

Executive summary

This thesis analyses the multidimensional poverty risk of vulnerable households in Central Europe. Since transition, there has been divergence between economic and human development in this region, which gives rise to question whether the use of a multidimensional approach instead of a financial assessment of poverty leads to a different identification of vulnerable socio-demographic groups. Moreover, the new Central European member states of the European Union are very diverse, which suggests that the relation between socio-demographic household characteristics might vary between different regions in the area.

The theoretical framework in this research is the livelihood framework of Ellis (2000), which is based on the capabilities approach as developed by Sen (1983). This approach to assessing human well-being evolved from the basic needs approach, and rejects the use of an objective financial cut-off for poverty, and a focus on only physical assets and the utility gained by individuals. The focus of the capability approach is on the ability to act and views commodities as means, not as ends to achieve a certain standard of well-being. The livelihood framework distinguishes assets, access, and activities, which together determine the living gained by an individual or household. Another alternative approach to measuring well-being is by using subjective well-being or life satisfaction, which originates on the work of Easterlin (1974) who linked psychology to economics. Subjective well-being is in this study also viewed as an household asset, and is with other (more objective) indicators of household capabilities integrated in a multidimensional well-being index. The construction of the multicomponent index is based on earlier work of Klasen (2000) and Guio (2005).

Research of the World Bank (2000, 2005) showed that well-being problems in Central Europe are mainly linked to housing and (semi-)public services, such as health care, education, and utilities. Moreover, studies by a.o. Bezemer (2006) and the World Bank (2005) show that women, children, elderly, and households in rural areas are vulnerable groups in Central Europe. Other research by the World Bank (2006) adds that there is a concentration of deprivation in secondary cities. Moreover, vulnerable households tend to be trapped in bad general living conditions with restricted access to improvements in their well-being situation. Further, some sociological case studies in Poland and Slovakia by Smith et al. (2006, 2008) and Stenning et al. (2007) show that low welfare is strongly connected with low skill, bad health, unemployment, and old age in poor areas. Moreover, Smith (2000, 2003) finds that regional welfare is strongly connected with industrial activity and high skill levels.

In this research, (financial) poverty is defined as an inadequate level of income to satisfy basic material needs. Multidimensional poverty (or deprivation) is defined as an insufficient level of capabilities to meet basic needs. For both poverty and deprivation, a 40% and 20% cut-off point is used to compare the vulnerability of households based on both measurements of well-being. First, conditional binominal regressions are used to estimate the odds of being poor and/or deprived for different types of households. Second, a multilevel model is used to analyse how the regional context is related to household well-being and estimate how the relation between the socio-demographic household characteristics and household well-being varies between regions. The household data that is used in this analysis is the EU-SILC cross-sectional wave of 2005, including Czech Republic (by NUTS2), Estonia, Hungary (by NUTS1), Latvia, Lithuania, Poland (by NUTS1), Slovakia and Slovenia. The regional data is based on the regional statistics collected by Eurostat.

First, the analysis finds that for a large share of the poor households, financial poverty and multidimensional poverty do not overlap. Moreover, the rank correlation of the financial poverty and multidimensional poverty ranks is the lowest for the worst-off households. Second, households in rural areas, single households, single parent families, large families, unemployed, inactives, and households with a foreign born head have the

highest general poverty risk. Third, mainly elderly, unemployed and urban households have a higher deprivation risk relative to their poverty risk. Fourth, large families is the main group that has a much higher poverty risk than deprivation risk. The last finding is surprising and does not support the hypothesis that large families are a very vulnerable group for low general well-being.

The second part of the analysis finds that unemployed, single parent families, singles, single elderly, and large families have to lowest average well-being. Also, average well-being increases by urbanization degree. A significant part of the variability in well-being is due to regional differences and variability in the relation between household characteristics and household well-being. In the final model, regional GDP and the share of employment in manufacturing explains part of the regional variation in well-being. Moreover, the effect of being elderly and urbanization degree varies between regions. Urbanization degree can even have a negative relation with well-being. Last, the relation between urbanization degree and household well-being is less strong in better-off regions.

This research concludes that the use of a multidimensional approach leads to a different identification of the poor, which is particularly evident for the worst-off households. Second, cross-regional differences in household well-being are hard to be explained in a multilevel model, but seem to be mostly connected to economic development. Last, the relation between socio-demographic risk factors for poverty can vary between regions. The results indicate that some risk factors for deprivation are higher in worse performing regions.

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1. Introduction

The World Bank wrote in their report *Making Transition Work for Everyone* in 2000: 'The magnitude of the increase in poverty—and its persistence during the past decade—alone would probably suffice to distinguish the experience of the transition countries in the Europe and Central Asia region from other regions.' (p. 2). After transition from the socialist system to a capitalist market economy, the former socialist countries experienced a sudden decline in economic output that can be compared with the Great Depression in the 1930s. Living standards deteriorated rapidly and political, economic and social life changed dramatically. Rising unemployment, value loss of assets and savings, and erosion of social services went hand in hand, decreasing the population's well-being and making them more vulnerable. In Central Europe, levels of absolute poverty (based on the \$2.15 poverty line) remained relatively low in comparison to Eastern European countries, but inequality is rising and other (non-financial) well-being problems have been surfacing after transition (World Bank, 2000). The follow-up report by the World Bank (2005) shows that between 1998 and 2003, the economies of most Central European countries recovered, lowering the (financial) poverty rates in these counties. On the other hand, progress in the non-income dimensions of poverty show very mixed results, between both countries and different dimensions of well-being. This situation gives rise to the question whether financial indicators of poverty are valid measures in the analysis of well-being levels in the Central European region.

This question has been the root of the debate on the measurement and conceptualisation of poverty in social sciences and economics in the last two decades. The capabilities approach developed by Sen (1983) influenced a whole new school of poverty research, which aims to develop a more multidimensional conceptualisation of poverty in an attempt to measure well-being more directly (Klasen, 2000). The objective of this study is twofold. First, this research attempts to analyze how the use of a multidimensional measurement of well-being leads to a different and more valid approach to distinguishing vulnerable groups in the Central European context. Second, the study will investigate how region-specific differences between Central European countries influence multidimensional poverty risk and well-being of the distinguished vulnerable groups. The goal of this research is to help understand how financial and non-financial dimensions of well-being relate to each other and how deprivation risk factors can vary among regions in Central Europe. This way, this study hopes to contribute to the improvement of pro-poor policy.

2. Background Literature

2.1 The conceptualisation of poverty

Poverty is an intensively discussed concept in welfare and well-being studies. Already at the end of the 19th century, Rowntree and Booth attempted to define poverty by taking the individual's ability to satisfy basic needs as a starting point. In Rowntree's article covering poverty in London in 1899, he defined poverty as 'a level of total earnings insufficient to obtain the minimum necessities for the maintenance of "merely physical efficiency," including food, rent, and other items' (World Bank, 2001, p. 17). Below a minimum needed amount of expenditures, Rowntree's study defined a family as poor (World Bank, 2001). In 1965, Orshansky also tried to quantify the norm for human physical needs. She used the cost of the Economy Food Plan in the United States to set a minimum living standard for households. First, she calculated the costs of a diet that is needed to maintain health. After that, she multiplied this amount by the inverse fraction of the average share of household income spent on food. This way of defining the cut-off point for poverty has remained central to the minimal living standard approach (O'Boyle, 1999; Sycheva, 1999). The World Bank's approach to measuring poverty builds forward on the Orshansky poverty thresholds. Since the 1990s, the World Bank has been estimating global income poverty figures based on a financial poverty line. Consumption expenditure data from household surveys are viewed as the preferred welfare indicator, because of the practical reliability and because it measures long term welfare more directly than current income. To make the consumption standard cross-country comparable, the price differences between countries are taken into account. Therefore, the consumption levels are corrected by the purchasing power parity of a country. Two poverty lines are used, the '\$1 a day' line (\$1.08) for low income countries and the '\$2 a day' line (\$2.15) that reflects the poverty lines most commonly used in lower middle income countries. In transition countries, an even higher poverty line is used. The '\$4 a day' line (\$4.30) does not reflect absolute poverty, but economic vulnerability. The World Bank defines poverty as the inability to meet basic material needs (World Bank, 2001, 2005).

Criticism exists on the use of an absolute poverty line. Setting an absolute poverty line does not take a general change in living standards into account. Therefore, relative poverty has also been integrated in many welfare studies after the early 1980s to control for these societal changes. However, the weakness of relative poverty measurements is that poverty reduction can be found in a country with falling incomes and living standards, because the income distribution has changed. An absolute standard does capture whether an individual or household stays above or below a certain subsistence minimum (Madden, 2000). The conclusion of the discussion between advocates of the absolute and the relative approach is that both views have their strengths and weaknesses in the measurement of poverty. The attempts to combine the (absolute) minimum living standard approach and the (relative) income-distribution approach have strengthened poverty research (O'Boyle, 1999). The World Bank also goes beyond just measuring the poverty head count to take differences in income distributions (in a country and among the poor) into account. With the poverty gap measure and the squared poverty measure, welfare studies also take the severity of poverty into account (World Bank, 2001).

In the 1980s, the debate about the way to assess human needs and well-being continued and evolved. The basic needs approach rejects a purely financial poverty line. It does not focus on income or consumption expenditure, but on 'human [basic] needs in terms of health, food, education, water, shelter, transport' (Streeten et al., 1981 quoted in Lipton and Ravallion, 1995, p. 2566). The view argues that increases in real income might not increase the access to services, such as health care, education and safe drinking water, to improve those basic needs. Sen's capability approach is related to the basic needs approach

and pleads for an even more fundamental redefinition of poverty. Sen (1983) argues that setting an absolute standard for well-being should be defined based on a person's capabilities, instead of commodities, characteristics or utility. Nevertheless, there is a clear link between these concepts. The Sen approach views commodities not as ends, but as means to desired activities. The benefits of having any claim over commodities are explicitly recognized. By possessing a certain commodity with certain characteristics, a person has the capability of acting in a way that may give that person utility or happiness. According to Sen (1983), the capability to function comes closest to the notion of the standard of living. The possession of a certain commodity may be the basis of a contribution to the standard of living, but is not a part of that standard. Moreover, the utility of the use of a good does not reflect the use itself, but the mental reaction to the use. The focus of the capability approach is on the ability to act. This ability indicates the standard of living most directly. It concentrates on meeting the need of self-respect and not just the pleasure from having that self-respect or meeting the social basis of self respect (as defined by John Rawls). The effect of the capabilities on the well-being situation depends on the personal and environmental circumstances of an individual. The strength of the capabilities approach is that it makes a certain basis for meeting the need of self-respect explicitly, but also acknowledges the variability that exists in the commodities required for capability fulfilment.

The capability approach is integrated in the livelihood framework that is widely used in research on poverty and (rural) development. Ellis (2000) defines livelihood based on the commonly used definition by Chambers and Conway (1992): A livelihood 'comprises the capabilities, assets (stores, resources, claims and access) and activities required for a means of living'. (p. 7, quoted by Ellis). The important feature of this definition is that it stresses the various options that people have in practice to achieve a certain standard of well-being. Ellis (2000) argues that the notion of access should be brought out more strongly, as the impact of social relations and institutions that mediate the capacity to achieve consumption requirements of individuals and households is considered important in poverty research.

Therefore, the definition of livelihood used by Ellis (2000) that will also be used in this research is: 'A livelihood comprises the assets (natural, physical, human, financial and social capital), the activities, and the access to these (mediated by institutions and social relations) that together determine the living gained by the individual or household,' (p. 10). Natural capital refers to natural resources that can be utilized by human populations. Physical capital refers to assets that can be used in economic production processes. Human capital refers to "among others" the education and health status of individuals. Financial capital refers to stocks of cash individuals can access to purchase goods. Social capital refers to social networks and associations in which people participate and that can be used to support their actions. Together, these different categories of capital contain the assets of individuals or households. Access is defined by the institutions and social relations that influence the differential ability of people to control or make use of their assets. It also refers to the ability to participate in and gain benefits from public services provided by the state or other organizations (e.g. community groups or NGOs). Activities are the 'doings' that a person uses to realise its potential as a human being (Ellis, 2000). The option to act is part of the capabilities of a person, but the actual surviving strategy itself is part of a livelihood. The combination of assets, access and activities determines the livelihood outcomes (Cahn, 2002).

The problem with this view is that it is hard to observe the capabilities itself, instead of achievements of individuals with a certain set of capabilities. Another problem with both the capability and basic needs approach is that preferences of individuals are not taken into account. Actual behaviour is a product of a choice someone makes and does not reflect all capabilities of a person. Despite the measurement problems, both views showed that commodity-, consumption- or income-centred approaches have their shortcomings and that command over commodities also should be taken into account when studying well-being (Lipton and Ravallion, 1995).

More criticism on financial and commodity-centred measurements of poverty comes from happiness research. It builds forward on the path breaking contribution of Easterlin (1974) that tries to link psychology to economics to assess welfare and well-being. Subjective happiness covers many more aspects of human well-being than the standard concept of utility that is used in economics. Therefore, the happiness approach to measuring well-being attempts to be complementary to more objective methods and tries to capture human well-being more directly (Graham, 2005; Frey and Stutzer, 2002). According to Veenhoven (2002), the use of subjective data adds to the understanding of the effects of social policy on individual well-being. Objective indicators fail to measure subjective matters, such as civil morale and perception of safety. These mental issues form together with material matters the complete well-being situation. An interesting result of happiness research is that non-financial variables have a consistently large influence on self-reported satisfaction (Frey and Stutzer, 2002). Moreover, Frey and Stutzer (2002) add that the influence of macro influences, such as institutional conditions, on individual well-being can be understood better when using subjective indicators of well-being. The effect of institutional quality on well-being is found to be much higher in comparison to the effect of economic and productivity growth (Helliwell, 2003). Also, happiness research helps to understand how individuals form their assessment of their well-being situation (Frey and Stutzer, 2002).

The relation between happiness and income is an intensively studied topic in happiness research. In general, people with a higher real income report a higher subjective well-being (Frey and Stutzer, 2002). However, differences in income explain only partly the differences in happiness. Other economic and non-economic factors are found to play an important role in explaining why some people report a higher well-being level than others. Another issue is that people assess their situation in relation to other individuals, and in relation to past consumption levels and expected future income (Frey and Stutzer, 2002). Heady et al. (2004) adds that consumption is a more accurate predictor of general well-being in comparison to income and wealth. Ferrer-i-Carbonell (2002) also concludes that income is not the most accurate predictor of self reported well-being. Employment is one of the main causes of well-being. Moreover, health, age, living with a partner, education, and inflation are found to influence well-being. From the happiness research, it can be concluded that a multidimensional approach will probably improve the analysis of poverty. Including non-income dimensions of well-being and subjective well-being will definitely increase the validity of the measurement of well-being.

2.2 The adoption of multidimensional measures of poverty

Pradhan and Ravallion (1998) tried to integrate qualitative and quantitative assessments of poverty to improve the validity of the poverty line. Based on questions whether the consumption of food, clothes and housing is sufficient for the respondent's family needs, a subjective poverty line is constructed. These poverty lines accord closely with more 'objective' poverty lines. However, the more subjective method shows larger differences between urban and rural areas. People in poor areas perceive themselves as poorer than is expected from 'objective' poverty analysis. Moreover, large households seem to be less poor when using more subjective poverty lines.

