, poverty and health include church, production, and private interest networks. In fact, a robust counter-intuitive result is found for production groups: households with higher levels of production group social capital are less likely to move out of poverty. This result may be attributed again to the endogeneity problem: these particular types of groups (e.g. farmers' associations, traders' associations, community gardens, sowing groups) are ones one would expect the poor to be members of, thus explaining why those who failed to escape poverty in fact are more likely to have memberships in such groups. Besides this odd result, there is no evidence of many *a priori* expected relationships between social capital and welfare and poverty. For example, it is in the nature of production groups, as in financial groups, to raise the welfare of its members. This is not the case here. One could also expect, for example, private

interest group memberships to be related to health levels. Even where the health levels of the members of the group are not key to the group's success (such as in sports groups), these groups should provide an individual with a network of like-minded individuals, who could be regarded as a support group in times of need. Even being in a group of people similar to oneself should better one's psychological well-being, and thus, be positively related to self-rated health, which encompasses both psychological and physical health status. Further research is required to delve deeper into the workings of these network types, to find the reasons why groups are not able to provide the results expected.

3. POLICY RECOMMENDATIONS

Knowing the significant associations between network social capital types and welfare or health levels allows policy decisions to be focused on the group types that matter for a particular outcome. For example, a policy to raise household welfare might focus on lowering the financial requirements associated with joining stokvels or burial societies, since we have shown that these types of groups raise the welfare levels of their members, and that there is generally an initial level of welfare required to share in the benefits of belonging to these groups.

There is another area where policy recommendations can be made, looking at the relationships that were expected, but not present between welfare or health and social capital. In the case of production group social capital, for example, one expects membership to be associated with welfare benefits, due to the nature of the group. But there may be many reasons for the lack of a significant relationship between the two. Markets may be inadequate for the product produced by members of the group, the members may not have enough capital to develop the group, or there may not be enough expertise amongst the group members to be able to provide a competitive product. This is a possible area in which policy-makers can direct further research. With more effective groups or networks, the evident increasing trend in memberships and access to groups can be utilized to its full potential.

In essence, this means that policy-makers need not only focus on those groups found to be related to welfare and health in this thesis, but they also need to direct research at finding the inefficiencies and inadequacies in those group types that are unexpectedly ineffective.

Policy-makers then need to develop policies to correct these inefficiencies and inadequacies.

In can be noted furthermore that the promotion of network social capital in achieving the outcomes discussed here in many areas fits well into the agenda of the South African Government's Department of Social Development. Most importantly, the Department's overarching Strategic Plan for 2000-2005 alone encompasses several areas related to network social capital (Department of Social Development, 2005):

- "rebuilding family, community and social relations"

  Social relations are presumably the building blocks of network social capital. This statement inadvertently highlights an area that requires extensive further research: finding the determinants of the variation in group memberships that is not captured by the models presented in this paper. Once these determinants are known, one can begin to understand the causes of network social capital, and not just the consequences, as found in this research.
- "an integrated poverty-eradication strategy"

  It has been shown in this paper, that financial group social capital, service group social capital, and political group social capital all positively affect the welfare of households. Moreover, individual health is better for those with increased memberships in financial and service groups as well, and, as we know already from several previous studies on the health-wealth nexus (such as in Meer *et al.,* 2003), an act of raising health levels may be a poverty-reducing act simply due the increase in productivity enabled by better health. The problems associated with these networks, however, are that an initial level of welfare is needed before the household can benefit from these groups. If this barrier to entry could be overcome, the formation of network social capital could indeed be a powerful integrated poverty-eradication strategy.
- "youth development"

  A function of several of the private interest networks is to develop the youth. Take, for example, a study group, where learners or students gather to better their knowledge base or help each other better their education, or a singing, music, or sports group, where young members can learn valuable skills. Unfortunately, no

evidence of improving welfare or health is found to be attributed to private interest social capital. Perhaps the outcomes of welfare and health are not sufficient measures of the efficacy of these groups. It may also be that the groups' influences on the welfare or health generating processes are just not strong enough, and need to be strengthened, or perhaps that these are not the explicit goals of the groups. Examples of strengthening the bonds between welfare or health and private interest group memberships could be incentives for taking part in the groups, like fitness or health programs being set out for sports groups.

