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THE IMPACT OF SOCIAL CAPITAL ON FARM AND HOUSEHOLD INCOME: RESULTS OF A SURVEY AMONG INDIVIDUAL FARMERS IN POLAND

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Abstract

Private farming is the dominant mode of agricultural production in most European countries. Not all farmers are equally successful, economically. In this paper it is analysed whether social capital is an important factor contributing to higher agricultural incomes. Based on the findings of a farm survey in Poland among 410 farmers by adopting factor and multiple regression analysis it can be deduced that social capital is indeed a significant factor determining the level of agricultural income. However, its impact not that clear-cut as anticipated. More in-depth analysis will be needed in the future.

Key words: cross sectional models, empirical research, farm income, individual (private) farms, social capital, Poland

1 Introduction

Right after the change of the political regime, the transformation process in most countries of Central and Eastern Europe (CEEC) focused on the restructuring of the organisation of agricultural production in promoting the privatisation of former agricultural production co-operatives and state farms. Production entities compatible with the market-economic system emerged although in many cases the legal label was changed, only (Lerman 2000: 10). Many of these organisations had been transformed into legal entities, i.e. transformed agricultural producer co-operatives, joint-stock companies and limited liability companies. In Poland this process of restructuring had been of minor importance as state and collective farms had not been very widespread. Just in the former German regions these production entities had been of importance. Individual farming continued to be the dominant mode of agricultural production during the socialist period. However, these *de jure* private farms had been closely linked to the state-owned upstream and downstream sectors under the central planing system. Therefore, with the change of political and economic regime, private farmers had to learn to organise agricultural production in a market-economic environment like their colleagues in the other transition economies.

In addition, the transformation of the agricultural sector involved the re-organisation of the supporting organisations of the agricultural producers. Farmers were in urgent need of appropriate institutions and self-help organisations (see for general discussion on the role of institutions and organisations: North 1990: 3-6) to their support in order to participate actively in economic development, and not to be sidelined as passive performers. The institutional set-up of the command economy had become obsolete when Ministries of Agriculture, state-owned companies and mass organisations under the guidance of the Party used to link agricultural production and producers with the national economy and society. A new set of organisational infrastructure in support of agricultural producers which are membership-oriented and independent from any outside interference had to be established. These organisations could be set-up either from scratch or "traditional-ones" had to be transformed accordingly. It is assumed that, besides other factors of influence, the competitiveness and the level of economic welfare of agricultural producers is restrained if they cannot rely on organisations to their support.

As could be observed during the last decade, some transition economies have been more successful than others in moving towards an agricultural sector that typifies the one found in the West (Rozelle and Swinnen 2004; Slangen et al. 2004: 246). Similarly, when looking at the farm level, quite a number of agricultural producers had been very successful while others just muddle through. Many factors seem to be of influence. One factor which is being analysed since about more than a decade concerns the issue of collaboration and linkages with people being confronted with a similar situation. This aspect is discussed under the heading of social capital. Whether this concept constitutes an additional factor increasing economic welfare will be the focus of this analysis. It is guided by the hypothesis that, besides the provision of other production factors, social capital can be identified as a significant factor in determining farm income of agricultural producers. This paper is structured as follows: In the next chapter we will discuss the concept of social capital, its definition and options for its measurement. The major part will be made up by the analysis of data from a farm survey among Polish farmers whether social capital has an influence on their material welfare. A short concluding chapter follows.

2 Role of Social Capital

The concept of social capital had been adopted fairly recently in social and economic sciences. Conventionally, in economics, growth and development are based on the efficient adoption of the major production factors, i.e., in general, land, labour and capital or, more specifically, natural capital, physical or produced capital (i.e. tools and technology), some economists separate financial capital (i.e. savings, credit, and investment) out of physical capital, and since its recognition in economics during the 1960s human capital (i.e. education, health, and training). “Together they constitute the wealth of nations ... Some natural capital will be depleted and transformed into physical capital” (Grootaert 1998: 1). The latter will depreciate, and it is expected that technology will yield a more efficient replacement. The 19th and 20th centuries have seen a massive accumulation of human capital which helped to foster a rapid increase in economic welfare. However, during the last years it has become more and more realised that similar endowments with production factors do not necessarily lead to similar patterns of economic growth and development.