Klasen (2000) constructed a multidimensional index of deprivation for his research in South Africa to explore the relation between financial poverty and multidimensional poverty, which is called deprivation in this study. The financial poverty measure is based on household expenditures. The deprivation measure is based on capabilities. In the deprivation index, both objective and subjective indicators of poverty are used. The index consists of 14 components, which are scored on a scale of 1 to 5. A score of five reflects the best possible standard or condition, a score of three should allow a decent standard of living, and a score of one indicates severe deprivation. The differences in levels are interpreted cardinally, so a score of two is twice as good as a score of one. The total deprivation score is simply the

average of all the individual components, as weighing the components based on principal component analysis did not gain a significant change in the results. Table 2.1 shows the 14 different components of the deprivation index and the description of the indicators used. Two poverty lines are set for both poverty measures to capture the 40 percent and 20 percent worst-off households. Also, the total poverty and deprivation gap is calculated.

Klasen (2000) finds that all components are significantly correlated with the deprivation score and with each other. However, the strength of the relationship differs considerably. Safety is only weakly correlated with the deprivation score and has a negative relation with some components. Furthermore, nutrition, transport and life satisfaction have a relatively weak correlation with the other components. The expenditure quintile measure has the closest correlation with the deprivation index. However, this relation between expenditures and deprivation is much weaker for the most deprived groups. When analysing the most deprived, the analysis shows a stronger relation of sanitation and fuels with the deprivation index. Still, the correlation of expenditures with the deprivation score remains strong. According to Klasen (2000), this result can for a large part be due to the *apartheid* legacy. The policies that favoured the white population affect both the consumption levels and the access to services of white households.

Table 2.1: The components of the Klasen (2000) deprivation index

Component	Indicator used
Education	Average years of schooling of all adult (16+) household members
Income	Expenditure quintiles
Wealth	Number of household durables
Housing	Housing characteristics
Water	Type of water access
Sanitation	Type of sanitation facilities
Energy	Main source of energy for cooking
Employment	Share of adult members of household employed
Transport	Type of transport used to get to work
Financial services	Ration of monthly debt service to total debt stock
Nutrition	Share of children stunted in household
Health care	Use of health facilities during last illness
Safety	Perception of safety inside/outside of house, compared to 5 years ago
Perceived well-being	Level of satisfaction of household

Source: Based on Klasen (2000)

The study of Klasen (2000) also finds that the severity of poverty of different socio-demographic groups greatly differs when comparing both measures. Households with female heads suffer from much higher deprivation. Households in urban and metropolitan areas tend to appear much more deprived than poor. Klasen (2000) uses a 40% and 20% cut-off line for both poverty and deprivation. When the poverty and deprivation lines are set to capture the 40% worst-off households, 44.2% of the people are both poor and deprived. For 17.4% of the people, expenditure poverty and deprivation do not overlap (see table 2.2). When the 20% cut-off lines are adopted, 20.3% of the population is both poor and deprived. Still, for 17.4% of the people, poverty and deprivation do not overlap. If the deprivation was indeed the true measure of multidimensional poverty, about 17% of the 20 million truly deprived, and about 30% of the 11 million truly severely deprived would not be identified as poor by the expenditure based poverty measure in South Africa. This shows that multiple deprivations are hard to capture with a financial measure of poverty and that an increase in well-being might not be realized by an increase in income alone.

Table 2.2: Overlap and differences between the poor and deprived in South Africa

	Both	Only poor	Only deprived	Neither
Poor/Deprived, %	44.2	8.7	8.7	38.4
Poor/Deprived, persons (mln.)	16.8	3.3	3.3	14.6
Poorest/Most deprived, %	20.3	8.6	8.8	62.4
Poorest/Most deprived, persons (mln.)	7.7	3.2	3.3	23.7

Source: Based on Klasen (2000)

A multidimensional methodology to analyse poverty in the European Union and Central Europe has been rarely used. For the European Union, Guio (2005) has constructed a multidimensional index of deprivation using the EU-SILC data of Eurostat. She distinguishes three dimensions of deprivation. The dimensions are economic strain, durables, and housing. The economic strain dimension refers to the fact whether or not someone could fulfil certain needs if wanted to. The durables dimension refers to the number of durable goods in a household, and the housing dimension to the quality of housing. The dimensions and its components are shown in table 2.3.

Table 2.3: The components of the Guio (2005) deprivation index

Dimension	Indicator used
Economic strain	Could not afford one week annual holiday away from home
	Arrears (mortgage or rent, utility bills or hire purchase instalments)
	Could not afford a meal with meat, chicken or fish every second day
	Could not afford to keep home adequately warm
Durables	Enforced lack of a colour TV
	Enforced lack of a telephone
	Enforced lack of a personal car
Housing	Leaking roof, damp walls/floors/foundations, or rot in window frames or floor
	Accommodation too dark
	No bath or shower in dwelling
	No indoor flushing toilet for sole use of the household

Source: Based on Guio (2005)

In the countries with the highest proportions of people suffering from economic strain and durables deprivation, the deprived also face a high monetary poverty risk. In those countries, high deprivation levels go hand in hand with high financial poverty levels. In the richer countries, the deprivation risk is much lower in comparison to the national poverty rate. In the poorest countries, people face a much higher deprivation risk than would be expected from the national based poverty risk. The link between housing deprivation and income poverty is less clear (Guio, 2005). Guio (2005) also finds that certain socio-demographic groups are relatively more at risk of being deprived. The vulnerable groups are single households, elderly households, and households with unemployed or other inactives.

The overlap between monetary poverty and deprivation is far from perfect. In the poorest countries (Spain, Greece and Portugal), 20 to 35% of the population is deprived but non-poor. In the whole European Union, the poor but non-deprived group is smaller than 10% of the population. The study concludes that deprivation levels in the enlarged EU are probably hard to compare, because of the diversity in social and economic development, but stresses the importance of the use of non-monetary measures to help enhancing the understanding of poverty and social exclusion in the EU (Guio, 2005).

The methodological framework of Eurostat is categorized in 8 different domains with in total 37 non-monetary indicators. The domains are basic needs and consumption, housing, education, labour market, health, family ties and social relations, social participation, and the financial situation of the household (Förster et al., 2004). The approach distinguishes three types of deprivation: means, people's perceptions and confidence in life. Half of the items refer to objectively measurable means and the other half of the indicators reflects perceived restrictions (Förster et al., 2004).

In their analysis of the EU15 plus accession countries Czech Republic, Hungary and Slovenia, Förster et al. (2004) use the domains basic deprivation, secondary deprivation, accommodation/housing, and subjective deprivation. In the basic deprivation domain indicators on food, clothes, housing costs and holidays are used. Secondary deprivation, housing deprivation and subjective deprivation refer respectively to durables in a household, lack of space and satisfaction with income. Their analysis shows that the Central European countries especially perform badly in the basic deprivation and the accommodation domain. In the subjective domain the countries perform much better. With all thresholds used, the level of consistent poverty (both income poor and deprived) is much lower than the level of income poverty. The differences are the greatest for the subjective domain of deprivation. This result also shows that income poverty only partly overlaps with other dimensions of poverty.

2.3 Poverty and well-being in Central Europe

Between 1988 and 1998, poverty rates in Europe and Central Asia increased from 2 to 21 percent. Table 2.4 shows that with the poverty line set at \$2.15 per person per day in 1996 purchasing power parity, the absolute poverty varies between 0% (Czech Republic) and 6.8% (Romania) in Central Europe. This indicates much less severe poverty than in the former Soviet States where poverty rates of more than 50% are found, but the loss of welfare has also been tremendously in the Central European countries. A poverty line set at \$4.30, which serves as an indication of economic vulnerability, shows that significant parts of the Central European population are vulnerable. This percentage varies from 0.7% in Slovenia to 44.5% in Romania. After 1998, the welfare situation has improved in Central Europe and poverty decreased. However, richer regions gained most. Moreover, poverty increased in some countries, such as Poland (World Bank, 2000, 2005).

In other dimensions of poverty, other well-being problems are visible in the after-transition period in Central Europe. The lack of investment in housing infrastructure has led to deteriorating housing conditions. The percentage of households connected to utilities has in general been high in 1996-98, particularly for electricity (close to 100%), water and sewerage. However, the difference between the poor and non-poor is substantial for all utilities, except for electricity. Table 2.5 shows that poor households have restricted access to district heating, network gas, water, and sewerage in Croatia, Hungary and Latvia. Moreover, the energy supply has become less reliable and the costs have risen dramatically, because of subsidy cuts (World Bank, 2000).

Table 2.4: Absolute poverty and vulnerability rates

Country	Survey Year	Poor	Vulnerable
Romania	1998	6.8	44.5
Latvia	1998	6.6	34.8
Bulgaria	1999	3.1	18.2
Lithuania	1997	3.1	22.5
Slovak Republic	1995	2.6	8.6
Estonia	1998	2.1	19.3
Hungary	1997	1.3	15.4
Poland	1998	1.2	18.4
Czech Republic	1996	0.0	0.8
Slovenia	1997/98	0.0	0.7

Source: World Bank (2000)

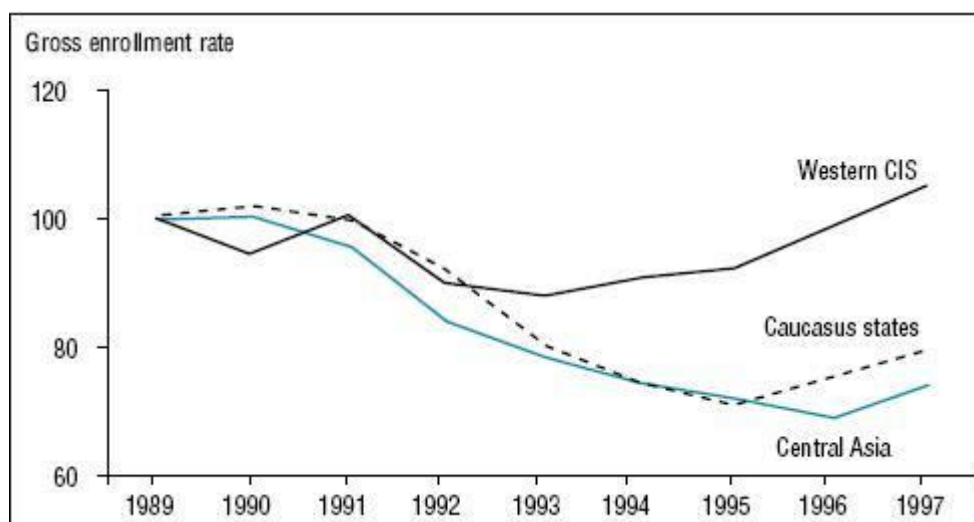
Table 2.5: Households connected to utilities in percentages

Utility	Group	Croatia ('98)	Hungary ('97)	Latvia ('97)
Electricity	non-poor	99.8	n.a.	99.9
	poor	99.0	n.a.	98.7
District heating	non-poor	33.4	26.6	69.9
	poor	7.8	14.8	49.0
Network gas	non-poor	27.1	82.0	52.9
	poor	11.0	56.4	38.4
Heating	non-poor	99.6	93.4	83.9
	poor	74.5	73.4	70.2
Hot water	non-poor	42.6	n.a.	59.0
	poor	20.3	n.a.	39.3
Sewerage	non-poor	79.6	92.8	82.1
	poor	51.2	71.0	66.4

Source: World Bank (2000)

The education and health levels have always been high during the socialist era in Central Europe. In comparison to countries with similar incomes in other parts of the world, health and education indicators have reflected high standards in these fields after transition. However, rising costs of education and health services in combination with declining household incomes are jeopardizing these results. In Central Europe, the gross enrolment rate in primary education remained around 100% after transition and the enrolment rate in secondary education was in 1996 back at the post-transition level (see figure 2.1). On the other hand, there is evidence that the poorest children have restricted access to education and the quality of schooling is deteriorating due to lower and non-progressive public spending (World Bank, 2000). Domanski (2006) finds significant educational inequalities in Poland, and concludes that secondary schools and universities are selective by social class. The health situation is a greater problem with increases in communicable diseases and decreasing life expectancies. The access to good-quality and affordable health care is restricted. This is due to both lower spending on health care and the increase in informal payments. For both education and health services, it is true that urban-rural differences are increasing. In rural areas, the decrease in quality and even physical accessibility is most visible due to cuts in public spending. Further, overcapacity and inefficient health facilities are also a problem in some areas of Central Europe (World Bank, 2000).

Figure 2.1: Gross enrolment rates in secondary education



Source: World Bank (2000)

In the safety dimension of well-being, Central European countries have also experienced problems after transition. Crime has risen substantially and this increase is supposed to be linked closely to the sharp increase in poverty. Furthermore, police corruption increased, organized crime has become widespread, and drug use and trade has increased. The subjective perception of well-being has also decreased sharply after transition. People feel unsafe, helpless and humiliated. This is also due to the fact that the drop in welfare was also felt strongly by well-educated and high skilled people, and because inequality increased (World Bank, 2000).

In the period of economic growth after 1998, non-financial well-being indicators have not improved as much as financial indicators of well-being. The Central European countries that joined the European Union perform much better than other transition countries. However, subjective health and the proportion of the population reporting chronic conditions remain higher than in most countries of the EU. Furthermore, there is much evidence that the poor experience greater barriers to accessing health care. Moreover, consumption poverty does not overlap with health deprivation for a large part of the population. On the one hand, education coverage has improved, especially for secondary education. On the other hand, quality of education is decreasing and is ill suited to the needs of the labour market. Infrastructure and housing have not shown improvements after 1998. The reliability of utilities is still a problem and the use of 'dirty fuels' is increasing, which is an indication of energy poverty (World Bank, 2005).

Subjective well-being is still very low and has only improved little after transition. Central Europe has still much lower self-rated satisfaction in life in comparison to the rest of Europe. All these trends show that the economy in Central Europe is improving, but general well-being is lagging behind (World Bank, 2005). The Eurobarometer also shows that life satisfaction is relatively low in Central Europe. In Hungary (47%) and Bulgaria (40%), less than half of the population are satisfied with the life they lead. The EU27 average is 77% and thus much higher. Moreover, inhabitants of Central Europe tend to be more pessimistic about their countries' future. Besides high unemployment and the economic situation, the health care system is also mentioned as a reason for worries (European Commission, 2008).

2.4 Vulnerable groups in Central Europe

In Central and Eastern Europe, certain vulnerable socio-demographic groups for (multidimensional) poverty can be distinguished. By quantity, working families are most common among the poor, followed by the elderly, the inactives or the unemployed, depending on the country (World Bank, 2005). However, more interesting is which groups are relatively more vulnerable of being multidimensionally poor. Bezemer (2006) distinguishes five vulnerable groups in transition economies. The first group consists of ethnic minorities, especially the Roma. Feliciano et al. (2004), Revenga et al. (2002), the UNDP (2007), and the World Bank (2005) all find that the Roma perform extremely bad in all dimensions of poverty, not just in absolute financial terms. Moreover, Roma also face social exclusion because of discrimination by the non-Roma majority in Central Europe. According to Feliciano et al. (2004), the poverty rate of Roma is 71% in Bulgaria and 80% in Romania. The absolute poverty rates of Roma have remained high the last decade and have even increased in Bulgaria, Romania and Hungary. Being Roma is a very significant predictor of being poor. However, they are a minority among the poor.

