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Rural Financial Markets under Transformation: A Study of Credit Supply and Demand in Romania's Private Farm Sector

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Abbreviations

A	land
BA	Banca Agricola
CNS	Statistical Yearbook of Romania
dt	one tenth of a tons
EBRD	European Bank for Reconstruction and Development
FAO	Food and Agricultural Organization
GDP	gross domestic product
ha	hectar
IFC	International Finance Corporation
K	capital expenditure
L	labor
Lei	0.5 EUR ~ 4500 Lei
mn	million
NBR	National Bank of Romania
NCS	National Commission for Statistics
NCS	National Securities Commission of Romania
OECD	Organization for Economic Corporation and Development
OLS	ordinary least squares

1 Introduction

1.1 General situation in Romania

More than 100 countries have privatized some or most of their state owned companies (IFC, 1999). In Romania, the reform process has started in 1990 with the privatization of agricultural land followed by management buy-outs, direct sales or investments and the mass privatization program. However, the findings of a study (IFC,1999) on privatization are that in many transition countries, like in Romania, mass and rapid privatization has turned over assets to large numbers of people who have neither the skills nor the financial resources to run them well. The statement of the EBRD country report (1999) that the transition process in Romania has recorded uneven developments in terms of macroeconomic stabilization and structural reforms supports this view. Moreover, the economic data in Table 1 gives evidence of a rather unstable economic situation. In 1997, the total external debt amounted to 28,2% of GDP and the total public debt to 26,4% of GDP. The real growth in 1997 was negative (-6.6%) and inflation rose to around 151% (to previous year) in 1997.

Table 1 Economic data

	1990	*1994*	*1997*
Contribution of sectors to GDP, in % to total GDP			
Financial sector*[3]	2.7	4.7	1.3
Agricultural sector	21.1	19.7	17.7
Private sector*[4]	16.4	35.0	58.2
Consumer price index	100	7,071	33,076
Total public debt to GDP	n.a.	n.a.	26.4
Total labor forces, in thousand	10,840	10,011	9,023
Labor forces in agriculture, in thousand*[5]	3,055	3,561	3,322
of which in private sector	n.a.	3,240	3,160
Labor forces in industry, in thousand	4,005	2,882	2,450
of which in private sector	n.a.	444	727
Labor forces in financial sector, in thousand	39	59	73
of which in private sector	n.a.	10	12
Cultivated area of private farm sector, in million ha	n.a.	7.3	7.4
total cultivated area	9.4	9.3	9.3
Tangible assets of the state (enterprises included), in billion lei*[2]	3,359	30,103	142,148
Tangible assets in private ownership, in billion lei *[2]	22	1,523	36,939
Savings deposits*[1] of private households to GDP, in %	29	8	10
Loans*[1] of private households to GDP, in %	2	< 1	< 1

Source: NCS 1998 and 1995, own calculations

Notes: *[1] at or from commercial banks, *[2] in current prices of corresponding year *[3] financial sector includes capital market, banking and insurance activities and not the adjustment for imputed output of bank services (IOBS), *[4] the contribution of the private sector before 1990 is not available, *[5] before 1990, the labor forces in agriculture ranged constantly around 3050 thousand

The transformation process has caused heavy changes in some sectors of the economy as regards the production structures, the supply and demand. The privatization of the agricultural sector started early and caused an allocation of land and labor from large specialized agricultural units to a newly created private farm sector, which is poorly equipped with real assets (equipment and buildings) and working capital. The privatization process in the industrial and financial sector has started late and has evolved slowly. Because of this lag the newly created private farm sector faces a slowly developing non-agricultural sector, large, state-owned wholesalers and predominantly state owned banks that used to channel cheap money to large scale state enterprises. Banks are one part of the financial sector, which includes other financial institutions and non-bank financial intermediaries (Schmidt, 1998). However, at the beginning of the reform process, neither banks nor non-bank financial intermediaries exerted any influence on an efficient capital allocation in Romania.