In this connection the concept of social capital has gained much prominence. The idea is based on the assumption that social networks are vital in managing one's daily life. These networks, however, are not naturally given but must be constructed through investment strategies oriented to the institutionalisation of group relations, usable as a source of other benefits (Portes 1998: 3). Although there had been a long tradition of research on organisational development, particularly concerning co-operatives (see e.g. Dülfer 1994), a growing theoretical and empirical literature has helped to fuel a resurgence of interest in the social dimension of development. A range of new research has shown that communities endowed with a rich stock of social networks and civic associations are in a stronger position to resolve disputes, share useful information, set up informal insurance mechanisms, implement successful development projects, and confront poverty and vulnerability (Isham et al. 2002: 6). However, due to its recent emergence, broad ambit and multi-disciplinary nature, the conceptual literature is still evolving (Productivity Commission 2003: 5). There had been a lot of criticism about the vagueness of the concept, as simply too many meanings are associated with it and a consensus about a commonly acknowledged one is still missing. Therefore, some economists are very sceptical whether this concept should be applied at all in studying economic issues (e.g. Manski 2000: 121-123). Others argue that these differences and disagreements are a good measure of the intellectual excitement of the current social capital literature and urge to go on with the debate (e.g. Durlauf 2002: F418).

2.1 *General Remarks*

The term ‘social capital’ had already been applied since a couple of decades. The concept, however, had become more popular during the 1980s. In general, it is referred to Bourdieu (1983) who considers social capital as an attribute of an individual in a social context. One can acquire social capital through purposeful actions and can convert it into other types of capital, like e.g. physical capital. But, he stresses that a high degree of transformation work is needed and long-term investments are necessary (Bourdieu 1983: 195). Others, like Coleman (1988) and Putnam (1993) have focused on the collective point of view, although their concepts and objectives differ to a large extent. In general, sociologists and political scientists relate in their studies to norms, networks and organisations through which people gain access to power and resources. In economics, the concept gained prominence with the execution of the ‘Social Capital Initiative’ by the World Bank during the second half of the 1990s. When analysing economic performance the ambitious claim had been put forward that social capital might constitute an independent, and hitherto under-appreciated, factor of production (Woolcock 2002: 20-21).

Economists, in general, concentrate on the contribution of social capital to economic growth. At the microeconomic level this is seen primarily through the way it improves the functioning of markets. At the macroeconomic level institutions, legal frameworks, and the government's role in the organisation of production are seen as affecting macroeconomic performance (Grootaert 1998: 2). More specifically, the social capital question concerns the benefits and costs of co-operation. Olson's study (1965) about the logic of collective action can be seen as the basic work of research about organisational development. As a central issue incentives, costs and expected profits are discussed that motivate people to act together. The basic hypothesis concerning social capital's impact assumes that the welfare within the group generally will be enhanced, in the sense that the collective gains net of costs to group members will be positive (Knack 2002: 43).

The major reason for the large spread of different understandings of social capital can be seen in the fact that different authors focus on different dimensions which in real life are interdependent and overlapping. Basically, four key dimensions can be distinguished: They are its scope (or unit of observation), its forms (or manifestations), its channels and its type of relationship through which it affects development (Grootaert/van Bastelaer 2002: 2-4; Bebbington/ Caroll 2000: 6). Since individual authors emphasise different aspects of the various dimensions, it is no surprise that the adopted definitions of social capital vary to a large extent. Some authors have tried to cover as many dimensions as possible, so the definitions become highly complex. The major drawback of such an approach is the fact that it is almost impossible to make them operational for any empirical tests. Therefore, voices became louder and called for a more tightly focused micro definition of social capital and advocated a 'lean and mean' conceptualisation focusing on the sources – that is, primarily social networks – rather than its consequences (which can be either positive or negative, depending on the circumstances), such as trust, tolerance and co-operation. The focus is on the micro level and the structural elements. The upside of this approach is that it is more or less clear about what is, and what is not, social capital, making for cleaner measurement and more parsimonious theory building; the downside is that it tends to overlook the broader institutional environment in which communities are inherently embedded (Woolcock 2002: 22).