Women form a second vulnerable group (Bezemer, 2006). Economic participation and independence has decreased in many countries. Moreover, due to less access to child care, women are more often burdened with the traditional role of care provision within a family. Therefore, pregnant women and women with children are more at risk of losing their job. Third, single elderly people have more chance of being poor or deprived. This is mostly caused by the decrease in real value of their pensions. However, non-single elderly are not distinguished as vulnerable groups (Scott, 2000 and Cornia, 2006). A fourth vulnerable group are children. According to the World Bank (2005), children are much more at risk of being poor compared to the elderly. Poorer families have in general more children, so children are more often poor. Research by Szivós and Giudici (2004) in Central Europe and by Cornia (2006) in Moldova are also quite consistent with the general overview by the World Bank (2005) and Bezemer (2006). Simai (2006) also highlights the problems of youth employment, a topic that is rarely mentioned in the analysis of vulnerability in other studies.

Furthermore, households at certain locations are more at risk of being deprived. Rural, remote areas have less social and public services, less employment possibilities, and the infrastructure is in a worse condition when compared to the rest of the country. Households in these areas are in general older, less educated and less mobile than the rest of the population (Bezemer, 2006). The World Bank (2005), Förster et al. (2002) and Spoor (2003) also find that residents in rural areas face a higher risk of poverty and deprivation than urban residents. In the last decade, the share of the rural poor in the total number of poor people in Central and Eastern Europe has even risen from 45% to 50%. In general, a non-farm economy is lacking in the rural regions, and the agricultural sector does not function well. Deprivation is also higher in rural areas, as the access to education, health care and public utilities is restricted and less reliable. Corina (2006) also finds in Moldova that vulnerable socio-demographic groups, such as children in large families, children in single-parent families, and pre-school children are even more vulnerable groups in remote rural areas. The collapse of the public support system plays a large role in this vulnerability. Pensioners do not have a higher than average risk of poverty in general, but their vulnerability can vary by region. In rural areas, land can serve as a source of income, but in cities most pensioners can not count on part-time work or food-plots. A last interesting result is that disabled people do not experience a higher risk of poverty, because the disability pensions are quite high in value.

However, the differences between rural and urban areas can differ from country to country. Marcours and Swinnen (2006) conclude that there are major differences in rural poverty across the transition countries. This is true for both income and non-income poverty. In the richer countries in Central Europe, the differences between rural and urban poverty are quite small, because of high productivity growth in the agrarian sector and because of

social transfers. In other countries, such as Romania and Bulgaria, land reform and privatisation have instead contributed to higher rural poverty, because the loss of scale economies in agriculture and market disruption caused a disastrous drop in production in the agricultural sector. Young and dynamic people left for the urban areas and the lower skilled and less educated older, and thus more vulnerable, people became concentrated in rural areas. Therefore, the differences between urban and rural poverty increased and remained high in these countries.

Research of the World Bank (2006) showed that not only differences in vulnerability exist between urban and rural areas exist. Besides the urban-rural disparities in poverty, substantial differences also exist between capitals and secondary cities in Central Europe. According to the study, the households in secondary cities are worse off than the households in capital cities in all dimensions of poverty. Poverty incidence and degree are higher in secondary cities, because of the relatively weak employment conditions, limited economic diversification and fewer economic possibilities in comparison to capital cities. The mobility rates of the poor also show that poor households seem to be trapped in poverty in secondary cities. This means that vulnerable socio-demographic groups are not only concentrated in rural areas in the Central European region.

2.5 Regional diversity and inequality in Central Europe

The huge differences in country poverty rates in the Central European region show that the countries are in different stages of development and provide a different context for households that are trying to make a decent living. This section will cover differences in contextual factors influencing the standard of well-being in Central Europe.

Table 2.6 shows several context variables that are related to the standard of well-being in Central Europe for the EU-member countries. The GDP per capita clearly shows the difference in economic performance of the countries. The richest country, Slovenia, has more than twice the income per head of the poorest countries, Bulgaria and Romania. The HDI shows a wholly different picture. The differences are much smaller. However, Romania and Bulgaria still perform the worst. The percentage of GDP spent on health and education does not seem to differ much. Only, Slovenia and Romania are standing out, respectively on the positive and negative side. Inequality (GINI) and unemployment seem not to relate much to the country indicators mentioned before. The Baltic States and Poland are most unequal, and unemployment is the largest in Slovakia and (again) Poland. Also, the urbanization figures show a diverse pattern with the lowest percentages for the richest country (Slovenia) and the poorest country (Romania). Life satisfaction scores seem to be strongly related with the GDP per head and the human development index. The poorest countries, Bulgaria and Romania, have the lowest life satisfaction scores, and the richer countries, Slovenia and Czech Republic, have the highest self reported life satisfaction.

Some sociological case studies explore the relation between the socio-economic context and poverty or well-being. Smith et al. (2008) find in their research in Kraków, Poland and Bratislava, Slovakia that poverty is not necessarily connected with high unemployment rates, but more with low skill of the poor. About 1 out of 3 of the poorest (< 60% of median income) are employed or self-employed. Stenning et al. (2007) also found in Kraków that low education level is strongly connected to low well-being. Still, unemployment also has a strong relation with poverty, as mainly older people are found to be trapped in unemployment, because of a mismatch between their skills and the labour market (Smith et al., 2008). Moreover, semi-public services, such as work agencies, are too expensive for a large part of the poor according to evidence in Slovakia. Also, people that are not working for health reasons are strongly represented in the poorest group (Smith et al., 2008, Stenning et al., 2007). Further, the poor are also clearly less satisfied with their household situation (Stenning et al., 2007). Smith et al. (2006) also find in Bratislava that the poor experience more intense and deeper deprivation than is expected from material

indicators. Last, labour migration is found to be a main livelihood strategy to improve well-being in both the community in Kraków and in Bratislava (Smith et al., 2008, Stenning, 2004).

Table 2.6: Core context indicators Central European Countries

	2005	2005	2008	2004	2002-05
	GDP/head	GDP index	HDI	% GDP Health	% GDP Education
Bulgaria	9,032	0.752	0.824	4.6	4.2
Czech Republic	20,538	0.889	0.891	6.5	4.4
Estonia	15,478	0.842	0.860	4.0	5.3
Hungary	17,887	0.866	0.874	5.7	5.5
Latvia	13,646	0.821	0.855	4.0	5.3
Lithuania	14,494	0.831	0.862	4.9	5.2
Poland	13,847	0.823	0.870	4.3	5.4
Romania	9,060	0.752	0.813	3.4	3.4
Slovakia	15,871	0.846	0.863	5.3	4.3
Slovenia	22,273	0.902	0.917	6.6	6.0

	GINI	GINI Year (a)	% Unemployed	% Urbanization	Satisfaction (10-0)
Bulgaria	29.2	2003	10.1	70.0	3.97
Czech Republic	25.4	1996	7.2	73.5	5.82
Estonia	35.8	2003	7.9	69.1	5.13
Hungary	26.9	2002	7.5	66.3	5.25
Latvia	37.7	2003	8.7	67.8	5.27
Lithuania	36.0	2003	8.3	66.6	5.22
Poland	34.5	2002	13.8	62.1	5.66
Romania	31.0	2003	7.2	53.7	4.48
Slovakia	25.8	1996	13.4	56.2	5.09
Slovenia	28.4	1998	5.8	51.0	6.70

Sources: UNDP (2007) and World Database of Happiness (2008)

Notes: Year of the survey on which the GINI coefficient is based.

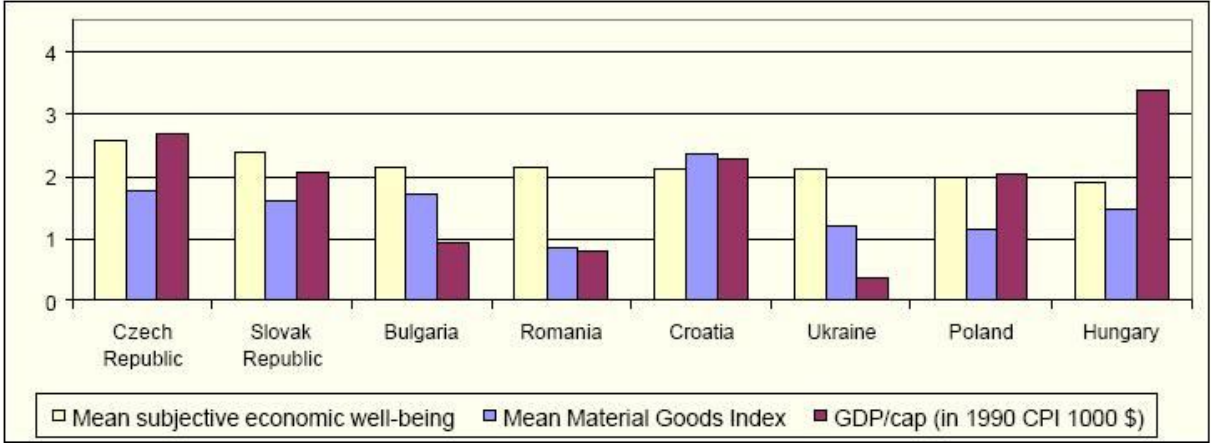
The development and causes of territorial inequalities are analysed by Smith (2003). Also within the richer countries of Central Europe, high inequalities exist. In Czech Republic and Hungary, the difference between the highest and lowest regional GDP per capita are respectively 77% and 43%. Twelve of the fifteen poorest regions are in the poorest countries; Bulgaria and Romania. The three others are in Poland. Smith (2003) finds that in Slovakia, average welfare is highly correlated with industrial activity. Earlier research by Smith (2000) also found a strong connection between the existence of ethnic minorities and low skill in the least developed regions of Slovakia.

Most research on regional inequalities is focussed on financial poverty. However, Szivós and Giudici (2004) study cross-country differences in social and multiple deprivations in Central Europe. In their research, a deprivation index is constructed based on unemployment, education and health. In Central Europe, regions in Bulgaria, Hungary, the Slovak Republic and Poland that are mainly rural have the highest deprivation scores.

The relation between multidimensional well-being specifically and macro context factors in Central Europe is not researched intensively. A study of Hayo and Seifert (2003) does compare three indicators of well-being in Central and Eastern European countries. The indicators used are subjective economic well-being, the material goods index, and GDP per capita. The study finds that the correspondence of these three indicators is not very strong (see figure 2.2). Using the subjective indicator, Czech Republic has the highest well-being and Hungary the lowest. According to the material goods index, Croatia is the richest country and Romania the poorest. Last, the GDP values show that Hungary has the highest

standard of living and Ukraine the lowest. The analysis of data of 1993/94 and 1995 shows mostly the same picture. The correlation coefficients do show a positive correlation between the indicators, but the relation is quite weak. An interesting exception is the correlation between subjective economic well-being and GDP per capita in 1995 (see table 2.7). The results show that, also on the country level, purely financial indicators might not reflect the (multidimensional) well-being situation appropriately. Furthermore, they show that there is no full correspondence between objective and subjective indicators of well-being. However, it seems that the relation has become stronger later after transition.

Figure 2.2: Cross-country comparison of indicators of well-being in 1992



Source: Hayo and Seifert (2003)

Table 2.7: Correlations between the well-being indicators in Central Europe

	1992 (8 cases)	1993/94 (6 cases)	1995 (6 cases)
Subjective economic well-being vs. material goods index	0.30	0.20	0.25 (0.63)
Subjective economic well-being vs. real GDP/capita	0.06	0.02	0.95

Source: Hayo and Seifert (2003)

Notes: Number in brackets gives the correlation coefficient when leaving out Slovakia in 1995. Correlations between material goods index and real GDP/capita are not available in this paper.

3. Research Approach

3.1 Research Questions and Conceptual Model

The main research question of this research is:

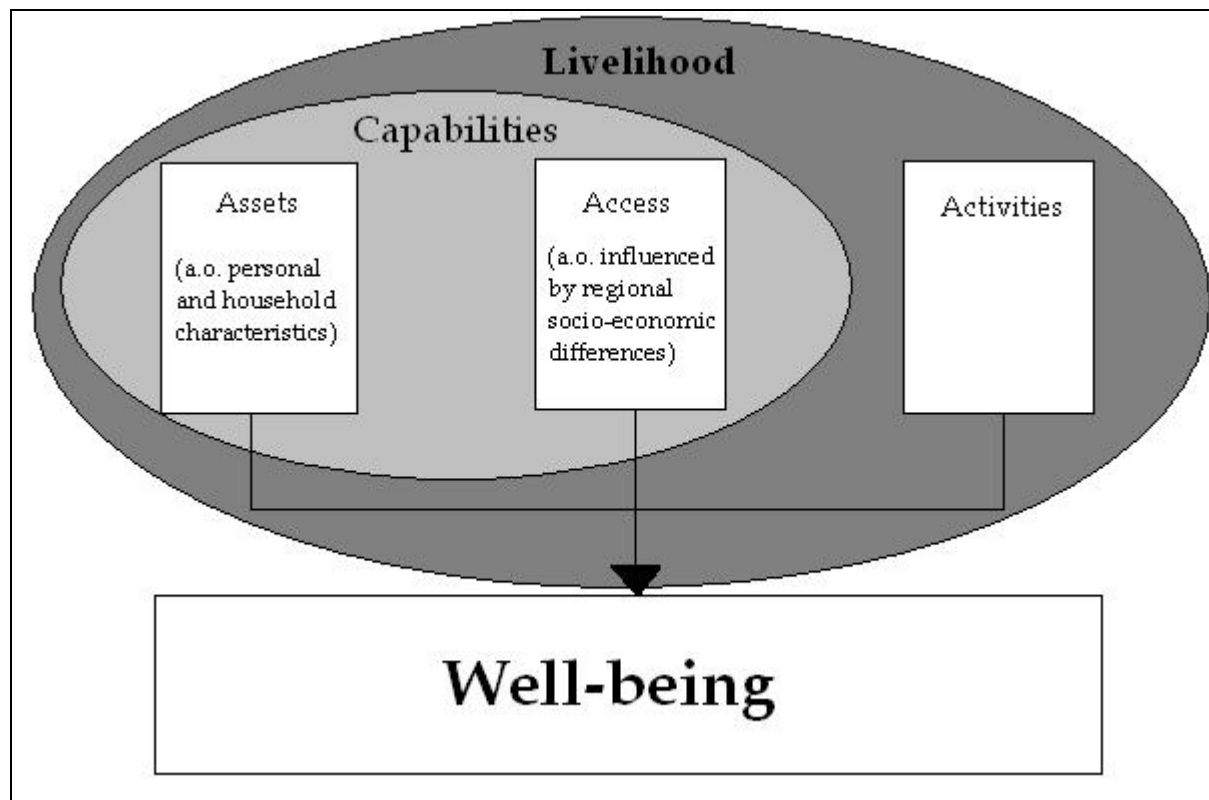
Which region-specific factors explain differences between multidimensional poverty risks of vulnerable households in Central Europe?

The subquestions are:

- Which socio-demographic groups are risk groups for multidimensional poverty in Central Europe?
- How does the use of a multidimensional conceptualisation of poverty differ from a financial conceptualisation in the identification of vulnerable households in Central Europe?
- How does the choice of the poverty and deprivation line influence the results?
- Which region-specific factors explain differences in multidimensional well-being of households?
- How does the relation between socio-demographic characteristics of households and multidimensional poverty risk vary between Central European regions?

The foundation of this research is in the livelihood framework as developed by Ellis (2000), which is an extension of the capabilities approach of Amartya Sen. In this research, livelihoods, which are survival strategies based on capabilities, are assumed to be directly linked to the level of well-being that individuals or households will experience. In the second part of this research, this study will analyse how socio-demographic household characteristics and region-specific factors explain differences in poverty risk through livelihoods of vulnerable groups. Figure 3.1 shows the schematic model of this research.