The main structural features of the agricultural and financial sector can be summarized as follows in Romania:

- The average size of private family farms is approximately 2.68 ha (Otiman, 2000). Moreover, there exists a very thin sales and rental market for agricultural land delaying the restructuring process in the private farm sector. Highly specialized cooperative farms were turned into unspecialized private farms. There are still highly subsidized state farms operating with a low capital stock and partly antiquated equipment. Between 1992 and 1997, the number of people occupied in the agricultural sector hardly changed, while that in the industry sector declined.
- The capital intermediation seems to be rather weak in the total economy. The total savings deposits at commercial banks amount to 22% of GDP (1997) of which 10% originates from private households. Furthermore, outstanding loans at commercial banks represent 35% of total assets of commercial banks (1997), of which only a loan share of 1.6% of all assets is allocated to private persons. In the absence of state guarantees and interest rate subsidies, commercial banks refuse lending to small scale enterprises, especially to farms (Schrieder, 1997). Further, they offer financial products and apply a credit technology that is more suited for large scale enterprises in urban areas. A capital market has developed during the transition process but the number of companies listed as well as the traded volume is rather small and insignificant for an efficient capital accumulation and allocation.

Under the influence of theoretical works from Stiglitz, (1985,1993), King and Levine, (1993) and others, the importance of the financial sector for welfare and growth of a country has been increasingly emphasized (Schmidt, 1999). It is argued that an efficient capital allocation through well functioning financial intermediaries supports the overall economic development. And vice versa, it is argued that economic development is necessary for the development of the financial sector. Taken together, the importance and interdependence of financial and economic development is undisputed.

This work recognizes the importance of financial markets development, especially in rural areas, of a transition country where the financial intermediation faces many constraints. It identifies the low level of capital intermediation through formal financial institutions in rural areas as a core problem and focuses on the supply of and demand for credit at the small scale farm level. The small scale private farm sector still engages a large part of the people in Romania and pre-dominates the economic activities in rural areas. Moreover, to be competitive it has to undergo a fundamental restructuring process, which requires a high level of liquidity provided through savings at and credits from the financial institutions.

1.2 Objective and structure of the study

It is intended to elicit in this work the characteristics and functioning of rural financial markets in Romania and to explain the behavior of the market participants. In particular, this work focuses on the factors affecting the demand for and supply of credit through financial institutions at the private farm level in a transition country. The overall objective of this study is to contribute to the research on access constraints for credit at the small private enterprise level in Romania. In this context, the study describes the credit approval mechanism and the matching of capital demand and supply under the prevailing loan conditions. It takes into account the economic and financial situation of the family farms. As discussed in Heidhues and Schrieder (2000) in Romania, the individual farmers' perception of access constraints to credit comprise institutional and financial reasons – complicated procedures, loan conditions and interest rates accompanied with aversions against credit. The following aspects are discussed in detail:

- A description and comparison of different loan types, their conditions and their approval procedure to show the preferences of potential borrowers and analyze the operating costs of financial institutions under the prevailing loan application procedure.
- A quantitative analysis intends to quantify the capital supply and demand under restrictions of risk, transaction costs and collateral requirements and to reveal the conditions under which the lender and borrower come to a loan agreement/contract.
- Under Romanian conditions, two factors have been found to be of relevance: collateral evaluation and risk behavior. These aspects are qualitatively analysed:
  - An analysis of the diverging collateral evaluation between lenders and borrowers in Romania.
  - An analysis of the risk aversion of family farms.

This study is divided into five sections (Figure 1) where the first section describes the objective and structure of the work. The second chapter outlines the problems and features of the financial and agricultural sector in Romania and provides the background for the discussion on financial and economic development.

The theories, methods and data are discussed in the methodology section (chapter three). It explains the production and demand factors specified and elaborates the issues of utility, risk aversion and adverse selection.

The analytical section addresses three topics: the demand and supply side of rural financial markets and its links to the agricultural and financial sector. The fist topic discusses the problems and interlinkages of the financial and agricultural sector development. It applies a theoretical framework which embeds the demand and the supply of capital as well as their constraints in a model. The model displays a capital demand function for individual farmers as well as a set of possible capital offers of the banking sector. The functions incorporate the main factors affecting demand and supply, such as collateral evaluation, interest rates, utility of assets, loan size, default risk and transaction costs. The results show which factors or combination of factors are actually determining the demand for and supply of capital and to which extent they are constraining. The chapter encompasses, second, the impact of uncertainty and asymmetric information on loan transactions and, third, the influence of risk aversion on loan decisions. These topics are shown to explain the difficulties and overall reluctance of financial institutions and farmers to agree on a loan contract.

The final section of this study summarizes the findings and derives conclusions for rural financial market policy in Romania.