- "commitment to co-operative governance"

  The formation of political-minded networks, as represented by the political social capital in this research paper, can be a key to co-operative governance. The government can use these political organizations as a starting point for the dispersion of any new concepts or policies arising from their governance. These social groups also create a channel through which the public can connect with officials they may or may not have been able to without the authority of the group organization.

The strategies that have been put in place by the Department for Social Development (2005) also include "the proposed introduction of incentives for professionals working in rural areas" and "the development of an appropriate service delivery model". Here, again, network social capital can fit into the Department's agenda seamlessly. Regarding the *former* statement, professionals in any area of expertise could be given incentives to form social organizations that allow people of lesser expertise in that field to join, and draw on that professional's knowledge. This represents the ideal structure of a vertically organized association – one that allows the less fortunate to 'mingle' with the fortunate, and to draw from the experiences of those who have been able to escape the situations that these less fortunate have not been able to escape. As for the *latter* statement above, social capital networks can be utilized to deliver services. Incentive-based service groups, for example, can be sanctioned to deliver the services offered to the area that the group members are residents of, and, in doing so the members are given the opportunity to raise their own welfare levels, simply by being a part of the group (hence the term incentive-based).

One of the projects of the Department of Social Development is their poverty-relief programme. This thesis has provided evidence for the poverty-reducing effects of certain

types of social capital, in particular financial and political group social capital. As mentioned before, however, these groups are not without their own problems, such as a barrier to entry being an initial level of welfare. However, the financial groups are not the only types of groups that should be related to welfare generation. Production groups should be providing a similar outcome: that of reduced poverty and raised welfare. Unfortunately, it is evident that this is not the case at the moment. The poverty reduction programme in the Department of Social Development could, for example, set aside resources to lower the barrier to entry into financial groups, and to increase the effectiveness of production groups.

Finally, it can be noted that the structures for sanctioning networks are already in place in the Department of Social Development, in the form of the Non-Profit Directorate, which registers non-profit organizations (such as these voluntary organizations) under the NPO Act of 1997 (Act 71 of 1997), so that these organizations can flourish. With a government department in place that works towards ideals so similar to those embodied by different groups or networks, and with the structures in place to sanction and monitor these different networks, it would require further administrative steps to promote network social capital, to correct the inefficiencies in network social capital, and to provide the assistance needed to keep the networks moving towards the outcomes intended. The benefits of these steps, moreover, could be extensive: raising welfare levels, reducing poverty, both chronic and non-chronic, and raising health levels. In a world struggling to keep up with the demands set out by the Millennium Development Goals, it may prove to be a step in the right direction.

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APPENDIX

Table A1. Descriptive statistics of individual-level data

Variable		Mean	Std. Dev.	Min	Max	Observations
Self-rated health (fair/poor/very poor = 1, good/very good = 0)	overall	0.688	0.463	0	1	N = 3234
	between		0.434	0	1	n = 2310
	within		0.215	0.188	1.188	T-bar = 1.4
Change in self-rated health	overall	-0.052	0.566	-1	1	N = 924
	between		0.566	-1	1	n = 924
	within		0	-0.052	-0.052	T = 1
Age	overall	50.092	14.136	8	100	N = 3106
	between		14.344	8	100	n = 2248
	within		2.148	46.592	53.592	T-bar = 1.38167
Square of age	overall	2709.004	1520.782	64	10000	N = 3106
	between		1530.145	64	10000	n = 2248
	within		231.987	2139.004	3279.004	T-bar = 1.38167
Gender (female = 1, male = 0)	overall	0.647	0.478	0	1	N = 3234
	between		0.482	0	1	n = 2310
	within		0	0.647	0.647	T-bar = 1.4
Race (African = 1, Indian = 0)	overall	0.833	0.373	0	1	N = 3234
	between		0.364	0	1	n = 2310
	within		0	0.833	0.833	T-bar = 1.4
Place of residence (rural = 1, urban = 0)	overall	0.651	0.477	0	1	N = 3200
	between		0.474	0	1	n = 2276
	within		0	0.651	0.651	T-bar = 1.40598
Years of education	overall	5.060	3.824	0	14	N = 3188
	between		3.834	0	14	n = 2293
	within		0.362	1.560	8.560	T-bar = 1.39032
Marital status (married = 1, otherwise = 0)	overall	0.714	0.452	0	1	N = 3231
	between		0.454	0	1	n = 2309
	within		0.097	0.214	1.214	T-bar = 1.39931
Household welfare	overall	6.686	0.931	4.387	10.334	N = 2715
	between		0.863	4.387	9.922	n = 1791
	within		0.351	5.181	8.190	T-bar = 1.51591
Number of 0 to 14 year olds	overall	2.539	2.330	0	15	N = 3136
	between		2.160	0	14	n = 2212
	within		0.807	-3.461	8.539	T-bar = 1.41772
Number of males 15 to 64 years old	overall	1.708	1.291	0	11	N = 3151
	between		1.207	0	9	n = 2227
	within		0.529	-2.292	5.708	T-bar = 1.41491
Number of females 15 to 64 years old	overall	2.088	1.461	0	10	N = 3184
	between		1.369	0	9	n = 2260
	within		0.543	-1.412	5.588	T-bar = 1.40885
Number of elderly (65 years old and older)	overall	0.401	0.603	0	3	N = 2783
	between		0.582	0	3	n = 1859
	within		0.215	-0.599	1.401	T-bar = 1.49704
Number of ill persons in the household if healthy (0 if not healthy)	overall	0.428	0.714	0	5	N = 2927
	between		0.643	0	5	n = 2003
	within		0.379	-1.572	2.428	T-bar = 1.46131
Church group memberships	overall	0.546	0.510	0	2	N = 3231
	between		0.449	0	2	n = 2307
	within		0.288	-0.454	1.546	T-bar = 1.40052