Figure 3.1: The conceptual model of the livelihood framework



3.2 Data

The data that is used in this study are the EU-SILC survey data. "The EU-SILC is an instrument aiming at collecting timely and comparable cross-sectional and longitudinal multidimensional micro data on income, poverty, social exclusion and living conditions. This instrument is anchored in the European Statistical System" (Eurostat, 2006). It is a voluntary survey of private households with the goal to collect information on the income and living conditions of different types of households, which can be used in the analysis of poverty, deprivation and social exclusion. The survey data were collected in 2005 in the current 27 member states of the European Union, Norway and Island. The reference population of EU-SILC is all private households and their current members residing in the territory of the member states of the European Union at the time of data collection. Persons living in collective households and in institutions are generally excluded from the target population.

The sample used in this study is the data on Central European households combined with the data on individual Central European persons. For all components of the EU-SILC, the data are based on a nationally representative probability sample of the population residing in private households within the country, irrespective of language, nationality or legal residence status. All private households and all persons aged 16 and over within the household are eligible for the operation. Representative probability samples are achieved for both households, which form the basic units of sampling, data collection and data analysis, and individual persons in the target population. The sampling frame and methods of sample selection ensure that every individual and household in the target population is assigned a known and non-zero probability of selection. Four types of data are gathered in EU-SILC: variables measured at the household level; information on household size and composition and basic characteristics of household members; income and other more complex variables termed 'basic variables' (e.g. education) measured at the personal level, but normally aggregated to construct household-level variables; and variables collected and analysed at the person-level termed 'detailed variables' (e.g. health). The EU-SILC samples are mainly selected according to a stratified two-stage design. Stratification is based on region and/or degree of urbanisation. Dwellings, households and/or persons were systematically selected. All the households and individuals that are living in the selected dwellings were eligible for contact. The number of household interviews that was completed and accepted for the database in the Central European countries, which are analyzed in this research was 53,428. The number of personal interviews completed was 125,316. See appendix A for further details on the data (collection) of the EU-SILC survey. For the cross-country comparison, EU regional statistics from Eurostat are used. The regional statistics are collected for the EU27, Norway and Island at NUTS0, NUTS1, NUTS2, and NUTS3 level. In this research, only relevant data at NUTS0, NUTS1, and NUTS2 levels is used.

Any flaws in the data should be taken into account before analysing. First, it is likely that the perceptions of certain dimensions of well-being are missing in the data or were translated crudely in a quantitative way. This will weaken the measurement of the well-being level of households, because the standard of living is measured more indirectly. Second, it is possible that the survey samples are not as representative as desirable. Severely deprived groups (i.e. Roma) can be excluded from the survey, because they are hard to reach or refuse to cooperate because of distrust or the lack of time. Third, it can occur that the answers given in the survey are incorrect, because of an inaccurate estimation of the respondents, a socially desirable answer, or an overestimation out of shame or pride. Fourth, it may be the case that in different countries different methods or different criteria for data collection were used, because different parties were involved in the collection of the survey data. Fifth, interests of the national statistical bureaus can play a role in the data collection. Certain unwanted minority groups can, for example, be excluded from the survey. This research will keep these factors in mind when interpreting the results of the analysis.

3.3 Methodology

In this study, the household is regarded as the unit of analysis. The household is characterized as a site with very intense social and economic interdependencies among a group of individuals. This makes a household a relevant unit of social and economic analysis, as the view is taken that individual action cannot be interpreted separately from the social and residential space people inhabit (Ellis, 2000). This research uses the term household to describe the resident's social unit. This way, the interdependencies between the household members that influence their well-being situation will be taken into account. The countries that are included in this analysis are all the Central European member states of the European Union that joined in 2005: Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia, and Slovenia. The formal regression that will be used in the first part of the study is:

$$\log\left(\frac{\pi_i}{1-\pi_i}\right) = \alpha * X_i + \varepsilon_i$$

In this regression, the dependent is the log of the odds that household i is poor or deprived. In the analysis, the exponent of these estimates are presented, which are the odds of being poor or deprived. Odds refer to the relative probability of a certain event to occur (in this research being poor or deprived), and is the probability of an event occurring divided by the probability of an event not occurring. Odds are used because it shows most clear how the probabilities of certain events are relative to each other. This means that the logistic regression estimates the relative probability that a household with certain specific socio-demographic characteristics is poor or deprived. Further, X_i is a vector of household characteristics of household i . Last, ε_i is the error or disturbance term.

The literature review in section 2.4 concludes that mainly large families, elderly, unemployed, singles, alien populations, rural populations, and people in secondary cities are vulnerable socio-demographic groups. Therefore, the household characteristics that are used are household size, number of children, activity status of the head of household, marital status of the head of household, country of birth of the head of household, and degree of urbanisation in the living area of the household. A logistic regression will be used in this analysis, as the dependent variable is binominal and the relative probability of being poor or deprived is estimated. First, the analysis will be conducted for deprivation and financial poverty to investigate how the use of a multidimensional measure of poverty changes the identification of poor households. Second, conditional logistic regressions will be used to analyze which socio-demographic characteristics are more related to poverty without deprivation, and deprivation without poverty. Table 3.1 shows the overview of the independent variables in the regressions. More details on the categorical variables in the regressions are available in appendix B.

Table 3.1: The variables included in the binominal and multinomial regressions

	N	Min.	Max.	Mean	Std. Dev.
Household size	45053	1	14	2.84	1.493
Equivalised household size	45053	1	6.5	1.84	0.660
Marital status household head (cat.)	45047	1	4	n.a.	n.a.
Household category (cat.)	45047	1	11	n.a.	n.a.
Activity status household head (cat.)	45053	1	4	n.a.	n.a.
Number of children	45053	0	4	1.10	1.512
Country of birth household head	45019	0	1	0.06	0.246
Urbanization degree	39314	1	3	2.10	0.914
Valid N	39302				

Notes: No data on urbanization degree for Slovenia, (cat.) Categorical variable

The second part of this study will cover the expected variation in deprivation risk of the selected households between Central European regions. For this analysis, a hierarchical model will be used. Hierarchical or multilevel models are widely used in human geography and sociology to understand the effect of the social context on outcomes on the individual level (Westert and Verhoeff, 1997; DiPrete and Forristal, 1994). It allows to estimate “explanatory processes and random variation at different levels” (Paterson and Goldstein, 1991, p.391). The context refers in this research to the spatial and institutional context.

The foundation of the idea that individuals respond to their context can be found in Marx’ (1846) work on the political economy, Durkheim’s research on the impact of the community on anomia and suicide (1897), Weber’s analysis of the relation between religion and economic behaviour (1905), and the research of Morton on communities, relative deprivation and social comparison theory in 1968 (DiPrete and Forristal, 1994). DiPrete and Forristal (1994) conclude in their review of multilevel models, that a variety of multilevel models have been used to conduct analyses at more than one level. They mention early studies that used a random-effects multilevel approach in social sciences, such as Coleman et al (1982) on school effects on test scores of pupils, Grusky and Hauser (1984) on the impact of societal attributes on social mobility, Casterline (1985) on the effects of community level characteristics on reproductive behaviour in developing countries, Entwisle and Mason (1985) on the relation between socioeconomic status and fertility, and many studies on neighbourhood effects on poverty (Datcher, 1982; Mayer and Jencks, 1989; Tienda, 1991; Garner and Radenbusch, 1991; Massey et al., 1992; Corcoran et al. 1993). Gua and Zhoa (2000) add more recent examples, such as work by Xie and Hannum (1996), Cotter et al. (1998), and Cohen (1998) on earnings inequality in China and the United States.

The analysis of variability of deprivation risk of the distinguished vulnerable household types between Central European regions uses two levels of analysis: the household itself and the region in which the household lives. The model estimates the average well-being level of different household types based on household and region level variables. The formal regression of the final multilevel model used in this part of the research is:

$$WB_{ij} = \beta_0 + \beta_1 * X_{ij} + \beta_2 * Z_j + (\mu_{0j} + \mu_{1j} * X_{ij} + \varepsilon_{ij})$$

In this regression, WB_{ij} is the average well-being score for household i in region j . X_{ij} is a vector of household characteristics of household i in region j . Z_j is a vector of region specific factors in region j . The last part of the regression equation refers to the error term. First, μ_{0j} is the variability of the intercept β_0 in region j . Second, $\mu_{1j} * X_{ij}$ is the variability of the slope β_1 in region j . Second, ε_{ij} is the general error or disturbance terms. Three error terms are estimated, because the assumption of this model is that the variability of the intercept, and the slopes for the socio-demographic household variables differ among regions. In other words, the relation between the socio-demographic characteristics of a household and its well-being level is expected to differ among regions. The first error term μ_{0j} is a specific error term for the estimate of the intercept in region j . The second error term $\mu_{1j} * X_{ij}$ is a specific error term for the parameter estimates for the household characteristics X_{ij} in region j . The general error term refers to region independent variability. A multilevel model estimates both fixed and random effects. The fixed effects in the final model are the parameter estimates for the first part of the regression: $\beta_0 + \beta_1 * X_{ij} + \beta_2 * Z_j$. The random effects are the estimates for the region specific variability of the intercept and the slopes of the estimates for household level variables, which is in the formal regression: $\mu_{0j} + \mu_{1j} * X_{ij}$.

This part of the study uses a multilevel linear regression, because of the probability of nesting of variables at the regional level. This means that the relation between

socio-demographic household characteristics and well-being can vary between regions. The final model is built from a simple regression model, which is extended step by step to explore how a multilevel analysis improves the cross-regional analysis of well-being. First a simple regression is estimated without (1) and with (2) regional variables. The regression with regional variables is conducted both with dummies and with the selected socio-economic context variables. The simple regressions are:

$$WB_{ij} = \beta_0 + \beta_1 * X_{ij} + \varepsilon_{ij} \quad (1)$$

$$WB_{ij} = \beta_0 + \beta_1 * X_{ij} + \beta_2 * Z_j + \varepsilon_{ij} \quad (2)$$

The extension to the final multilevel model goes in several steps. First, only the variability between regions is tested (3), and then the context variables are added (4). Both models are unconditional random-effects models, in which an extra, region specific, error term is added to the model. Second, the household variables are added in a mixed model (5) to explore how household level characteristics explain variability in well-being scores among regions. Until this point, only the variability of the intercept, so the variability of the relation between the regional context and average well-being scores is taken into account. Third, the variability of the relation of the household variables with well-being among regions is addressed in a random-coefficient model (6). Therefore, an extra error term is added for the estimates on the household level. Last, the regional context variables are included again for the final multilevel model (7). The formal regressions of the hierarchical models are as below:

$$WB_{ij} = \beta_0 + (\mu_{0j} + \varepsilon_{ij}) \quad (3)$$

$$WB_{ij} = \beta_0 + \beta_1 * Z_j + (\mu_{0j} + \varepsilon_{ij}) \quad (4)$$

$$WB_{ij} = \beta_0 + \beta_1 * X_{ij} + (\mu_{0j} + \varepsilon_{ij}) \quad (5)$$

$$WB_{ij} = \beta_0 + \beta_1 * X_{ij} + (\mu_{0j} + \mu_{1j} * X_{ij} + \varepsilon_{ij}) \quad (6)$$

$$WB_{ij} = \beta_0 + \beta_1 * X_{ij} + \beta_2 * Z_j + (\mu_{0j} + \mu_{1j} * X_{ij} + \varepsilon_{ij}) \quad (7)$$

The household characteristics that are used in this regression are the same as in the analysis of poverty and deprivation risks of Central European households. Based on the literature review on regional diversity and inequalities in Central Europe in section 2.5, some regional context variables are selected to explain regional differences in well-being. The socio-economic economic factors that seem to be most connected to well-being are besides economic development: education level, unemployment, share of elderly, average health, industrial activity, and population density. Therefore, these region-specific factors are included in this analysis as shown in table 3.2. GDP per head is included to explore the relation between material welfare and average well-being on the regional level. Share of people with at least university level education is used as an indicator of regional education level. Doctors per 1000 inhabitants and hospital beds per 1000 inhabitants serve as indicators of health as no regional health indicators are available. The share of employment in manufacturing and the share of heavy metal industry in total manufacturing are used as indicators of industrial activity. For Czech Republic, the data is available at NUTS2 level. For Hungary and Poland, the data is available at NUTS1 level. For all other countries, the data is only available at the country level. This research used SPSS 16.0 to estimate both the logistic and the multilevel regressions. SPSS is the statistical package that is the most commonly used program in social sciences, and provides the linear mixed model option to estimate multilevel models.

Table 3.2: The variables included in the multilevel regressions

	N	Min.	Max.	Mean	Std. Dev.
GDP per inhabitant	45053	4532.8	20512.9	8133.64	3191.448
Population density	45053	31	2424.9	135.40	232.682
Share of elderly of total population	45053	0.12	0.17	0.15	0.017
Unemployment rate 15 years and older	45053	2.8	16.4	9.58	3.858
Share of university graduates of total population	45053	0.06	0.25	0.16	0.047
Doctors per 1000 inhabitants	41296	189.3	666	264.22	66.727
Hospital beds per 1000 inhabitants	41296	477.5	1071	666.26	119.939
Share of employment in manufacturing	45053	0.05	0.16	0.08	0.026
Share of heavy metal industry of total manufacturing	45053	0.07	0.34	0.13	0.046
Valid N	41296				

Notes: No data on doctors per 1000 inhabitants and hospital beds per 1000 inhabitants for Lithuania.

3.4 The construction of the well-being index

The variable 'equivalised disposable income' will be used to set the financial poverty line. This is the total disposable household income corrected by the equivalised household size. The poverty line is set at the 40th and 20th percentile of the household income, to avoid the use of local poverty lines, to make the results comparable to the Klasen study, and to create cut-off points that can also be used for the ordinal well-being scores. To define the multidimensionally poor, an adapted version of the multicomponent deprivation index developed by Klasen (2000) will be used. The components of the index are chosen to fit the available survey data for this research. Table 3.3 shows the dimensions of the well-being index that is used in this study.

Table 3.3: The dimensions of poverty

Financial	Housing	Societal	Health	Subjective
Income percentile	Durables	Education level	General health	Financial problems
Arrears on payment	Sanitation	Employment situation	Health problems	Vulnerability
Financial vulnerability	Living conditions	Mobility	Unmet need	Living environment

The scores of the index are ordinal and the results can be interpreted cardinally, so a score of 2 is twice as good as a score of 1 (Klasen, 2000). In the Klasen study, two ways of weighting the components were used that gained virtually identical results. Therefore, this study will only use the most simple of those two methods. The total well-being score will be calculated as the average score of all individual dimensions. The choice of the deprivation line will be similar to the Klasen study (2000). The cut-off points for the deprivation lines are chosen to be the 40% and 20% most deprived households measured in terms of the average well-being score to make the results easier comparable to the income poverty lines. A schematic overview of the indicators in the index is provided in table 3.4. See appendix C and D for further details on the categories of the well-being index and the variables that are used in the index. This research does not use an official poverty line, such as the 2 dollar a day line, because no official poverty line exists for deprivation. Moreover, the focus of this research is how the identification of vulnerable groups changes when a multidimensional conceptualisation of poverty is used instead of a financial one. The focus is on the comparison of the relative well-being situation of the households, so an absolute cut-off point for poverty is therefore not appropriate.