In our analysis we will follow this more pragmatic approach. In line with other authors (e.g. Winters et al. 2002: 146; Sobel 2002: 139) we use a quite narrow definition of social capital. We refer to Rose (2000: 1) who defines social capital as follows: "Social capital consists of informal social networks and formal organisations used by individuals and households to produce goods and services for their own consumption, exchange or sale". In general, informal social networks comprise face-to-face relationships between a limited number of individuals who know each other and are bound together by kinship, friendship, or propinquity. Informal networks are 'institutions' in the sociological sense of having patterned and recurring interaction. However, they lack legal recognition, employed staff, written rules and own funds. In general, they are not formally structured as there is no principal but agents only exchanging information, goods and services. On the other side, formal organisations are legally registered and, hence, have a legal personality. They are rule-bound and have to follow formal procedures in their management. In general, they have a secured annual budget which might be made up by its members, the market and/or the state. A formal organisation can have as its members both, individuals and/or other organisations. In this respect, an organisation is a corporate actor who, as a principal, co-ordinates its agents' activities and benefits from the activities of the agents (Rose 1999: 149; Abele et al. 2001: 4).

Closely linked to the discussion about the definition of social capital is the question of how to quantify and measure it. Like human capital, social capital is difficult, if not impossible, to measure directly; for empirical purposes the use of proxy indicators is necessary. Years of education and years of work experience have a long tradition as proxies for human capital and have often proven their value in empirical studies, depending on the

research question. Depending on the definition adopted, the number and focus of indicators varies which make any comparison of social capital studies quite difficult. Indicators differ both geographically and sectorally (Grootaert/van Bastelaer 2002a: 6-7). Some authors have developed up to 124 indicators which were grouped into 44 variables (see e.g. Bebbington/Carroll 2000: 20-21). Needless to say that this approach required a lot of time and resources. In line with the call for a more tightly focused micro, or more pragmatic, definition of social capital the number of relevant indicators is supposed to be reduced. We will follow this more pragmatic approach and will concentrate on membership in formal organisations, i.e. both passive and active one. While passive membership just means membership as such, i.e. paying membership fees and participating in meetings, involves active membership the election to and service of the respective members in the self-governing bodies of an organisation.

2.2 *Role of Social Capital in Transitional Agriculture*

In general, it can be stated that the transition of the agricultural sector from a centrally planned to a market economy has not been that successful as originally anticipated and a number of reasons have been given (see e.g. Rozelle and Swinnen 2004, Bezemer 2002: 1301-1307). The major ones can be summarised as follows: Underdeveloped rural financial systems and the complicated mode of farm restructuring led to limited access to loans due to the lack of profitability, collateral problems, risks and uncertainty. Similarly, the farm sector was characterised by a weak human capital structure, fragmented land ownership, rapid changes in agricultural policies and an incomplete legal framework. In this respect, the risk averse behaviour of the economic agents is seen as quite rational. As an additional reason, it has been argued that the poor and disappointing results of the transformation process have been due to a low level of social capital (Chloupkova 2002; Paldam and Svendsen 2000). But others argued that whatever social capital could be found at the start of transition had been inherited from the pre-communist past. Therefore, most CEEC were in a more advantageous position than most countries of the former Soviet Union (Winiecki 2004: 63-68).