Figure 1 Sections, topics and issues of the study

Sections	Topics	Issues
Introduction	Objective of the study	Transformation issues, objective and structure of the study
Changing financial and agricultural sector	Discussion on finance and development	Rural finance and finance in transition economies
	Financial sector in Romania	Characteristics, problems and constraints
	Agricultural sector in Romania	Characteristics, problems and constraints
Methodology	Data set	Data selection and analysis
	Methods and Theories	Utility and indifference curves, risk aversion, adverse selection, production and demand functions
Analysis	Rural financial markets	Capital demand and capital supply under constraints
	Financial sector – loan transactions	Asymmetric information and uncertainty
	Agricultural sector	Risk aversion
Summary and conclusion	Finance and Agriculture	Constraining factors and way to overcome them

2 Romania's economy in transition and the changing financial and agricultural sector

2.1 The discussion on financial and economic development

The discussion on financial development and rural financial markets emerged in the early 1950s has intensified during the last decade and now it includes the special features of transition economies. A large portion of studies on transition economies describes the functioning and problems of these economies, the economic and legal environment as well as the potential development of the financial sector in general. There are numerous studies on rural finance in developing countries but relatively few combine the issues of rural finance and of finance in transition countries. Furthermore, they seldom analyze the special features of rural financial markets and of economic behavior in transition economies. It is intended to elicit in this work the functioning and characteristics of rural financial markets in transition countries. The literature review includes discussions on rural finance and financial markets in transition countries.

2.1.1 Financial markets and rural finance

Von Pischke et al (1983) defined rural financial markets as relationships between buyers and sellers of financial assets who are active in rural economies. The relationship is based on transactions that include borrowing, lending and transfers of ownership of financial assets. Financial assets consists of debt claims and ownership claims. Debt claims are promises of someone else to pay, ownership claims give the owner the right about an asset. The literature on rural financial markets covers several decades and starts with the discussion about the failure of the market mechanism and policies to direct financial intermediation as well as the influence of human behavior[1]. It includes the importance of technologies, organizations, contracts and institutional design for financial development. Recently, the forum embodied discussions on prudential regulations and governance structures.

The market and policy failure approach

Based on the assumption of a positive relationship between financial and economic development, rural credit markets have been at the center stage of often unsuccessful policy intervention in developing countries over the last decade (Gonzales, 1994). In the 1950s the lack of access to formal credit, the high and dispersed interest rates and short duration of loans were perceived as the main problem in rural financial markets. These problems in rural financial markets were considered as a reflection of two types of market failure, the information problem and monopoly power. This failure served as a justification for

[1] Includes the influence of cultural and social factors as well as economic/financial considerations

government intervention (von Pischke, 1996). Early reservations and critics about government credit programs in rural areas came from D. Penny (1968) and D. Adams (1971). This and the experience with government failure shifted the first message of “policy failure” in the 1970s (Gonzales, 1994) to the message “policies continue to matter and financial technologies matter too” in the 1980s.

Efficient financial intermediation and institutional viability

Already in 1966 Patrick emphasized in his work the importance of the efficiency of financial intermediation through the private market mechanism in allocating scarce capital to its most productive uses. Under some conditions, however, the private optimal allocation diverges from the social optimum, e.g. if the financial institutions avoid risk more than socially desirable. In his work on farm credit policy Penny (1968) studied the behavior of farmers in eight villages in Indonesia. He found out that farmers differed widely from village to village in their attitudes towards economic development and debt. He states that it is not lack of capital or credit access in agriculture that inhibits development but lack of farmers’ motivation to use the capital or credit sources they already have.

Analogous to the emerging message of the 1990s “organizational design matters for appropriate policies and cost-effective technologies to be adopted and implemented” (Gonzalez, 1994) von Pischke and Adams (1980) stressed in their paper on agricultural credit projects the importance of the institutional viability. They proposed a strategy that is centered on the performance of institutions assuming that target groups are most efficiently benefiting when institutions serving them are efficient and financially strong. According to their findings, projects which undermine the viability and financial integrity of a credit agency should not be termed successes.

Access to credit and information asymmetries

In the discussion on access to credit especially for farm households, several financial and non-financial features of the borrower may have an influence. According to David and Meyer (1980) differences in technology, yield and price uncertainty of farm commodities, management ability, product and input prices as well as financial constraints and savings may explain differences between borrowing and non-borrowing farm households. The conclusion of Lee (1983) in his work on the role of financial intermediation in the activities of rural firms and households is that the potential demand for effective financial intermediation in rural areas appears to be strong. However, low participation in savings and credit services in rural areas is often explained by the local inaccessibility, the high costs and the rigidity of services. In this context, a study by Feder (1989) about the demand for agricultural credit and farm performance in China suggests that the limited demand for loans goes hand in hand with the limited supply of farm input factors. Credit constraints may have been more pronounced if the supply of inputs were increased.