3.5 Hypotheses

This study expects that households with many children, households with an inactive head and (single) elderly households have a significantly lower well-being in comparison to the average population. First, this is because elderly are less mobile than other population groups, which limits the access and activity aspects of a livelihood. Second, the lower level of well-being is expected, because these vulnerable groups are mainly concentrated in rural areas or secondary cities where the access to public services is restricted, and where the services are of lower quality and reliability. Moreover, this study expects that the level of well-being of these groups is lower, based on the multidimensional well-being index, than would be expected from their financial situation. This is because the low accessibility and use of public services are not solely caused by high costs, but also by less physical accessibility, less reliability and low quality of these services.

Furthermore, this research expects that the regional context has a significant impact on the poverty risk of vulnerable groups. In particular, the 'softer' indicators of regional well-being, such as the quality of education and health services are expected to have a strong influence on the deprivation risk of the distinguished vulnerable groups, as multidimensionally poor households suffer most from the low quality of and restricted access to public services. Second, urbanization degree is expected to have a strong influence, because public services are in general of lower quality in rural areas, which causes deprivation in the societal, subjective and health dimension of well-being. Third, the unemployment rate is expected to have a stronger relation with the multidimensional poverty risk of vulnerable groups in comparison to GDP per head. This is probably due to the fact that unemployment rate has a stronger relation with more subjective indicators of well-being than financial macro-indicators. Last, it is expected that the socio-demographic variables that explain differences in well-being of households are stronger related to well-being in less developed regions, as the most vulnerable groups tend to be concentrated in the worst-performing areas.

Table 3.4: The indicators of the well-being index and the variables used

Indicator	Cat.	Variables	EU-SILC	Description
Income percentile	5	HHIncome	HX090	Equivalised disposable income
Arrears on payment	5	ArrRent	HS010	Arrears on mortgage or rent payments in last 12 months
Financial vulnerability	5	ArrUtility	HS020	Arrears on utility bills in last 12 months
		ArrLoan	HS030	Arrears on loan payments in last 12 months
		Unexpected	HS060	Capacity to face unexpected financial expenses
Durables	5	PovertyInd	HX080	Poverty indicator (< 60% of median income)
		WorkContract	PL140	Type of contract
		Phone	HS070	Do you have a telephone (including mobile phone)?
Sanitation	3	TV	HS080	Do you have a colour TV?
		Computer	HS090	Do you have a computer?
		WashMach	HS100	Do you have a washing machine?
Living conditions	5	WashingF	HH080	Bath or shower in dwelling
		Toilet	HH090	Indoor flushing toilet for sole use of household
Education level	5	ProbLight	HS160	Problems with the dwelling: too dark, not enough light
		ProbWater	HH040	Leaking roof, damp walls/floors/foundation, or rot in window frames or floor
		Utility	HH050	Ability to keep home adequately warm
Employment situation	5	Edulevel	PE040	Highest education level attained
Mobility	5	EcoStatus	PL030	Self-defined current economic status
		Activity	PX050	Activity status
General health	5	Holiday	HS040	Capacity to afford paying for one week annual holiday away from home
		Car	HS110	Do you have a car?
Health problems	5	HealthGen	PH010	General health
Unmet need for treatment	5	HealthChron	PH020	Suffer from any a chronic (long-standing) illness or condition
		HealthLimit	PH030	Limitation in activities because of health problems
		HealthUnmet	PH040	Unmet need for medical examination or treatment
		UnmetReason1	PH050	Main reason for unmet need for medical examination or treatment
Financial problems	5	Dentist	PH060	Unmet need for dental examination or treatment
		UnmetReason2	PH070	Main reason for unmet need for dental examination or treatment
Subjective vulnerability	5	BurHouse	HS140	Financial burden of the total housing cost
		BurLoan	HS150	Financial burden of the repayment of debts from hire purchases or loans
Living environment	5	EndsMeet	HS120	Ability to make ends meet
		ProbNoise	HS170	Noise from neighbours or from the street
		ProbEnv	HS180	Pollution, grime or other environmental problems
		ProbCrime	HS190	Crime violence or vandalism in the area

4. Analysis

4.1 Introduction

This chapter describes the results of the analysis of this research. First, the overlap between poverty and deprivation will be explored and the strength of the relation between income and well-being ranks will be tested. Second, the variation of poverty and deprivation rates between countries and socio-demographic categories will be described. Moreover the influence of several socio-demographic characteristics on the odds of being poor and/or deprived will be tested, using binominal and multinomial logistics regressions. In the last paragraph, cross-region differences in deprivation risk of different household types will be analysed using a multilevel analysis. The conclusion and recommendations will follow in chapter 5.

4.2 The relation between poverty and deprivation

The cross tabulations in table 4.1 show that poverty and deprivation do not overlap for a significant proportion of the households. With a cut-off point for poverty and deprivation set to capture the 40% worst off households, 26.2% of the households have no overlap of deprivation and poverty. With a 20% poverty line, 20.0% of the households are not consistently identified by both measures. In comparison to the results of Klasen (2000), the overlap between poverty and deprivation is even less in Central Europe than in South Africa. The relation between poverty and deprivation seems to be weak, particularly for the poorest households in Central Europe.

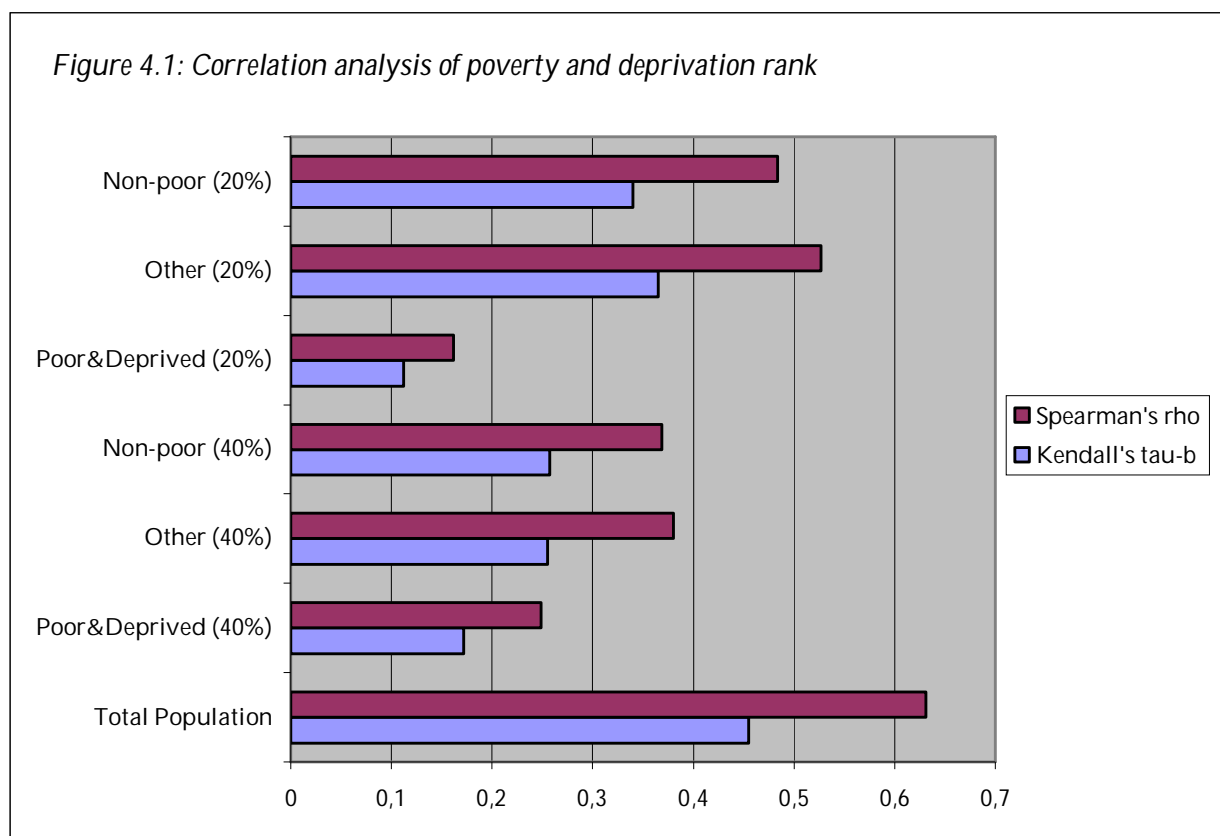
Table 4.1: Crosstabs of the poor and the deprived

	Non-poor	Only Poor	Only Deprived	Poor/Deprived
40% poverty lines	46.0%	12.5%	13.7%	27.9%
20% poverty lines	69.1%	8.8%	11.2%	11.0%

Figure 4.1 shows the correlation statistics for the relation between the financial and the multidimensional ranking of the households included in this study. The results show that the correlation between the income ranks and the well-being ranks of households is significant for the total survey population as well as for all the subgroups. Hardly any difference is found between the non-poor group and the group 'other', which also includes non-poor, but deprived and deprived, but non-poor households. However, the relation between income ranks and well-being ranks is much weaker for the group that is poor and deprived than for the rich and for the total population. For the ultra poor households, the relation between poverty and deprivation rank is the weakest. This is not surprising when looking at the lack of overlap between the two poverty types. It supports the assumption of this study that a weak relation exists between many 'alternative' dimensions of poverty and the income of households, which accords with the study of Klasen (2000).

Table 4.2 shows that besides huge differences in poverty rates, also big differences in deprivation rates exist between the Central European countries. Slovenia and Czech Republic perform the best by far in all cases. However, it is surprising that for the poorest countries, the deprivation rates are lower than the poverty rates. For the richest countries, the opposite is true. Still, the Baltic States, Poland and Slovakia have clearly the worst well-being situation. The difference between the poverty rate and the deprivation rate in Slovenia, Hungary and Czech Republic is quite shocking. With a 20% poverty and deprivation line, the same pattern is visible. Only Poland has relatively more severely deprived in comparison to the rates with the 40% poverty line. When compared to the results of Guio (2005) for the EU15, these results show a quite different pattern. In Guio's study, rich countries have a

relatively low deprivation rate, and the poor in rich countries have less risk of being deprived than the poor in poorer countries. Table 4.2, on the contrary, shows relatively low deprivation rates in Central European countries with a high poverty rate. The numbers in this analysis indicate stronger that general well-being has a weak relation with household income situation and that some well-being problems might not be solved by a higher income alone.



Notes: All significant at 0.01 level

Table 4.2: Share of poor and deprived by region (cont. on next page)

	40% cut-off lines		20% cut-off lines	
	% Poor	% Deprived	% Poor	% Deprived
Czech Republic	11.5	24.7	2.4	9.4
Praha (CZ)	5.7	20.7	1.5	8.5
Strední Cechy (CZ)	9.8	27.2	1.4	9.6
Jihozápad (CZ)	8.8	22.5	1.9	6.9
Severozápad (CZ)	14.7	34.3	3.5	11.3
Severovýchod (CZ)	11.2	21.9	3.3	10.3
Jihovýchod (CZ)	11.5	18.8	1.6	5.6
Strední Morava (CZ)	13.4	25.4	2.4	10.2
Moravskoslezsko (CZ)	15.6	28.9	3.1	13.1
Estonia	48.4	35.5	21.1	17.4
Hungary	25.6	43.2	7.7	22.8
Közép-Magyarország (HU)	15.0	36.6	3.9	17.9
Dunántúl (HU)	22.8	37.6	6.1	18.7
Alföld és Észak (HU)	34.5	51.4	11.2	28.9

Latvia	67.2	61.8	45.0	39.4
Lithuania	68.1	50.9	42.5	29.1
Poland	52.9	50.6	26.7	29.8
Centralny (PL)	52.1	49.2	25.9	29.7
Poludniowy (PL)	47.4	48.6	23.0	26.1
Wschodni (PL)	60.1	54.4	32.1	34.2
Północno-Zachodni (PL)	51.6	49.8	24.5	28.7
Poludniowo-Zachodni (PL)	48.4	49.1	24.7	30.1
Północny (PL)	56.6	52.7	29.7	30.0
Slovakia	46.4	37.6	15.3	14.2
Slovenia	2.1	18.2	0.8	6.1

4.3 Poverty and deprivation risk of Central European households

This section and section 4.4 present the binomial regressions that analyse the relative probability (or odds) that different types of households are poor and/or deprived. The odds are both estimated for the 40% and 20% poverty line. To describe the fit of the models, the R-squared statistic is used, which shows how much of the variance in the data is explained by the model.

The output of the binomial regression in table 4.3 shows the expected results. Having many children, being unemployed or living in a rural area increases the odds of being poor the most. Having a job, being married, having no dependent children or living in the city decreases the odds of being poor the most. No difference in poverty risk seems to exist between households with never married, widowed and separated/divorced. The statistic of household size suggests that poverty risk decreases with household size, but this is quite confusing, as the relation between poverty risk and household size seems to be U-shaped. Single households have a relatively high poverty risk, families with two to four people have a lower poverty risk, but larger families have a higher poverty risk again.

The analysis of deprivation risk shows some different results in comparison to the analysis of poverty risk. First, the relation between household size and deprivation seems to weaken or even cease to exist when using the 20% cut-off line. However, the overview of table 4.3 suggests that here is also a non-linear, U-shaped relation between household size and deprivation risk. Second, married couples have even lower odds of being deprived, and households with a never married head have lower odds of being deprived in comparison to being poor. Third, the odds of being deprived are much higher for the unemployed, and the retired also have a relatively higher deprivation risk. With the 20% deprivation line, this risk is even not significantly different from the inactive. For the children variable, the differences between the different categories seem to decrease, but large families still have a much higher deprivation risk in comparison to families with less than three children. Furthermore, the difference between households with a foreign born head and a native born head decreases. Last, the odds of being deprived are relatively less related to less populated areas than for the odds of being poor.

When including Slovenia, the urbanization degree has to be dropped, because of missing data for Slovenian households. The results only show some minor changes in the estimates for the socio-demographic variables in comparison to the results of the binomial regression without Slovenia. Because the differences are that small and the explained variance decreases quite a lot, Slovenia will be excluded in the rest of the analysis. The regression output with the Slovenian households can be found in Appendix E.

Table 4.3: Binominal logistic regressions with socio-demographic indicators

	40% poverty line				20% poverty line			
	Poor		Deprived		Poor		Deprived	
	Exp(B)	Sig.	Exp(B)	Sig.	Exp(B)	Sig.	Exp(B)	Sig.
Household Size	0.889	0.000	0.974	0.038	0.913	0.000	0.984	0.255
Never married	0.964	0.421	0.731	0.000	0.958	0.401	0.721	0.000
Married	0.699	0.000	0.551	0.000	0.647	0.000	0.450	0.000
Widowed	0.987	0.768	1.081	0.085	0.959	0.392	0.922	0.080
Separated/Divorced	0 (b)	-	0 (b)	-	0 (b)	-	0 (b)	-
Employed	0.292	0.000	0.204	0.000	0.297	0.000	0.225	0.000
Unemployed	1.749	0.000	2.462	0.000	2.094	0.000	2.696	0.000
Retired	0.521	0.000	0.842	0.001	0.417	0.000	0.943	0.270
Inactive	0 (b)	-	0 (b)	-	0 (b)	-	0 (b)	-
No dependent children	0.436	0.000	0.767	0.000	0.482	0.000	0.744	0.000
1 child	0.561	0.000	0.664	0.000	0.619	0.000	0.632	0.000
2 children	0.804	0.000	0.630	0.000	0.855	0.002	0.639	0.000
3+ children	2.201	0.000	1.332	0.000	2.309	0.000	1.382	0.000
1+ children (special cases)	0 (b)	-	0 (b)	-	0 (b)	-	0 (b)	-
Born in same country	0.729	0.000	0.801	0.000	0.753	0.000	0.863	0.003
Born in another country	0 (b)	-	0 (b)	-	0 (b)	-	0 (b)	-
Densely populated	0.461	0.000	0.651	0.000	0.478	0.000	0.653	0.000
Intermediately populated	0.537	0.000	0.691	0.000	0.412	0.000	0.610	0.000
Thinly populated	0 (b)	-	0 (b)	-	0 (b)	-	0 (b)	-

Notes: Slovenia excluded, (b) reference category

Table 4.4: Model description binominal logistic regressions

Dependent variable	N	df	-2LL	R2
Poor with 40% poverty line	39302	14	50055.017	0.134
Poor with 40% deprivation line	39302	14	46461.573	0.236
Poor with 20% poverty line	39302	14	38144.515	0.139
Poor with 20% deprivation line	39302	14	37710.824	0.212

Combining the socio-demographic characteristics into different household categories would improve the interpretation of the analysis and would provide a clearer picture on which types of households are most vulnerable to poverty and/or deprivation. The household categories are based on number of adults, number of children, age and sex. The binominal regression output in table 4.5 also shows the expected results. Couples with more than three children, single parents, non-elderly singles, and single female elderly have the highest odds of being poor. Households without children have the lowest poverty risk. With the 20% poverty line, the odds of being poor are even higher for single parents with children, single males, and couples with three or more children. Couples without children still have the lowest odds of being poor.