The Polish agricultural sector is specific compared to the one of other CEEC. At the end of the socialist period more than four fifths of the total agricultural labour force had been working on private farms, i.e. 4.2 million out a total of 5.1 million (Ingram & Ingram 2004: 214). These private farms had been linked to the agro-food sector through a well-developed network of state-managed service co-operatives, machinery rings and co-operative banks. Like their colleagues in the collective and state farms, individual farmers were rather well-off. However, with economic transition the agricultural sector is characterised by several, almost contradictory trends. On the one side, although the economic development, in general, picked up since 1993, the number of agricultural labour force declined somewhat by about 16 % between 1988 and 2000. This decline was attributable in its entirety to the collapse of the state farms, where over 860,000 jobs disappeared. Private farms actually experienced a modest employment growth by about 35,000 persons during the same period. This labour-absorption effect is even more surprising as agricultural incomes declined by about two-thirds during that time. This might be explained by the high official unemployment rate in the country, so that access to land provided a certain safety net for the farm family through the relatively cheap provision of food (Ingram & Ingram 2004: 214-223; Kowalak 2003: 209-210). On the other side, the majority of those organisations which are supposed to support individual farmers economically either collapsed or their importance declined drastically. Particularly, input and marketing co-operatives as well as machinery rings lost more than two-thirds of their members during the 1990s. The only exceptions are dairy co-operatives which are marketing about 80 percent of the produced milk and co-operative banks which are still the most important financial service providers for farmers (Kowalak 2003: 209-218). In this respect, it can be concluded that Polish farmers, on average, lack social capital in order to overcome their limited factor endowment through joint collaboration. Nevertheless, quite a share of

farmers is doing quite well economically. Whether social capital is one factor of influence will be analysed below.

But it has to be admitted that not many studies about the role of social capital on rural development in general and agricultural development in specific have been executed in transition economies, so far. A very comprehensive overview about research on social capital in Central and Eastern Europe has been presented by Mihaylova (2004). While, like in other disciplines, the number of studies about the impact of social capital on economic development is increasing, there are only a few when it comes to rural, or even, agricultural development. First studies have been organised by Rose (1999 and Rose et al. 1998) and O'Brien (2000) focusing on Russia, but the existence of social capital among rural inhabitants as such and not the agricultural development process was the focus of their work. However, during the last years various researchers started to look in more detail into the concept of social capital and its relevance for agricultural development. Besides Bezemer (2002), Chloupkova (2002) and Chloupkova/ Bjornskov (2002), Hudeckova/ Lostak (2003) analysed data from the Czech Republic, Swain (2000) from Hungary, Rivza/ Kruzmetra (2003) from Latvia, Lerman/ Mirzakhania (2001) from Armenia, Valentinov (2004) from Ukraine and Hagedorn et al. (2002) from different CEEC. However, in not all of these studies social capital had been the central focus and the adopted approaches differ greatly.

In general, it has to be concluded that the weights ascribed to social capital in explaining the variations in economic performance, for the transition economies at least, stands in stark contrast to the dearth of empirical evidence that would support such conclusions (Raiser et al. 2001: 1). There is still a great lack of information regarding the economic effects of social capital with respect to the situation of agricultural producers in transition economies. The empirical analysis about this issue has just started. In our analysis we want to contribute in filling this gap by analysing survey data from private farmers in Poland.

3 Empirical Analysis of a Polish Farm Survey (Data Analysis)

We will test our hypothesis in analysing primary data of a Polish farm survey which had been executed in 2000 by IAMO with support of two Polish partner universities (Petrick 2001). The survey areas are located in the former voivodships of Szczecin, Tarnów and Rzeszów. The focus of the survey had been somewhat different at that time so we have no data about the whole range of social capital indicators. But there had been questions about membership in formal organisations to their support. Hence, in our analysis we just focus on these indicators of social capital with an emphasis on its structural elements. Similarly, while we want to show the effects of social capital we have to admit that we have no data about the costs involved in becoming and remaining a member.

The sample of this survey had been randomly selected out of all those farmers who are registered with the agricultural extension service. Hence, those farms which are just focusing on subsistence production are underrepresented in relation to their share among all Polish farms. This fact might bias our sample with respect to those farmers who are better educated and are more eager to pursue market production. The number of respondents comes up to 410.

Due to the different focus of this survey, our analysis of the concept of social capital had to be restricted to membership in formal organisations. In total, 15 independent variables could be identified in the analysis which had an influence on the annual agricultural gross income of the private farms (as the dependent variable). Two of them are representing social capital while the other 13 are made up by production factors and other factors of influence (as discussed in Chapter 3.1). The data analysis starts with descriptive statistics to get an

overview over the sample. Because the size of the annual agricultural gross income depends a lot on correlated variables, further evaluation was done using factor analysis in order to extract independent factors from the set of correlated variables. These factors were used in the final evaluation step to calculate a multiple regression model and to test whether the factors have a significant impact on the annual agricultural gross income. All calculations were done with the software package SPSS.