Table A1. Descriptive statistics of individual-level data (continued)

Variable		Mean	Std. Dev.	Min	Max	Observations
Financial group memberships	overall	0.347	0.590	0	2	N = 3231
	between		0.546	0	2	n = 2307
	within		0.266	-0.653	1.347	T-bar = 1.40052
Production group memberships	overall	0.024	0.155	0	2	N = 3231
	between		0.124	0	1	n = 2307
	within		0.092	-0.976	1.024	T-bar = 1. 40052
Private interest group memberships	overall	0.018	0.137	0	2	N = 3231
	between		0.129	0	2	n = 2307
	within		0.062	-0.482	0.518	T-bar = 1.40052
Service group memberships	overall	0.031	0.197	0	3	N = 3231
	between		0.167	0	2	n = 2307
	within		0.106	-1.469	1.531	T-bar = 1.40052
Political group memberships	overall	0.023	0.152	0	2	N = 3231
	between		0.131	0	1	n = 2307
	within		0.083	-0.977	1.023	T-bar = 1.40052
Other group memberships	overall	0.013	0.116	0	2	N = 3231
	between		0.089	0	1	n = 2307
	within		0.069	-0.987	1.013	T-bar = 1.40052
Household church group memberships	overall	2.573	3.352	0	29	N = 3172
	between		2.682	0	19	n = 2248
	within		2.168	-11.927	17.073	T-bar = 1.41103
Household financial group memberships	overall	0.834	1.450	0	17	N = 2923
	between		1.337	0	15	n = 1999
	within		0.701	-6.666	8.334	T-bar = 1.46223
Household production group memberships	overall	0.062	0.291	0	3	N = 2727
	between		0.254	0	3	n = 1803
	within		0.162	-1.438	1.562	T-bar = 1.51248
Household private interest group memberships	overall	0.195	0.680	0	11	N = 2779
	between		0.555	0	5.500	n = 1855
	within		0.414	-5.305	5.695	T-bar = 1.49811
Household service group memberships	overall	0.077	0.316	0	3	N = 2732
	between		0.264	0	2	n = 1808
	within		0.184	-1.423	1.577	T-bar = 1.51106
Household political group memberships	overall	0.081	0.343	0	4	N = 2738
	between		0.303	0	3	n = 1814
	within		0.173	-1.419	1.581	T-bar = 1.50937
Household other group memberships	overall	0.032	0.249	0	5	N = 2721
	between		0.201	0	4	n = 1797
	within		0.148	-2.468	2.532	T-bar = 1.51419
Community church groups	overall	7.979	9.685	0	60	N = 3213
	between		8.905	0	60	n = 2304
	within		4.162	-12.021	27.979	T-bar = 1.39453
Community financial groups	overall	5.064	6.569	0	50	N = 3234
	between		5.895	0	50	n = 2310
	within		3.264	-18.936	29.064	T-bar = 1.4
Community production groups	overall	3.126	5.155	0	30	N = 3234
	between		4.597	0	30	n = 2310
	within		2.721	-10.874	17.126	T-bar = 1.4