When comparing the odds of being deprived with odds of being poor, single female elderly score much worse and are, therefore, most at risk of being deprived. Other non-single households without children, couples without children, and elderly couples also score much worse, but still have relatively low odds of being deprived. Surprising is that couples with three or more children have much lower odds of being deprived than of being poor. The differences between the odds of being deprived and the odds of being poor show broadly the same trends when using the 20% poverty and 20% deprivation line instead of the 40% cut-off points.

Table 4.5: Binominal regressions with the new household categories

	40% poverty line				20% poverty line			
	Poor		Deprived		Poor		Deprived	
	Exp(B)	Sig.	Exp(B)	Sig.	Exp(B)	Sig.	Exp(B)	Sig.
Single male	1.364	0.000	1.502	0.000	1.883	0.000	1.733	0.000
Single female	1.280	0.000	1.393	0.000	1.260	0.000	1.354	0.000
Single parent with child(ren)	1.862	0.000	1.831	0.000	2.229	0.000	2.092	0.000
Couple w/o children	0.492	0.000	0.707	0.000	0.620	0.000	0.737	0.000
Couple with 1-2 child(ren)	0.833	0.000	0.703	0.000	0.947	0.244	0.708	0.000
Couple with 3+ children	2.127	0.000	1.340	0.000	2.468	0.000	1.438	0.000
Elderly couple	0.599	0.000	0.877	0.005	0.454	0.000	0.752	0.000
Single male elderly	0.910	0.228	0.968	0.681	0.891	0.214	0.934	0.417
Single female elderly	1.388	0.000	1.976	0.000	1.143	0.024	1.640	0.000
Other w/o children	0.447	0.000	0.775	0.000	0.510	0.000	0.760	0.000
Other with child(ren)	0 (b)	-	0 (b)	-	0 (b)	-	0 (b)	-
Born in country of residence	0.721	0.000	0.789	0.000	0.737	0.000	0.848	0.001
Born in another country	0 (b)	-	0 (b)	-	0 (b)	-	0 (b)	-
Employed	0.278	0.000	0.198	0.000	0.275	0.000	0.212	0.000
Unemployed	1.714	0.000	2.452	0.000	2.008	0.000	2.619	0.000
Retired	0.484	0.000	0.851	0.002	0.442	0.000	0.978	0.672
Inactive	0 (b)	-	0 (b)	-	0 (b)	-	0 (b)	-
Densely populated	0.453	0.000	0.653	0.000	0.464	0.000	0.659	0.000
Intermediately populated	0.532	0.000	0.691	0.000	0.400	0.000	0.607	0.000
Thinly populated	0 (b)	-	0 (b)	-	0 (b)	-	0 (b)	-

Notes: Slovenia excluded, (b) reference category

Table 4.6: Model description binominal logistic regressions

Dependent variable	N	df	-2LL	R2
Poor with 40% poverty line	39011	16	48979.403	0.156
Poor with 40% deprivation line	39011	16	46014.009	0.239
Poor with 40% poverty line	39011	16	37242.979	0.160
Poor with 40% deprivation line	39011	16	37472.582	0.210

In summary, households with children and single households, particularly elderly single households, have a high poverty risk. Single parents with children, couples with more than three children and single female elderly seem to be most vulnerable to poverty. Couples without children and other households without children have the lowest poverty risk. In general, single households and large families are most at risk of being poor. Second, married couples have a much lower poverty risk than households with another marital status. Third, unemployed experience more often poverty and employed experience much lower poverty risk than the average household. Fourth, households with a household head that is born in another country than the country of residence have slightly higher odds of being poor. Last, poverty risk increases when population density decreases.

The analysis of deprivation risk shows mostly the same pattern, but some striking differences exist. First, elderly households experience a higher deprivation risk than is expected from the poverty risk. Second, the widowed are more vulnerable to deprivation than to poverty. Third, the discrepancy between the employed and the unemployed and is much higher for deprivation. Fourth, households with no children seem to be more likely to experience deprivation in comparison to poverty. Last, deprivation is relatively less associated with rural areas than financial poverty.

In the remainder of this analysis, the household categories will be used as explanatory variables instead of the socio-demographic variables used in table 4.4 (household size, number of children and marital status), because the results with household types provides richer and easier interpretable information, and because three of the four regressions with the household types have a higher explained variance. The analysis results that still include these variables will be shown in the appendices for the interested readers.

4.4 The relation between poverty and deprivation of Central European households

Table 4.7 shows the odds of being deprived for the households that are poor. The results of the binominal regression show that the odds that both poverty types overlap differ for the different household types. Single households, single parents and other households without children that are poor have high odds that they experience deprivation as well. For elderly couples and couples with 1 or 2 children, deprivation is less likely to accompany poverty. Furthermore, the unemployed are very likely to be deprived when they are poor. On the other had, poor households with a head that has a job are very likely to avoid deprivation. Both country of birth of the household head and urbanization degree have a less strong influence on the odds of being deprived. Still, when the head is native born and when the household is living in a rural area, poverty is more likely to be connected to deprivation. The results with the 20% poverty and deprivation line do not show large differences. Only single female elderly have much lower odds of being deprived when their household is financially poor, while the odds for single males remain approximately the same.

Table 4.7: Odds of being deprived when poor

	40% line		20% line	
	Exp(B)	Sig.	Exp(B)	Sig.
Single male	1.691	0.000	1.624	0.000
Single female	1.409	0.000	1.142	0.232
Single parent with child(ren)	1.793	0.000	1.412	0.001
Couple w/o children	1.267	0.001	1.162	0.134
Couple with 1-2 child(ren)	0.840	0.003	0.711	0.000
Couple with 3+ children	1.137	0.109	1.014	0.892
Elderly couple	1.084	0.275	0.936	0.542
Single male elderly	1.255	0.091	1.345	0.096
Single female elderly	2.249	0.000	1.379	0.004
Other w/o children	1.418	0.000	1.328	0.011
Other with child(ren)	0 (b)	-	0 (b)	-
Born in country of residence	1.181	0.023	1.090	0.352
Born in another country	0 (b)	-	0 (b)	-
Employed	0.287	0.000	0.387	0.000
Unemployed	2.706	0.000	2.732	0.000
Retired	1.220	0.010	1.612	0.000
Inactive	0 (b)	-	0 (b)	-
Densely populated	0.864	0.000	0.830	0.001
Intermediately populated	0.742	0.000	0.763	0.001
Thinly populated	0 (b)	-	0 (b)	-

Notes: Slovenia excluded, (b) reference category

Table 4.8: Model description of the conditional regressions

Dependent variable	N	df	-2LL	R2
40% poverty line	17901	16	19358.693	0.203
20% poverty line	8762	16	10660.637	0.195

Table 4.9 shows the odds of being poor when a household is deprived. Single parents and couples with many children that are deprived have high odds of being poor as well. Elderly couples, couples without children and 'other' households with children that are deprived have relatively low odds that they are also financially poor. Moreover, households with a head that is foreign born, employed or retired are more likely to be deprived without financial poverty. Last, households in rural areas have relatively high odds of poverty when they are deprived. With a poverty and deprivation line of 20%, some differences in the estimates of the odds can be observed. Single male households have higher odds that poverty accompanies deprivation. Second, the odds of deprivation when poor decreases strongly for single female elderly, single parents and single females. This probably means that these household types have higher odds of being deprived despite a healthy financial situation. Couples with three or more children are also less likely to be both poor and deprived when the lower poverty line is used, but still have to highest odds of all household types that poverty is connected to deprivation.

Table 4.9: Odds of being poor when deprived

	40% line		20% line	
	Exp(B)	Sig.	Exp(B)	Sig.
Single male	1.693	0.000	2.092	0.000
Single female	1.395	0.000	1.031	0.771
Single parent with child(ren)	2.286	0.000	1.788	0.000
Couple w/o children	0.704	0.000	0.809	0.026
Couple with 1-2 child(ren)	1.230	0.003	1.175	0.074
Couple with 3+ children	2.772	0.000	2.401	0.000
Elderly couple	0.593	0.000	0.419	0.000
Single male elderly	1.136	0.258	1.067	0.639
Single female elderly	1.323	0.000	0.844	0.057
Other w/o children	0.541	0.000	0.623	0.000
Other with child(ren)	0 (b)	-	0 (b)	-
Born in country of residence	1.447	0.000	1.428	0.000
Born in another country	0 (b)	-	0 (b)	-
Employed	0.517	0.000	0.560	0.000
Unemployed	1.407	0.001	1.713	0.000
Retired	0.470	0.000	0.438	0.000
Inactive	0 (b)	-	0 (b)	-
Densely populated	0.433	0.000	0.486	0.000
Intermediately populated	0.439	0.000	0.366	0.000
Thinly populated	0 (b)	-	0 (b)	-

Notes: Slovenia excluded, (b) reference category

Table 4.10: Model description of the conditional regressions

Dependent variable	N	df	-2LL	R2
40% poverty line	17531	16	19659.178	0.125
20% poverty line	9538	16	11849.405	0.178

Table 4.11 shows the odds of being deprived for the non-poor. The results confirm the findings of the conditional regression with the deprived. Elderly, in particular female single elderly, have high odds of being deprived even when the household is not poor. Singles and single parents both have high odds of deprivation without financial poverty. Furthermore, non-elderly couples, and non-single households without children have relatively low odds of deprivation when they are not poor. Apparently, no households with a native born head experience deprivation without poverty. The odds of deprivation without poverty seem not to be related to urbanization degree. Last, employed have a higher risk of being deprived when they are non-poor, despite their job. The analysis with the 20% poverty line does not show very different results, except for the fact that the deprivation risk of the earlier mentioned vulnerable groups increases. Also, deprivation of non-poor is more likely to exist in rural areas when a stricter cut-off point for poverty and deprivation is used.

Table 4.11: Odds of being deprived when non-poor

	40% line		20% line	
	Exp(B)	Sig.	Exp(B)	Sig.
Single male	1.084	0.428	1.216	0.056
Single female	1.203	0.046	1.373	0.000
Single parent with child(ren)	1.204	0.103	1.912	0.000
Couple w/o children	0.705	0.000	0.725	0.000
Couple with 1-2 child(ren)	0.588	0.000	0.672	0.000
Couple with 3+ children	0.799	0.085	0.997	0.981
Elderly couple	1.009	0.894	0.935	0.318
Single male elderly	0.806	0.066	0.855	0.147
Single female elderly	1.595	0.000	1.761	0.000
Other w/o children	0.860	0.032	0.827	0.010
Other with child(ren)	0 (b)	-	0 (b)	-
Born in country of residence	0.000	0.000	0.000	0.000
Born in another country	0 (b)	-	0 (b)	-
Employed	1.776	0.000	1.865	0.000
Unemployed	1.092	0.311	1.176	0.034
Retired	1.083	0.270	1.065	0.347
Inactive	0 (b)	-	0 (b)	-
Densely populated	0.937	0.090	0.837	0.000
Intermediately populated	1.035	0.486	0.828	0.000
Thinly populated	0 (b)	-	0 (b)	-

Notes: Slovenia excluded, (b) reference category

Table 4.12: Model description of the conditional regressions

Dependent variable	N	Df	-2LL	R2
40% poverty line	21110	16	20651.533	0.188
20% poverty line	30249	16	22892.419	0.171

Table 4.13 shows that households that are financially poor, but non-deprived, are mainly large families, single parents and rural households. Other families with children, other couples and other non-singles without children have low odds of being poor when they are not deprived. This analysis also shows that no family with a native born head experiences poverty without deprivation. Furthermore, households with an employed head are the least likely to be poor when the household does not experience deprivation. With a 20% poverty and deprivation line, single parents, large families and rural households stand out even more as risk groups for financial poverty without deprivation. Moreover, singles and single female elderly have much higher odds of poverty when they are not deprived in comparison to the analysis with the 40% poverty lines.

Table 4.13: Odds of being poor when non-deprived

	40% line		20% line	
	Exp(B)	Sig.	Exp(B)	Sig.
Single male	0.945	0.494	1.456	0.000
Single female	1.013	0.873	1.229	0.016
Single parent with child(ren)	1.237	0.014	1.923	0.000
Couple w/o children	0.382	0.000	0.551	0.000
Couple with 1-2 child(ren)	0.795	0.000	1.006	0.925
Couple with 3+ children	1.801	0.000	2.421	0.000
Elderly couple	0.642	0.000	0.516	0.000
Single male elderly	0.741	0.030	0.729	0.042
Single female elderly	0.935	0.492	1.122	0.227
Other w/o children	0.360	0.000	0.442	0.000
Other with child(ren)	0 (b)	-	0 (b)	-
Born in country of residence	0.000	0.000	0.000	0.000
Born in another country	0 (b)	-	0 (b)	-
Employed	1.000	0.998	1.202	0.078
Unemployed	0.446	0.000	0.345	0.000
Retired	1.197	0.012	1.255	0.002
Inactive	0 (b)	-	0 (b)	-
Densely populated	0.506	0.000	0.489	0.000
Intermediately populated	0.683	0.000	0.474	0.000
Thinly populated	0 (b)	-	0 (b)	-

Notes: Slovenia excluded, (b) reference category

Table 4.14: Model description of the conditional regressions

Dependent variable	N	Df	-2LL	R2
40% poverty line	21480	16	23259.804	0.084
20% poverty line	29473	16	21449.504	0.095

Another method to analyse the consistency of the identification of the poor is a multinomial regression. This method gives an overview of the odds of being in one of the four poverty states (non-poor/non-deprived, poor/non-deprived, non-poor/deprived, poor/deprived), but is harder to interpret. The results of this analysis confirm the earlier results of the conditional regressions. Therefore, this chapter will not elaborate much on the details.

Households with children, in particular single parents, and families with three or more children, rural households, and households with an employed, inactive or foreign born head are most at risk of being solely financially poor. Single female elderly and unemployed

have the highest odds of being solely deprived. Households that are both poor and deprived are mainly single parents, couples with three or more children and single households, with the exception of single male elderly. Living in a rural area, having a foreign born household head and being unemployed are very strongly associated with the risk of being both poor and deprived. Elderly (and thus retired), unemployed and urban households seem to be most clearly overrepresented among the deprived. Large families and households with a foreign born head seem to be relatively overrepresented among the financially poor. The biggest difference in the analysis with the 20% poverty lines is that single males, single parents, and rural households have much higher odds of poverty, deprivation, and a combination of both. Furthermore, the differences in poverty and deprivation of above mentioned groups stand out more. The detailed results of the multinomial regressions can be found in appendix F.