3.1 Descriptive Statistics

The 15 independent variables mentioned above could be put together under seven categories (i.e. labour, land, capital, production structure, human capital, social capital, and information sharing and vocational training). These variables were used in the quantitative analysis below. Agricultural gross income was used as the dependent variable describing the annual agricultural farm turn-over. The variables can be described as follows:

Labour: The labour input is measured in manpower equivalent units (MEU). Based on the survey answers all labourers on the farm had been added up. Full time persons had been multiplied by 0.8 to reflect the incidence of non-farm and off-farm activities. Seasonal workers were calculated as 0.2 MEU while the total amount of working days of daily workers had been divided by 261 annual working days (Table 1 for summarising statistics). The average MEU of about 4.5 reflects the relatively high level of farm labour on Polish farms keeping in mind the relatively small farm size.

Land: This indicator covers the value of land to take the different levels of soil fertility into consideration. This figure refers to the personal assessment of the farmers of their own cultivated land (Table 1). On larger farms additional land is rented. On average, the value of land comes up to about 30,000 Zł². The average farm size of our sample comes up to about 8.1 ha which is bit higher than the average farm size for Poland which stood at 7.2 ha in 2000 (Ingram & Ingram 2004: 218).

Capital: This indicator is the sum of the value of buildings, machines and equipment, animals plus the amount of cash savings (Table 1). The average value of these assets including savings comes up to about 173,000 Zł per farm.

Table 1: Descriptive statistics for major independent indicators

| Variable | Unit | N | Median |
|---|-------------|-----|--------|
| Used labour | MEU | 408 | 4.53 |
| Value of own cultivated land | Thousand Zł | 407 | 30.0 |
| Value of other farm assets, incl. savings | Thousand Zł | 408 | 173.3 |
| Production structure (share of crop production in farm income) | % | 410 | 38.1 |
| Job experience | Year | 410 | 20.0 |
| Farm management experience | Year | 410 | 15.0 |
| Age of household head | Year | 403 | 43.0 |
| Use of extension service (last year) | Number | 401 | 11.0 |
| Passive membership (0=none; 0.2=one organisation; 0.4=two; 0.6=three; 0.8=four; 1.0=five) | Scale | 410 | 0.20 |
| Active membership (0=none; 0.33=one organisation; 0.67=two; 1.0=three) | Scale | 410 | 0.00 |
| Agricultural gross farm income | Thousand Zł | 410 | 32.3 |

Source: Own calculation with data from the IAMO Poland farm survey (Petrick 2001)

Production Structure: This indicator reflects the adopted farming system presenting the share of crop production in the total agricultural gross income (Table 1). On average, about two fifths of the total gross income is made up by the value of crops.

Human Capital: Several questions had been asked in order to assess its level. The variable "education" has been defined as an index and comes up from 0 to 1, i.e. not completed primary school is set at zero, completed primary school at 0.25, completed vocational school at 0.5, completed secondary or technical school at 0.75, and completed university at 1. As it is shown in Table 2 the educational level of the farmers is relatively high. Just about 12.6% of our sample have primary education only while with respect to Poland, on average, this share comes up to over 40% (Ingram & Ingram 2004: 220). As a second variable we have defined "job experience" as the number of working years given by the respondents. On average, respondents worked for about 20 years. As a third variable we looked at the "manager experience" whereby it had been asked for the actual number of years managing the private farm as the decision-making agricultural household head (excluding the years as helping family member). On average, respondents were managing their farms for about 15 years. Finally, the age of the respective farm household heads had been recorded as well. With an average age of 43 years this variable is rather low in the survey (Table 1), but there is a high degree of distribution. In total the relatively high level of education and the low values of job and manager experience as well as age reflect a certain bias of the sample to the more energetic farmers.