It becomes clear from these empirical and theoretical works that the pure focus on socio-cultural aspects, or the theory of monopolistic moneylenders (Stigler, 1967) and of perfect markets with market clearing prices reflecting the high risks and information costs, fail to explain all features of rural credit markets. Advances have evolved from the paradigm of imperfect information and imperfect enforcement. It says that rural credit markets behave the way they do because of the problems of screening, incentives and enforcement (Hoff, 1993). There are a direct and an indirect mechanism to partly solve these problems. While the first entails an active screening of the borrowers and limiting the range of lending activities to particular groups, the latter relies on “the design of contracts by lenders such that, when a borrower responds to these contracts in his own best interests, the lender obtains information about the riskiness of the borrower, and induces him to take actions to reduce the likelihood of default and to repay the loan whenever he has the resources to do so” (Hoff, 1993). Braverman (1993) supports this view and argues that the problems with rural agricultural financial markets are related to the poor design of incentive systems within financial institutions and to government imposed interest rate ceilings. He suggests that the apparently large influence of social and cultural factors on the performance of financial institutions requires more experimentation among alternative modes of organizations in lending and savings mobilization.

Williamson (1985), Bardhan (1989), Hoff (1990), and Besley (1995) identify and summarize the major constraints to financial market development as information asymmetries, lack of suitable collateral and high transaction costs. Similarly, in his paper on financial innovations to facilitate credit access Meyer (1997) considers collateral as an important factor influencing access to credit. According to him, small farmers have fewer assets acceptable as collateral so they are more likely than the rich to be credit rationed. But because of the absence of complete information about borrowers, banks require collateral either as a mechanism to enforce loan payment (Plaut, 1985), or as a screening device to sort borrowers of varying riskiness (Bester, 1985). Some informal arrangements require collateral for loans, but informal finance has frequently developed effective collateral substitutes using interlinked contracts, peer monitoring and group lending (Meyer, 1997). However, these possible alternative approaches transfer risk from the lender to the cosigners (Stiglitz, 1993). Besides appropriate staff incentives, loan delivery and social mechanisms, Yaron (1994) stresses self-sustainability and outreach of the financial institution as important performance indicators. One key element for successful institutions appears to be the introduction of a social mechanism supplying peer pressure to repay loans.

Recent discussions emphasize the importance of a supportive legal and regulatory framework. The formulation of appropriate prudential banking laws, financial contract laws and procedures (GTZ, 1999) as well as strong governance structures for financial institutions are important areas for policy interventions and cooperative activities in financial development. In this context, Dewatripont and Tirole (1993) pursue an approach which

consists of viewing a bank as an ordinary firm. They argue that only the market failure stemming from the depositors' collective action problem requires a regulation.

The review of approaches and models to explain the functioning and problems of rural financial markets shows that many factors as well as their interaction and interrelation affects the performance of rural financial markets. The paper by Yaron (1994) on rural financial institutions, reviews the policy, modes of operation, incentives and financial performance of widely perceived successful institutions and supports this complexity of factors. His conclusion is that a solution which works in one socioeconomic environment will not necessarily work in another, where social values are different. However, if national policy is to foster economic development through financial development, it is necessary to isolate the relevant financial variables that constrain the development of financial markets and to operationalize them as instruments of economic policy. To do this for the specific situation of transition economies is the intention of this study.

2.1.2 Financial sector development in transition economies

The transition process to a market economy entails extensive changes on rather different levels of a country, e.g. the establishment of a proper legal, institutional and policy framework, appropriate education system, governance, property rights, liberalization, etc.. An efficient sequencing of these changes is difficult but the reform of equity ownership and the restructuring of enterprises were often two essential measures which accompanied the process from the beginning. The distribution of equity to individuals does not necessarily imply a change in structure or in production practices of a firm (World Bank, 1995). Replacing the state ownership of enterprises by private equity holders must be accompanied by appropriate sources of financing and a corporate governance structure that imposes discipline on managers and reduces the principle-agency problems (Smith, 1993; Walter, 1993). At this point an efficiently functioning financial sector is vital for a successful restructuring of the enterprise sector.