The analysis of section 4.3 and 4.4 support the conclusions of studies by Bezemer (2006), Cornia (2006), Scott (2000), Szivós and Giudici (2004), and the World Bank (2005) that mainly single elderly, women, children, and unemployed are vulnerable groups. Moreover, the vulnerability of those groups is even stronger when analysing deprivation instead of poverty. The only exception are children in large families, which are found to be more vulnerable to poverty than to deprivation. Further, this analysis also finds a concentration of poverty and deprivation in rural areas, which is similar to the results of Bezemer (2006), Corina (2006), Förster et al. (2002), Spoor (2003), the World Bank (2005). However, poverty seems to be more concentrated in rural areas than deprivation. This could add to the conclusions of later research by the World Bank in 2006, which concludes that vulnerable socio-demographic are also trapped in secondary cities with weak employment possibilities, limited economic diversification and low quality (public) services.

4.5 Region-specific influences on multidimensional poverty risk

In this final section of the analysis, the regional variance of deprivation or multidimensional poverty risk is addressed. First, a simple regression will be used, which will be extended to a multilevel model, as described in section 3.3. The analysis will focus on the question which model is the best tool to explain differences in well-being score among households and regions. In all models, the score of the multidimensional well-being index is the dependent variable. The statistics on model fit will be the -2 restricted log likelihood (-2RLL), and Akaike's Information Criterion (AIC), because no general way of defining the R squared is possible for mixed models (Kramer, 2005). This is due to different levels of variance in the model. Moreover, R squared will increase as parameters are added (Kramer, 2005). The -2RLL method is developed for the fitting of linear mixed models, such as multilevel or hierarchical models. AIC is used, because it penalizes for an increasing number of parameters. This statistic is very useful, because in a model that estimates both fixed and random effects, the number of estimated parameters can be very high. A R squared statistic would be inflated for these models. For both -2RLL and AIC, lower values mean a better model fit. The same statistics are also used to describe the simple regressions, because the same SPSS function is used to make the models better comparable. The analysis still excludes Slovenia, because of the missing data for urbanization degree on the household level. Including Slovenia does not lead to very different estimates, and does not increase the number of random effects that are found in the multilevel analysis. Further, without the Slovenian households, the results of this paragraph are better comparable to the results of the analysis in sections 4.3 and 4.4.

Table 4.15 shows the expected estimates in a simple regression with only household variables. Single parents, single female elderly, single adults, and large families have on average the lowest well-being. Couples without children or with less than 3 children have the best well-being scores. Furthermore, an employed household head has a strong positive effect, and having an unemployed household head has a strong negative effect on well-being

in comparison to the other activity statuses. Last, the more densely populated the area, the higher the average well-being score of the households.

Table 4.15: Simple regression of household characteristics with well-being

	Estimate	Sig.
Intercept	3.289	0.000
Single male	-0.095	0.000
Single female	-0.065	0.000
Single parent child(ren)	-0.158	0.000
Couple w/o children	0.117	0.000
Couple with 1-2 child(ren)	0.116	0.000
Couple with 3+ children	-0.065	0.000
Elderly couple	0.062	0.000
Single male elderly	0.013	0.456
Single female elderly	-0.138	0.000
Other w/o children	0.074	0.000
Other with child(ren)	0 (b)	-
Employed	0.479	0.000
Unemployed	-0.285	0.000
Retired	0.046	0.000
Inactive	0 (b)	-
Urbanization degree	0.059	0.000
Model statistics	-2RLL	AIC
	53038.40	53040.40

Notes: Slovenia excluded, (b) reference category

The regression output in table 4.16 is an extended version of the last regression, including a dummy for every region in the data. The -2 restricted log likelihood and Akaike's Information Criterion show that the model improves a lot, which is not surprising, as great differences exist between countries and regions in Central Europe. Poland, Latvia and Lithuania score clearly below average and the Czech Republic and Estonia score above average. The estimates of the household variables did not change much.

Table 4.16: Simple regression of household characteristics with well-being with region dummies (cont. on next page)

	Estimate	Sig.
Intercept	3.371	0.000
Single male	-0.120	0.000
Single female	-0.089	0.000
Single parent child(ren)	-0.178	0.000
Couple w/o children	0.089	0.000
Couple with 1-2 child(ren)	0.099	0.000
couple with 3+ children	-0.079	0.000
Elderly couple	0.038	0.000
Single male elderly	-0.025	0.154
Single female elderly	-0.177	0.000
Other w/o children	0.054	0.000
Other with child(ren)	0 (b)	-

Employed	0.452	0.000
Unemployed	-0.277	0.000
Retired	0.028	0.000
Inactive	0 (b)	-
Urbanization degree	0.063	0.000
Praha (CZ)	0.188	0.000
Strední Cechy (CZ)	0.221	0.000
Jihozápad (CZ)	0.266	0.000
Severozápad (CZ)	0.116	0.000
Severovýchod (CZ)	0.230	0.000
Jihovýchod (CZ)	0.279	0.000
Strední Morava (CZ)	0.191	0.000
Moravskoslezsko (CZ)	0.143	0.000
Estonia	0.092	0.000
Közép-Magyarország (HU)	-0.001	0.920
Dunántúl (HU)	0.031	0.014
Alföld és Észak (HU)	-0.090	0.000
Lithuania	-0.116	0.000
Latvia	-0.269	0.000
Centralny (PL)	-0.097	0.000
Poludniowy (PL)	-0.113	0.000
Wschodni (PL)	-0.162	0.000
Północno-Zachodni (PL)	-0.074	0.000
Poludniowo-Zachodni (PL)	-0.073	0.000
Północny (PL)	-0.113	0.000
Slovakia	0 (b)	-
Model statistics	-2RLL	AIC
	50448.43	50450.43

Notes: Slovenia excluded, (b) reference category

Using regional variables instead of dummies improves the goodness of fit of the model some more. The household variables have more or less the same parameter estimates. Most regional variables have a weak, but significant relation with well-being. First, share of employment in manufacturing and the share of heavy metal industry of the total industry has a strong positive relation with well-being. The most industrialised (urban) areas have apparently also the highest well-being. Second, well-being increases when GDP per head and number of doctors per thousand inhabitants increases. However, well-being has a negative relation with the number of hospital beds per thousand inhabitants. This can mean that it might not be a good indicator of health services, because a higher amount of hospital beds does not necessarily mean more care. Last, a higher proportion of university graduates is negatively related to well-being. This effect is hard to interpret. It can have something to do with the fact that the elite can go to university anyway, and that a high share of university graduates does not mean that the more vulnerable part of the population has more access to (higher) education.

Table 4.17: Simple regression of household characteristics with well-being with regional variables

	Estimate	Sig.
Intercept	3.230	0.000
Single male	-0.117	0.000
Single female	-0.090	0.000
Single parent child(ren)	-0,187	0.000
Couple w/o children	0,095	0.000
Couple with 1-2 child(ren)	0.095	0.000
Couple with 3+ children	-0.076	0.000
Elderly couple	0.042	0.000
Single male elderly	-0.016	0.382
Single female elderly	-0.173	0.000
Other w/o children	0.054	0.000
Other with child(ren)	0 (b)	-
Employed	0.435	0.000
Unemployed	-0.298	0.000
Retired	0.015	0.209
Inactive	0 (b)	-
Urbanization degree	0.056	0.000
Share of employment in manufacturing	3.317	0.000
Share of heavy metal industry	0.658	0.000
GDP per capita	2.97E-05	0.000
Doctors per 1000 inhabitants	2.55E-04	0.000
Hospital beds per 1000 inhabitants	-5.68E-04	0.000
Share of inhabitants with a university degree	-0.700	0.000
Model statistics	-2RLL	AIC
	45871.45	45873.45

Notes: Slovenia excluded, (b) reference category

This analysis gives some interesting results. However, a simple regression does not take into account that some of the variables are at the household level and that some variables are at the regional or country level. The regional variables are treated as characteristics of the households. The nesting of the households in regions means that not all cases are independent. Moreover, the relation between the socio-demographic variables and well-being can differ between the regions. To take the different scale levels of the variables into account, this study uses a multilevel (or hierarchical) analysis as an alternative to a simple regression. This analysis treats only households from different regions as independent. Households in the same region are assumed to be nested within that region.

Therefore, an unconditional random-effects model is estimated that tests how well-being means vary between regions. This variability are the random effects in the estimation. Table 4.18 shows that a significant part of the variance (about 10%) is due to variance among regions. After adjusting for regional variables, a significant variation in regional well-being means remains to exists. In the final unconditional random-effects model, GDP per head and share of employment in manufacturing are the only significant regional variables. So when nesting of households in regions is taken into account in the analysis, most regional variables have no significant relation with well-being. The variance that is attributed to regional differences decreases strongly when regional variables are added to the hierarchical model. The variance among regions decreases from 0.031 to 0.003 when GDP per inhabitant and share of employment in manufacturing are included, so this means that the significant regional variables explain about 88% of the variance in well-being

between regions. Still, a significant part of the regional variance is unexplained. Furthermore, the aim of this research is to explain well-being variability at the household level, so the household characteristics are added in an extension of this model later. See appendix G for the complete results of the unconditional random-effects models.

Table 4.18: Test for random effects among regions

	Estimate	Sig.
Residual	0.277	0.000
Variance region	0.031	0.001
Residual	0.277	0.000
Variance region	0.003	0.003

Notes: Second model with GDP/inhabitant and share of employment in manufacturing

The next step in this analysis is a hierarchical mixed model with the household variables. The fixed effects of the household variables are shown in table 4.19. The first model is a hierarchical model with only nesting of households in regions. The second model also takes into account that part of the variance in well-being scores can be due to variability in household characteristics among the different regions. The fixed effects are again more or less the same for both models in comparison to the estimates of the simple regressions.

Table 4.19: Estimates for the fixed effects of the household variables in the mixed models

	Estimate	Sig.		Estimate	Sig.
Intercept	3.401	0.000	Intercept	3.411	0.000
Single male	-0.119	0.000	Single male	-0.113	0.000
Single female	-0.088	0.000	Single female	-0.086	0.000
Single parent child(ren)	-0.178	0.000	Single parent child(ren)	-0.179	0.000
Couple w/o children	0.089	0.000	Couple w/o children	0.095	0.000
Couple with 1-2 child(ren)	0.099	0.000	Couple with 1-2 child(ren)	0.085	0.000
Couple with 3+ children	-0.078	0.000	Couple with 3+ children	-0.085	0.000
Elderly couple	0.039	0.000	Elderly couple	0.058	0.002
Single male elderly	-0.025	0.162	Single male elderly	-0.015	0.516
Single female elderly	-0.176	0.000	Single female elderly	-0.164	0.000
Other w/o children	0.054	0.000	Other w/o children	0.061	0.001
Other with child(ren)	0 (b)	-	Other with child(ren)	0 (b)	-
Employed	0.452	0.000	Employed	0.455	0.000
Unemployed	-0.277	0.000	Unemployed	-0.287	0.000
Retired	0.028	0.014	Retired	0.037	0.078
Inactive	0 (b)	-	Inactive	0 (b)	-
Urbanization degree	0.063	0.000	Urbanization degree	0.053	0.000
Model statistics	-2RLL	AIC	Model statistics	-2RLL	AIC
	50434.88	50438.88		50131.35	50141.35

Notes: Slovenia excluded, (b) reference category

Table 4.20 shows that the variance in the hierarchical mixed models decreased a lot in comparison to the unconditional random-effects models without household variables that were summarized in table 4.18 and appendix G. The total unexplained variance is about 23% lower than in the first unconditional random-effects model. Both the total variance and than part of variance that is due to regional differences decreased. In the first mixed model, still about 10% of the variance is due to variability among regions. In the second model, part of the variability is explained by differences between regions in household characteristics in the sample. According to this model, the parameter estimates for all household variables vary by region. However, the variability is very small and probably negligible in this analysis. Moreover, the unexplained regional variability increases from 0.025 to 0.037, which also means a relative increase from about 10% to about 15% of the total variance. This suggests that when the variability of household characteristics is taken into account, the unexplained variability due to regional differences in well-being even increased. Further, the goodness fit of the model also does not increase much when the variability of household characteristics is taken into account.

Table 4.20: Variance among regions in the mixed models

	Estimate	Sig.
Residual	0.212	0.000
Variance region	0.025	0.002
Residual	0.209	0.000
Variance region	0.037	0.004
Variance region * household type	0.002	0.000
Variance region * activity	0.002	0.002
Variance region * urbanization degree	0.001	0.030

A random coefficient model can analyze how the estimates of the slopes of the household variables vary between the regions. However, the goodness of fit of this model is much worse than the simple hierarchical model, because the urbanization degree variable is insignificant. Moreover, the analysis does not find any significant variance of the parameters between regions, because the number of estimated parameters is too large. This is also an issue in the final multilevel model, which includes the regional variables. Urbanization degree is again insignificant, but in all other regressions it has been highly significant, so this suggests a misspecification in the model. The share of employment in manufacturing is the only significant variable in the multilevel model and has again a positive relation with the well-being of households. The estimates of these model can be found in appendix H and I.

To fit a model that can explore the variability of the relation between household characteristics and household well-being among regions, the household categories are recoded in dichotomous variables. The socio-demographic variables that seem to have the strongest relation with well-being are chosen in the following analysis, which are being single, being elderly, having a female head, and having children in a vulnerable context (single parent or a large family).

The estimates of the mixed models in table 4.21 show the expected results. Mainly being unemployed strongly lower the well-being of households. Moreover, being single, being elderly, being a single parents or having many children have a strong negative relation with well-being. The first interaction shows that being single elderly has a small positive effect on well-being, which is due to the fact that single male elderly have relatively high

well-being scores. The second interaction shows that single female elderly indeed perform much worse. Last, household well-being increased by urbanization degree. The model statistics show that these models have a worse fit than the mixed models with the categorical variables, which is not very surprising, as some of the household characteristics that are used to build the household types are not used in the new models. This loss is acceptable, because the aim of this extension of the analysis is to focus on the characteristics that seem to be most connected with low well-being. Moreover, a too complicated model will reduce the possibility to find any random effects in the final multilevel model.

Table 4.21: Estimates for the fixed effects of the household variables in the mixed models with dichotomous household variables

	Estimate	Sig.		Estimate	Sig.
Intercept	3.787	0.000	Intercept	3.802	0.000
Single	-0.172	0.000	Single	-0.173	0.000
3+ children or single parent	-0.162	0.000	3+ children/single parent	-0.162	0.000
Elderly	-0.237	0.000	Elderly	-0.229	0.000
Female head	-0.039	0.011	Female head	-0.039	0.010
Single*Elderly	0.045	0.035	Single*Elderly	0.044	0.042
Elderly*Female head	-0.125	0.000	Elderly*Female head	-0.123	0.000
Unemployed	-0.590	0.000	Unemployed	-0.599	0.000
Urbanization degree	0.068	0.000	Urbanization degree	0.059	0.000
Model statistics	-2RLL	AIC	Model statistics	-2RLL	AIC
	56195.03	56199.03		56094.38	56102.38

Notes: Slovenia excluded, (b) reference category

The unexplained variance has somewhat increased in comparison to the earlier mixed models, which is shown in table 4.22. This is not very surprising as the model fit is slightly worse. The unexplained variance due the variability between regions is also slightly larger in these models, respectively around 11% and 16%. Further, part of the unexplained variance is because the indicator of elderly and urbanization degree vary among regions. This indicates that for these variables, random effects might be found in a multilevel model.