Table 2: Educational level of household heads (N = 410)

| | No degree | Primary | Vocational school | High or technical school | University | Total |
|-----------------|-----------|---------|-------------------|--------------------------|------------|-------|
| Absolute figure | 1 | 51 | 188 | 144 | 26 | 410 |
| Percentage | 0.2 | 12.4 | 45.9 | 35.1 | 6.3 | 100 |

Source: Own calculation with data from the IAMO Poland farm survey (Petrick 2001)

Social Capital: Two indicators assess the passive and active membership of farmers in organisations to their support. A first question dealt with the passive membership in various types of organisations. Farmers had been asked, whether they were member of a co-operative bank, a credit union, any other type of co-operative, a farmers' union, and/or a political party. The answers were combined into a simple unweighted index of "passive membership", amounting from 0 to 1, i.e. member in no organisation comes up to zero, member in one to 0.2, etc. On average, farmers are members of one organisation (Table 1). In addition, respondents had been asked whether they were elected leaders in various organisations. They were asked whether they were an elected member of the supervisory board of a co-operative bank, a delegate to the Chamber of Agriculture and/or an elected member of regional authoritative bodies. Those who have been elected can be seen as leaders of the farming population and we assume that they are somewhat better-off than the others. The answers were combined, again, to an unweighted index of "active membership" amounting from 0 to 1, i.e. not elected at all comes up to zero, elected to one board to 0.33, elected to two boards to 0.67 and elected to three board to 1.0. On average, about 15% of all farmers have been elected in one of the self-governing bodies of their organisations (Table 1).

Information Sharing and Vocational Training: Five indicators refer to up-grading farmers' knowledge about various technical issues; of which three require an active participation in organised activities while two just make up an informal exchange of experience. First, farmers were asked how often they had made use of the agricultural extension service. The average number of 11 contacts per farm and year underline very close links (Table 1). In addition, farmers were asked whether they had participated in advanced training courses and visited field demonstrations during the last year. Again, the participation rate is very high. About 86.3% and 77.3% of them did so (Table 3). Finally, farmers were

asked whether they discussed and exchanged technical information informally with neighbours and whether they were listening to the agricultural news in the radio. This type of information exchange does not seem to be that popular anymore. Surprisingly, just about 70% and 80%, respectively did so (Table 3).

Table 3: Information sharing and vocational training

| | Participation in advanced training | | Visit of field demonstrations | | Talking with neighbours | | Listening to radio | |
|-----|------------------------------------|------|-------------------------------|------|-------------------------|------|--------------------|------|
| | N | % | N | % | N | % | N | % |
| Yes | 354 | 86.3 | 316 | 77.3 | 290 | 71.1 | 331 | 80.9 |
| No | 56 | 13.7 | 93 | 22.7 | 118 | 28.9 | 78 | 19.1 |

Source: Own calculation with data from the IAMO Poland farm survey (Petrick 2001)

Agricultural Gross Income: As the dependent variable we used the annual agricultural gross income as indicator for farm income. Unfortunately, the indicators given by the respondents which form the basis for cost calculations had been highly unreliable. Therefore, no net farm income could be used in our analysis. The average annual agricultural gross income comes up to 32,300 Zł per farm (Table 1).

3.2 Factor Analysis

A first statistical analysis shows that all 15 variables are more or less correlated with each other. These correlations prevent a clear picture of the impact of different variables on the agricultural gross farm income, therefore we used factor analysis to extract independent factors.

Table 4: Factor loadings (principal component analysis, varimax rotation with Kaiser normalisation)