Table A1. Descriptive statistics of individual-level data (continued)

Variable		Mean	Std. Dev.	Min	Max	Observations
Community private interest groups	overall	5.157	6.732	0	50	N = 3234
	between		6.113	0	50	n = 2310
	within		3.385	-17.343	27.657	T-bar = 1.4
Community service groups	overall	4.036	4.593	0	30	N = 3207
	between		4.103	0	30	n = 2297
	within		2.434	-7.964	16.036	T-bar = 1.39617
Community political groups	overall	1.767	1.877	0	10	N = 3186
	between		1.709	0	10	n = 2294
	within		0.876	-2.233	5.767	T-bar = 1.38884
Other community groups	overall	0.108	0.339	0	2	N = 3234
	between		0.275	0	2	n = 2310
	within		0.208	-0.892	1.108	T-bar = 1.4

Table A1. Descriptive statistics of household-level data

Variable		Mean	Std. Dev.	Min	Max	Observations
Household welfare	overall	6.617	0.828	3.798	10.334	N = 3042
	between		0.714	4.306	9.893	n = 1285
	within		0.428	5.143	8.532	T-bar = 2.36732
Household poverty (poor = 1, non-poor = 0)	overall	0.416	0.493	0	1	N = 3042
	between		0.402	0	1	n = 1285
	within		0.308	-0.251	1.083	T-bar = 2.36732
Change in poverty status (-1 = out of poverty, 0 = no change, 1 = into poverty	overall	-0.028	0.565	-1	1	N = 1757
	between		0.403	-1	1	n = 1035
	within		0.434	-1.028	0.972	T-bar = 1.69758
Household poverty status (chronic = 1, transient = 2, non-poor = 3)	overall	2.004	0.838	1	3	N = 2166
	between		0.839	1	3	n = 722
	within		0	2.004	2.004	T = 3
Household chronic poverty status (chronic = 1, non-chronic poor = 0)	overall	0.349	0.477	0	1	N = 2166
	between		0.477	0	1	n = 722
	within		0	0.349	0.349	T = 3
Years of education of head of household	overall	4.080	3.822	0	14	N = 2499
	between		3.659	0	14	n = 1181
	within		1.027	-1.920	10.080	T-bar = 2.116
Gender of head of household (female = 1, male = 0)	overall	0.389	0.488	0	1	N = 2531
	between		0.464	0	1	n = 1181
	within		0.147	-0.278	1.055	T-bar = 2.1431
Age of head of household	overall	53.636	14.781	17	109	N = 2345
	between		14.239	19	97	n = 1159
	within		5.057	12.636	94.636	T-bar = 2.0233
Squared age of head of household	overall	3095.234	1636.275	289	11881	N = 2345
	between		1553.118	361	9418	n = 1159
	within		562.514	-2480.766	8671.234	T-bar = 2.0233
Number of 0 to 14 year olds	overall	2.459	2.223	0	16	N = 3042
	between		1.852	0	13	n = 1285
	within		1.220	-5.208	9.459	T-bar = 2.36732
Number of males 15 to 64 years old	overall	1.475	1.239	0	11	N = 3042
	between		0.989	0	7.333	n = 1285
	within		0.734	-2.858	5.142	T-bar = 2.36732
Number of females 15 to 64 years old	overall	1.929	1.332	0	10	N = 3042
	between		1.072	0	8	n = 1285
	within		0.785	-3.071	5.929	T-bar = 2.36732

Table A1. Descriptive statistics of household-level data (continued)