Table 4.22: Variance among regions in the mixed models with the dichotomous household variables

	Estimate	Sig.
Residual	0.246	0.000
Variance region	0.030	0.002
Residual	0.245	0.000
Variance region	0.048	0.003
Variance region * elderly	0.003	0.020
Variance region * urbanization degree	0.002	0.021

In the final multilevel model, the fixed effects for the household level variables are more or less the same as in the mixed model in table 4.21. The significant regional variables are the share of manufacturing in employment, regional GDP per capita, and the unemployment rate among inhabitants of older than 15. The signs of the first two regional

variables are as expected. First, a more industrialised region is associated with higher household well-being. Second, a higher GDP per capita is also related to higher well-being of households. However, the relation between unemployment rate and household well-being is positive instead of the expected negative relation, as unemployment at the household level is strongly related to lower well-being. However, when the GDP variable is dropped, unemployment rate is insignificant. This indicates an autocorrelation issue, and therefore the final model is estimated without the unemployment rate variable. Moreover, the multilevel model without unemployment rate has a better model fit. The results are shown in table 4.23. The results of the model with unemployment rate can be found in appendix J.

Table 4.23: Estimates for the fixed effects of the household variables in the final multilevel model with dichotomous household variables

	Estimate	Sig.
Intercept	3.285	0.000
Single	-0.173	0.000
3+ children or single parent	-0.162	0.000
Elderly	-0.226	0.000
Female head	-0.040	0.009
Single*Elderly	0.043	0.043
Elderly*Female head	-0.123	0.000
Unemployed	-0.590	0.000
Urbanization degree	0.057	0.000
Share of manufacturing in employment	3.895	0.000
GDP per capita	1.8E-05	0.000
Model statistics	-2RLL	AIC
	56057.41	56071.41

Notes: Slovenia excluded

Further, table 4.24 shows that significant random effects are found in this multilevel model. The significant variables in the diagonal from the top left corner to the bottom right corner implies that a random intercept, and a random slope for elderly and urbanization degree is found. This means that the intercept, and the relation of being elderly and urbanization degree varies significantly between regions. Moreover, the last significant estimate in the bottom left (or top right) corner suggests that there is a relation between the slope of urbanization degree and the intercept value of regions. Regions with higher intercept have a lower slope for urbanization degree.

Table 4.24: Covariance structure of the random effects in the final multilevel model

	Intercept Region	Elderly Region	Urbanization Region
Intercept Region	0.01125	0.00174	-0.00384
Elderly Region	0.00174	0.00296	-0.00108
Urbanization Region	-0.00384	-0.00108	0.00179

Notes: Statistics in bold are significant at the 5% level

The estimates of the covariance structure can be more easily interpreted by calculating how the intercept and the slopes of both variables vary within a 95% confidence interval, and by calculating the correlation between the different random effects. The randomness of the slopes is presented in table 4.25. The values for the intercept show that a quite large variation in well-being means seems to exist, which is true in reality. Second, the effect of elderly is apparently negative in all areas, but the strength of the link between old age and low well-being varies between the Central European regions. In some regions the (varying) negative effect of being elderly can be smaller than, for example, the fixed negative effect of being single or having children in a vulnerable context. Last, the random variation of the slope of urbanization degree shows an interesting result. Apparently, the slope can also be negative in some areas, which means that well-being decreases with urbanization degree. This supports the hypothesis that well-being is not necessarily always lower in rural areas, and that in some urban environments, such as possibly secondary cities, households can be worse off in terms of multi-dimensional well-being.

Table 4.25: Randomness in the intercept and slopes of the household variables

	Std. Dev.	Lower bound	Fixed estimate	Upper bound
Intercept	0.106	3.073	3.285	3.497
Elderly	0.054	-0.335	-0.226	-0.117
Urbanization	0.042	-0.028	0.057	0.142

Notes: Lower bound and upper bound are respectively at 5% and 95%

The correlations between the intercept and slopes is presented in table 4.26. The statistics clearly show that there is a strong negative correlation between the random slope for urbanization degree and the random intercept. This means that the relation between urbanization degree and well-being is less strong in better performing areas. For the other random effects, the correlation statistics are below 0.5 and are insignificant in the multilevel model.

Table 4.26: Correlation between intercept and slopes in the multilevel model

	Intercept	Elderly	Urbanization
Intercept	-	0.302	-0.857
Elderly	0.302	-	-0.470
Urbanization	-0.857	-0.470	-

Notes: Statistics in bold are significant at the 5% level

Table 4.27 shows the overview of the goodness of fit of the different models in this study. The statistics show that the multilevel models with the household categories do not really explain more than the simple regressions. This is mostly due to the fact that no significant random effects seem to exist for the household variables. The best model is the simple regression with regional variables. However, this model is not very realistic, as the nesting of the households within regions is not taken into account. Both the simple regression model and the multilevel model show that general well-being indeed differs between Central-European regions, but none of the regional variables explain these differences very well. The final multilevel model is the best model, but a simple regression, which includes regional GDP per head, regional share of employment in manufacturing and the household level variables, could be an easier interpretable alternative.

Table 4.27: Goodness of fit of the different models in the multilevel analysis

	-2RLL	AIC
Simple regression model	53038.40	53040.40
Simple regression model with regional dummies	50448.43	50450.43
Simple regression with regional GDP	52284.29	52286.29
Simple regression with regional variables	45871.45	45873.45
Unconditional random-effects model	70135.05	70139.05
Extended unconditional random-effects model	70107.81	70111.81
Mixed model	50434.88	50438.88
Extended mixed model	50131.35	50141.35
Random-coefficient model	77793.26	78067.26
Complete multilevel model	83344.15	83618.15
Mixed model with dichotomous variables	56195.03	56199.03
Extended mixed model with dichotomous variables	56094.38	56102.38
Final multilevel model	56057.41	56071.41

The results of the analysis concord with the conclusions of Smith (2003) that average welfare is strongly connected with industrial activity. Further, the relation between skill level, health, unemployment and well-being at the regional level, that were found Smith et al. (2006, 2008) and Stenning et al. (2007), are not confirmed in this research. This is probably due to the multilevel methodology, which shows that in a more realistic model, regional variation in well-being is hard to explain. However, the relation between regional economic indicators and household well-being seems to be stronger than was concluded by Hayo and Seifert (2003). Last, this analysis shows that the relation between socio-demographic risk factors and well-being can vary between Central European regions. This is mainly interesting for the relation between urbanization degree and well-being. The conclusions of Szivós and Guidici (2004) that high deprivation mainly exists in rural areas of Central Europe is only partly supported by this research. This study finds that this does not have to be the case in all Central European regions, and that the relation is less strong in better performing areas. This accords with the conclusion of Marcours and Swinnen (2006). Moreover, the relation between population density at the household level and household well-being can even be negative. This can indicate evidence for the finding of the World Bank (2006) that vulnerable groups can be concentrated (or trapped) in secondary cities.

5. Conclusion

This last chapter will answer the research questions and synthesize the results of the analysis. Furthermore, this section will reflect on the results and will try to make suggestions for further research on the topic of multidimensional poverty e.g. deprivation. The main research question of this research was:

Which region-specific factors explain differences between multidimensional poverty risks of vulnerable households in Central Europe?

The first part of the analysis focussed on the relation between financial poverty and deprivation. The analysis showed that for many households financial poverty and deprivation do not overlap necessarily. With a lower poverty line, the overlap between the two different poverty types is even smaller (relatively). The relation between poverty and deprivation ranks of households is also quite weak. This is in particular the case for the worst-off households in Central Europe.

The overview of the share of the poor and deprived in the Central European countries shows a diverse picture. Besides the obvious differences in poverty and deprivation rates between the countries, the differences between the poverty rate and the deprivation rate in the countries is surprising. The 'richer' countries have a relatively high deprivation rate, while the poorest countries experience a deprivation rate that is low in relation to their financial poverty rate. Hungary is a shocking example with 22.8% of the households below the 20% deprivation line, but only 7.7% of the population living in poverty.

Moreover, the poverty and deprivation odds for different household types show some large discrepancies. The most striking differences are the relatively high deprivation risk for the elderly and the relatively lower deprivation risk for larger families in comparison to their poverty rates. Furthermore, financial poverty is much more concentrated in rural areas in comparison to deprivation. In general, the households with the highest deprivation risk in Central Europe are single households, single parents, large families with 3 or more children, and households with an unemployed or inactive head.

The analysis of the consistency of the identification of the households with a low standard of well-being shows that single households, single parents, other households without children, and rural households have high odds of being deprived when they are poor. For these groups low income is a reliable indicator of low general well-being. The opposite is true for all other types of households with children, and elderly couples. Furthermore, unemployment of the household head is a good determinant of deprivation of the household. When the household head is working, the poor financial situation does not often go hand in hand with high deprivation risk.

Among the deprived households, large families, single parents, single non-elderly, and rural households have high odds of also being poor. This is also true for households with a foreign born or unemployed head. On the other hand, couples or larger households without children, single elderly, urban households, and households with a native born, retired or employed head have high odds of being deprived without financial poverty. This means that the low standard of well-being of the deprived households in these categories will not be identified when their income is measured. Last, only for female elderly, the results are highly dependent on the poverty line. With a 40% poverty line, poverty and deprivation seem to be strongly connected. However, deprivation without poverty is very likely when the 20% poverty and deprivation line are adopted. For all other households, the choice of the poverty line does not influence the results much.

The same analysis among the non-poor shows that most elderly and singles have high odds of being deprived, despite their relatively healthy financial situation. A financial measure of poverty will underestimate the well-being problems of these households. On the

other hand, households without children are most often consistently identified as non-poor by both the financial and multidimensional measure of poverty. Surprising is that non-poor households with an employed head have relative high odds of being deprived in comparison to households with an inactive, unemployed or retired head.

Among the non-deprived, large families, single parents and rural households have high odds of being poor. This means that the well-being situation of these households will look worse when it is measured with a financial indicator instead of a more multidimensional indicator. With a 20% poverty line, the poverty risk of single households increases a lot among the non-deprived, and thus the financial indicator of poverty is a less reliable predictor of deprivation for singles.

Therefore, this study concludes that the lower well-being of many retired (so elderly) people and urban households will not be identified when a purely financial indicator of poverty is used. On the other hand, the financial problems of some large families and single households will probably not be identified with a multidimensional measure of well-being. However, this is less of a problem than the inconsistent identification of low well-being among elderly and urban households, because single households and large families also experience a lot of overlap of poverty and deprivation. The use of a 20% poverty line instead of a 40% poverty line does not gain many different results, except for the fact that the most vulnerable groups stand out more.

The last part of the analysis studied regional variation in the multidimensional poverty risk of the vulnerable households. A simple regression was extended to a multilevel or hierarchical model in this analysis. The results show that mainly single households, single parents, large families, households with an unemployed head, and households in more rural areas are vulnerable of being deprived. It is clear that regional differences exist, and the tests for random effects show that part of the variability in well-being means is due to regional variance. Share of employment in manufacturing, share of heavy metal industry, income per capita, doctors per thousand inhabitants, hospital beds per thousand inhabitants, and proportion of people with a university degree explain part of the differences in wellbeing in the simple regression model. However, in a multilevel model, only income per capita and share of unemployment in manufacturing is significant. This hierarchical multilevel model takes into account that households within a region are not independent, because all households experience the same regional effects, and is therefore more realistic. The results show that both regional income per head and share of employment in manufacturing are positively related to the average well-being of household. The regional indicators on unemployment, health, education, share of elderly, and population density have no significant relation with average household well-being. Furthermore, some random effects are found in the final model. First, the intercept significantly varies among the Central-European regions. Moreover, a significant part of the variability of the well-being of Central European households is due to variation in the relation between being elderly and household well-being, and urbanization degree and household well-being among the regions in this study. Last, there is a negative relation between the regional intercept and the effect of urbanization degree on household well-being.

Based on these results, this study concludes that the first part of the hypothesis of this research is partly true. Households with many children, elderly households, rural households and households with an unemployed or inactive head are indeed vulnerable socio-demographic groups. However, some of these groups do not experience a lower well-being level than can be expected from their financial situation. Households with an unemployed or inactive head and rural households experience a large overlap of poverty and deprivation. Completely contrary to the expectations of this study, larger families are more at risk of poverty than of deprivation. Elderly households and urban households are the main groups that do have a higher deprivation than poverty risk. This can mean that the quality, reliability and access of public services are worse in the (secondary) cities than on

the countryside. Second, this can mean that elderly suffer the most from the low quality and reliability of public services, or that elderly are most deprived from access to these services. Furthermore, the general living conditions are probably worse in more densely populated areas. This can also be an explanation for the situation of the elderly, because they tend to be concentrated in cities without the ability to move.

The second part of the hypothesis is also partly true. Indeed, regional differences in multidimensional poverty risk exist. However, regional differences in health indicators, unemployment rate, and urbanization grade cannot explain these differences significantly. The only indicators that explain part of the variance in well-being among Central-European regions are GDP per capita and the share of employment in manufacturing. Apparently, regional income per head and degree of industrialisation explain the regional differences between multidimensional poverty risks of vulnerable groups in Central Europe the best. Well-being and income levels are stronger connected on the regional level than on the household level. Furthermore, differences between regions have some influence on the relation between the household characteristics and the deprivation risk of the vulnerable households that were distinguished in this study. The effect of being elderly and urbanization degree on deprivation risk varies among regions. Moreover, the relation between urbanization degree at the household level and well-being is less positive in areas with higher well-being, which means that there are probably less urban-rural differences in better performing regions. Therefore, this study concludes that there is indeed some regional variation in socio-demographic risk factors for deprivation. This indicates that vulnerable households are probably extra vulnerable in poorer areas. Last, this analysis shows that the relation between the assets component of a livelihood and well-being is clearer than the for the access component. This is not very surprising as the concept of access is less explicitly defined and will only be captured indirectly by regional indicators.

When interpreting the results of this study, some aspects of the research that could influence the results should be taken into account. First, the construction of the well-being index is quite arbitrarily. The index tries to provide a broad view on general well-being, but of course many variables that are also related to the well-being of households are left out. This can be due to data problems or to keep balance in the index. Moreover, the choice which variables belong to which dimension of poverty can be controversial. For example, an indicator such as unmet need for health services refers to both the health dimension and the subjective dimension of well-being. It is hard to argue which indicator is subjective and which is not. In reality, many of the indicators are neither objective nor subjective. Even the variables in the subjective dimension are quantified, so the data can never reflect the true opinion of the interviewee.

Finally, some suggestions for further research can be formulated. First, the possibility to group the micro data by NUTS2 level would greatly improve the analysis. That way, the number of regions will increase, and the grouping of households will be on the same scale level. It will be easier to detect regional differences in determinants of vulnerability to deprivation of households then. The fact that few regional variability in deprivation risk factors seems to exist in this research can be due to the limited amount of regions in the analysis. Only the households in Czech Republic could be grouped by NUTS2 region.

Furthermore, a longitudinal study on this topic could give insight into the question which factors influence transition into and out of poverty. Also, the relation between different dimensions of well-being could be analyzed in time. Last, a more qualitative case study on this topic could help to understand how people perceive well-being and poverty, and which dimensions of well-being are most important to them. Moreover, qualitative research can help explore whether the different methodologies that are used in poverty studies provide valid and reliable tools for studying this phenomenon.

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