| Variable | Factor | | | | | |
|--|-------------|-------------|-------------|-------------|--------------|-------------|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| Education | -0.26 | 0.01 | 0.04 | 0.72 | -0.18 | 0.06 |
| Job experience | 0.86 | -0.01 | -0.04 | 0.00 | 0.09 | 0.08 |
| Age | 0.83 | -0.10 | -0.06 | 0.01 | 0.04 | 0.00 |
| Farm management experience | 0.86 | 0.01 | 0.03 | -0.03 | 0.01 | 0.00 |
| Passive membership in organisations | 0.11 | 0.11 | 0.24 | <i>0.46</i> | <i>0.45</i> | -0.20 |
| Active membership in organisations | 0.14 | 0.12 | -0.02 | 0.73 | -0.03 | -0.02 |
| Use of extension service | -0.01 | 0.67 | 0.11 | 0.03 | -0.10 | -0.07 |
| Participation in advanced training | -0.04 | 0.82 | 0.00 | 0.09 | 0.10 | -0.02 |
| Exchange of information with neighbours | 0.02 | -0.08 | 0.30 | -0.08 | -0.06 | 0.71 |
| Visiting of field demonstrations | -0.05 | 0.80 | 0.07 | 0.07 | 0.04 | 0.10 |
| Listening to radio for professional information | 0.05 | 0.08 | -0.22 | 0.06 | 0.13 | 0.74 |
| Value of own cultivated land | 0.02 | 0.06 | 0.81 | -0.04 | -0.06 | 0.01 |
| Value of assets besides land | -0.09 | 0.14 | 0.73 | 0.12 | 0.11 | 0.02 |
| Used labour | 0.08 | -0.02 | 0.22 | -0.13 | 0.66 | 0.00 |
| Share of crop production in gross agricultural farm income | -0.02 | -0.01 | 0.26 | 0.06 | -0.69 | -0.13 |
| Eigenvalue | 2.28 | 1.85 | 1.52 | 1.32 | 1.22 | 1.13 |

Remarks: Factor loadings higher than 0.6 and less than -0.6 are bold, those higher than 0.4 are in italics.

Source: Own calculation with data from the IAMO Poland farm survey 2000 (Petrick 2001)

These factors can be used in further, more advanced calculations. The calculation started with a matrix of correlation coefficients (Kendall's tau) and was done using principal component analysis with varimax rotation and Kaiser normalisation. Only factors with an eigenvalue greater than 1 were included in further calculations because a factor should at least explain as much variability as one variable causes (Kaiser criterion). Six factors could be identified explaining 62.2 % of the total variance.

According to the variables that have loadings higher than 0.6 or less than -0.6 with a factor (Table 4) we label the factors (1) life and job experience, (2) active participation in further training, (3) land and capital, (4) education and social capital, (5) production structure and used labour, and (6) informal exchange of experiences. We could identify a social capital factor and recognise that social capital in the form of active membership in organisations is in our sample highly correlated with the educational level of the farmers. The variable passive membership in organisations has factor loadings of 0.46 with the factor education and social capital and 0.45 with the factor production structure and used labour. That this variable does not show high loadings on a single factor may be due to the complexity in our data material. On the one hand, there are farmers operating farms with a focus on animal production who are well organised. On the other hand, higher educated farmers as such rather see the necessity to get organised in order to enforce their interests and act according to their insights. Finally, these two groups are overlapping to some extent, only. If there were a stronger overlapping, the factor loadings would be more clear. Therefore, the loadings of the variable "passive membership in organisations" is divided among these two factors.

In a final step, we computed the factor scores of the six factors to replace the 15 correlated variables in a multiple regression analysis.

3.3 *Regression Analysis*

In order to test our hypothesis that social capital enhances the level of agricultural gross farm income we calculated following multiple regression model:

$$(1) Z_AFI = \sum_{i=1}^6 b(i) * factor(i) + b(i,i) * factor(i)^2 + b(i,i,i) * factor(i)^3$$

Z_AFI: standardised agricultural gross farm income
 b(i), b(i,i), b(i,i,i): coefficients for the ith factor, i=1..6
 factor(i): scores of the ith factor, i=1..6

The model includes not only linear but also quadratic and cubic effects because we assume that there are some nonlinear effects especially of the factor land and capital in our sample. Due to lacking values the sample size came up to 388 farms.

The complete model explained 74.5 % of the variance of the agricultural gross farm income but a lot of coefficients were not significant on the 0.05 level, thus we reduced the model to the significant effects only (Table 5). This reduced model explains 73.4 % of the variance of the agricultural gross farm income.