Variable		Mean	Std. Dev.	Min	Max	Observations
Number of elderly (65 years old and older)	overall	0.300	0.530	0	2	N = 3042
	between		0.438	0	2	n = 1285
	within		0.296	-1.033	1.634	T-bar = 2.36732
Race (African = 1, Indian = 0)	overall	0.838	0.368	0	1	N = 3042
	between		0.375	0	1	n = 1285
	within		0	0.838	0.838	T-bar = 2.36732
Place of residence (rural = 1, urban = 0)	overall	0.654	0.476	0	1	N = 3042
	between		0.476	0	1	n = 1285
	within		0	0.654	0.654	T-bar = 2.36732
Household total years of education	overall	24.852	16.980	0	176	N = 3042
	between		14.338	0	122.667	n = 1285
	within		9.007	-18.814	78.186	T-bar = 2.36732
Owns farming vehicle (yes = 1, no = 0)	overall	0.008	0.090	0	1	N = 3042
	between		0.069	0	1	n = 1285
	within		0.059	-0.658	0.675	T-bar = 2.36732
Owns mechanical farm equipment (yes = 1, no = 0)	overall	0.075	0.263	0	1	N = 3042
	between		0.167	0	1	n = 1285
	within		0.207	-0.592	0.742	T-bar = 2.36732
Owns farming tools (yes = 1, no = 0)	overall	0.442	0.497	0	1	N = 3042
	between		0.361	0	1	n = 1285
	within		0.361	-0.225	1.108	T-bar = 2.36732
Has access to grazing land (yes = 1, no = 0)	overall	0.223	0.416	0	1	N = 3042
	between		0.321	0	1	n = 1285
	within		0.281	-0.444	0.889	T-bar = 2.36732
Number of cattle	overall	1.029	3.224	-4	72	N = 3042
	between		2.498	-2	32.667	n = 1285
	within		1.915	-21.637	40.363	T-bar = 2.36732
Number of ill persons in the household	overall	0.676	0.848	0	6	N = 3042
	between		0.625	0	5	n = 1285
	within		0.621	-2.324	4.010	T-bar = 2.36732
Household church group memberships	overall	1.521	2.582	0	29	N = 3042
	between		1.485	0	9.667	n = 1285
	within		2.086	-8.146	20.854	T-bar = 2.36732
Household financial group memberships	overall	0.526	1.080	0	17	N = 3042
	between		0.766	0	7.333	n = 1285
	within		0.738	-5.807	11.193	T-bar = 2.36732
Household production group memberships	overall	0.038	0.220	0	3	N = 3042
	between		0.146	0	1.667	n = 1285
	within		0.153	-1.296	2.038	T-bar = 2.36732
Household private interest group memberships	overall	0.111	0.520	0	11	N = 3042
	between		0.334	0	4	n = 1285
	within		0.378	-3.556	7.444	T-bar = 2.36732
Household service group memberships	overall	0.043	0.237	0	3	N = 3042
	between		0.149	0	1.500	n = 1285
	within		0.175	-1.290	2.043	T-bar = 2.36732
Household political group memberships	overall	0.047	0.264	0	4	N = 3042
	between		0.199	0	3	n = 1285
	within		0.164	-1.619	2.381	T-bar = 2.36732

Table A1. Descriptive statistics of household-level data (continued)

Variable		Mean	Std. Dev.	Min	Max	Observations
Household other group memberships	overall	0.018	0.183	0	5	N = 3042
	between		0.109	0	2	n = 1285
	within		0.139	-1.649	3.351	T-bar = 2.36732
Community church groups	overall	6.521	7.802	0	60	N = 3029
	between		6.341	0	33.333	n = 1285
	within		4.268	-6.812	33.188	T-bar = 2.3572
Community financial groups	overall	3.827	5.306	0	50	N = 3042
	between		3.733	0	18.333	n = 1285
	within		3.604	-12.507	35.493	T-bar = 2.36732
Community production groups	overall	2.050	4.064	0	30	N = 3042
	between		2.642	0	13.333	n = 1285
	within		2.965	-7.950	21.050	T-bar = 2.36732
Community private interest groups	overall	3.690	5.294	0	50	N = 3042
	between		3.590	0	20	n = 1285
	within		3.742	-11.310	33.690	T-bar = 2.36732
Community service groups	overall	2.950	4.346	0	30	N = 3029
	between		3.620	0	27.500	n = 1285
	within		2.621	-11.384	15.950	T-bar = 2.3572
Community political groups	overall	1.532	1.867	0	10	N = 3015
	between		1.654	0	9	n = 1285
	within		0.947	-1.468	6.532	T-bar = 2.3463
Other community groups	overall	0.058	0.253	0	2	N = 3042
	between		0.137	0	1	n = 1285
	within		0.209	-0.609	1.391	T-bar = 2.36732