In both transition countries and developed market countries, financial markets can be considered as key elements for the functioning of modern economies. Their existence can be traced back to three elements (Viñals, 1992): time, uncertainty and space. The time dimension arises from the desire of households' and firms' to transfer purchasing power from the present into the future or vice versa. The uncertainty dimension refers to the presence of risk which can impose serious impediments for economic activities and consequently for efficient resource allocation. However, as Arrow (1964) discussed, there exists a market equilibrium and an efficient allocation of resources if sufficient financial instruments are offered to cover the different states of natures or risk levels. Finally, the space dimension comprises the differing location of borrowers and lenders where the financial intermediary literally represents a marketplace for the meeting between demanders and suppliers of capital.

The financial system has to fulfill three main functions, (Rybczynski, 1992) (1) collecting voluntarily generated savings and allocating them to economic activities with the highest expected return, (2) monitoring the use of money and disciplining the managers/owners in case the financial results gained are inadequate and (3) creating and managing a payment system, and developing a clearing and settlement system to economize on financial, human and real resources. Given a sound economic environment, namely an adequate institutional building, an elaborated legal, supervisory and regulatory framework and overall economic stability, the financial system will fulfill these three functions. In reality, however the functioning of financial markets in transition economies is limited by incomplete markets plagued by asymmetric information, immobility of production factors, heterogeneous products and factors and high transaction costs leading to organizational inefficiency.

At the beginning of the financial system reform, discussions (Rybcynski, 1992, Girard, 1992, Nicoleascu, 1993, Guitan, 1993, Blommestein, 1993, Roe, 1992, Thorne, 1993, Mullineux, 1996) focused on the legacy of the past, on the future role of the financial system as well as on the necessary and sequential steps to transform the system, like supportive laws, supervision, prudential regulation, organization, corporate governance, monetary and human resource management. The main problem encountered at the beginning of the reform process of the financial system were ‘bad-loans’ (Levine, Scott, 1993, Mullineux, 1996), ownership structure (Roe, 1992), bank supervision and prudential regulation, technical issues, macroeconomic factors, adequate capital resources and interest rates (Karailev, 1993; Petkova, 1993). Smith and Walter (1993) considered the choice of linkage between financial institutions and privatized industrial sectors as the critical issue. According to them, effective monitoring and control of the industrial sector is a topic of continuing debate, involving the discussions about the choice between the Japanese ‘keiretsu’, the Anglo-American capital market or the German universal banking as the model to describe the relationship between banks and industry.

Hence overall sound economic and financial settings as well as a supportive legal environment are necessary but insufficient conditions for an efficiently working banking sector. To contribute to the development of the capital market, banks have to be able to assess a firm’s financial position, prospective situation and profitability as well as the riskiness of projects. For banks to be able to do this, reliable information about the enterprise’s operations is needed and there must be a readiness of the enterprise to deliver the information and the techniques and technologies to process the information and judge the firm’s creditworthiness (Calvo, 1993).

Griffith-Jones (1995) discerns the asymmetric information and the lack of appropriate collateral as a major impediment for lending to small and medium sized businesses in particular in Eastern European countries. According to her, asymmetric information in combination with macroeconomic instability, inadequate bank regulation and imperfect competition leading to a higher risk of default resulting in lower expected profits enforces

credit rationing. In the case of asymmetric information and high transaction costs, the financial institutions are unable to distinguish between high and low risk borrowers. To limit their risk they either charge a premium to cover expected losses or they avoid the riskier areas of economic activities by setting credit limits (Viñals, 1992) resulting in credit rationing (Stiglitz and Weiss, 1981). Prevailing asymmetric information in the market leads to external financial constraints for firms and to limited possibilities of substituting new equity for debt (Viñals, 1992). In particular, in transition countries the underdeveloped economic environment for financial markets as well as incomplete markets impose several constraints on the development of efficient financial markets and on overall economic development. In turn, the low developed and only heavily bank-based (EBRD, 1998) financial markets confine the development of the market economy.

To overcome these impediments to economic development the establishment of a sound financial environment as well as the creation and design of new financial products (Schrieder 1997) is necessary. All new financial products which make markets more efficient and complete are defined as financial innovations (Van Horne, 1985). Financial innovations not only encompass new products but also a new organization or processes e.g. electronic transfers and changes in the financial framework such as trends towards securitization and off-balance sheet activities (Viñals, 1992). In this context, as a pre-requisite to functioning financial markets, Arrow's (1964) model of security markets offers possibilities to share risks and to enhance the markets with more information (on prices, supply, demand and risk).