Table 5: Results of the multiple regression analysis (N = 388)

| Coefficient | Value |
|--------------------|--------------|
| b(1) | -0.049 * |
| b(3) | 0.332 * |
| b(4) | 0.042 * |
| b(5) | -0.089 * |
| b(3,3,3) | -0.001 * |
| b(5,5,5) | 0.054 * |

Remarks: * significant on the 0.05 level

Source: Own calculation with data from the IAMO Poland farm survey 2000 (Petrick 2001)

The factors (1) life and job experience, (3) land and capital, (4) education and social capital, and (5) production structure and used labour influence significantly the agricultural gross farm income. The factor “life and job experience” has a negative coefficient that means that older farm managers who have worked for a longer period in agriculture have a lower agricultural gross farm income than younger farmers. Older farmers tend to conserve the achieved level and kind of production and are shy at innovations whereas younger farmers are more likely to invest in new technologies and to participate in technical progress and may have therefore a higher agricultural gross farm income. The factor “land and capital” has a positive linear coefficient and a negative cubic coefficient. The linear coefficient is the largest in the model showing that a farm’s endowment with land and capital is the most important factor for the level of agricultural gross farm income. The negative cubic coefficient, although its value is rather small, causes a decreasing agricultural gross farm income for larger farms. We assume that at a certain threshold of farm size the agricultural gross farm income reaches a maximum level and then declines.

The factor “education and social capital” shows a positive impact on the agricultural gross farm income proving our hypothesis that social capital enhances the level of agricultural income. The factor “production structure and used labour” has a negative linear, but a positive cubic coefficient. The value of the linear coefficient is rather small and, hence, of marginal influence in comparison to the relatively large value of the cubic coefficient which is of high influence. Therefore, it can be concluded that due to this cubic effect the factor “production structure and used labour” influences the level of agricultural gross farm income, i.e. the higher the degree of specialisation in animal production, the higher agricultural gross farm incomes.

4 Conclusion and Outlook

In this paper we discuss the impact of social capital on agricultural gross farm income based on our hypothesis that social capital is an important factor of influence. With the help of the data of an empirical survey among 410 individual farmers in Poland we could test our hypothesis. However, the focus of the survey had been on access to financial services and the concept of social capital is just covered by passive and active participation in formal organisations, i.e. by its structural form. In this respect the results just give a first glance about its influence on farm income.

In our analysis we aimed at identifying social capital as an independent factor influencing agricultural gross farm income. The analysis supports our hypothesis in showing a significant impact on agricultural income by the factor “education and social capital”. However, when looking more closely at the findings, it shows that not passive membership in

organisations is of significant relevance, but active participation in one of their self-governing bodies. The variable “passive participation” is associated with too many other variables in order to be linked significantly with one factor. The degree of active participation is closely linked with the level of education. This seems plausible as the higher the level of education, the more likely farmers are ready to be elected to one of these self-governing positions.

As expected by neoclassical theory agricultural gross farm incomes are significantly influenced by the classical production factors, i.e. land, capital, and labour. Surprisingly, job and farm management experience which make up a big share of human capital are significantly negatively correlated with agricultural gross farm income. We conclude that the technical knowledge of those farmers with job and farm management experience seems to be out-dated for producing more efficiently and, hence, to earn higher farm incomes. Similarly, older farmers are to do any investments for improving farm income.

Finally, it can be concluded that social capital does have a significant influence on the level of agricultural gross farm income among individual farmers in Poland. Our hypothesis has been approved by the analysis. Therefore, a first recommendation can be drawn: Individual farmers can improve their agricultural income if they join and work actively in formal organisations. But we have to admit that the impact of social capital is not as strong as anticipated. Similarly, we are just at the start in analysing and quantifying the concept. There is ample room for improving the methodological approach. So far, we cannot say anything about the costs in building up social capital. Similarly, we have developed various indicators representing social capital, but we could not come up with a single factor. Therefore, more in-depth research and more complex research approaches will be needed in order to clarify the concept of social capital, its measurability and its impact on farm income. We are planning to execute a more detailed study on social capital in a comparative analysis covering various countries in Central and Eastern Europe in due course.

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² Zł: Polish Zloty, 1 US\$ = 4.35 Zł, 1 €= 4.02 Zł in 2000 (OANDA 2005)