In a theoretical paper on financing investment in Eastern Europe Holmstrom (1993) states the information gap between those who have more money than ideas and those who have more ideas than money, as the fundamental problem of financing. For matching money and ideas he mentions two vehicles, collateral securing the investor's funds and intermediation bridging the information gap. However, the value of collateral is determined by its marketability, which in turn, depends on the symmetry of information about the future returns of such an asset and the maintenance of collateral. Since collateral plays such an important role in attracting funds, he recommends the development of collateral lending. This implies a reduction in information asymmetries which appears to be, at least partly, the result of prevailing uncertainties which comprise according to Holmstrom (1993) uncertainties through inflation, political and legal actions of the government.

2.1.3 From a centrally planned to a market economy

A stylized centrally planned economy encompasses three economic units, government including any kind of institutions, firms comprising all units producing commodities and households. The government employs a central plan determined to distribute commodities and money between firms and between firms and households. According to the central plan the firms employ labor and produce commodities that the households consume. The households receive income from the firms or the government that they can either save or

spend on commodities produced by firms. The type of products and services, the quantity of goods commodities and input prices as well as wages are set by the government. Thus, a market clearing mechanism which determines the demand and supply of commodities as in a market economy does not exist.

The ‘so called’ financial institutions collect capital from households and ‘surplus making’ firms through savings and transfers the money as instructed to the government or to ‘non-surplus making’ firms. The resource capital is not allocated according to highest expected returns but according to social and/or governmental interests. Consequently, the financial institutions’ sole function is to establish a capital and an implicit tax transfer system but they do not efficiently allocate capital, monitor the borrowers’ financial performance or exert influence on economic and/or managerial decisions. Financial control under classical socialism includes a totally passive credit and money system for enterprises as money demand determines money supply (Buch, 1996). The monetary system did not allow enterprises to bid for scarce resources (McKinnon, 1993) and inconsistencies between the financial needs of the production plan and financial flows are leveled out through the extension of additional credit (Buch, 1996). Through the price setting mechanism and the extraction of firm surpluses the government implicitly collects ‘taxes’ with little codification in formal tax law. In such a stylized centrally planned economy, no law addressing the issue of income tax is necessary if enterprises withhold household income (McKinnon, 1993) and increase instead their surpluses which in turn are skimmed off by the state.

The transition from a centrally planned economy to a market economy requires a thorough restructuring of the whole economy. It has been accepted and recognized that for the transformation of a command economy into a market economy the re-establishment of property rights, the liberalization of prices, the introduction of competition (Rybczynski, 1992), the elimination of subsidies, the liberalization of trade and the introduction of currency convertibility (Mullineux, 1996) are necessary but not sufficient conditions for the process of transformation. An essential requirement is institutional infrastructure (Mullineux, 1996) including the creation and/or reform of the legal system which comprises an efficient taxation system, corporate governance, regulation, supervision as well as bankruptcy (disclosure) and banking laws. In addition, an open, flexible, competitive and efficient financial system contributing to the efficient allocation of capital and the creation of a payments system to support these new commercial relationships is also necessary (Mullineux, 1996, Rybczynski, 1992).

However, once the liberalization process begins the central planning system is weakened by the loss of property rights, decision power, price setting rights and monopoly power. Additionally, the establishment of property rights and price liberalization deprives the government of its implicit tax income (McKinnon, 1993). The privatization of former state enterprises led to ‘loss making’ firms with a majority of shares still hold by the state or a state owned institution and to ‘surplus making’ firms hold in private ownership. With the

privatization or liquidation of former state owned enterprises the existing labor market is unable to absorb the excess employees when the labor force is released. At the beginning of the transformation process when state revenues decline due to decreased implicit tax income and expenditures increase because of social transfers, the government's only capital source to finance state enterprise losses and budget deficit are loans from the central state owned banks.

Local governments pressure the banks to lend to enterprises they own or control, and to finance infrastructure investments in their localities (McKinnon, 1993). The lending to inefficient and/or 'loss making' firms does not necessarily improve the financial results of those companies, rather it can deteriorate the financial institutions asset structure and lead to a 'bad-loan' problem which is a common problem for banks in all transition countries. The existence of poorly or non-performing loans on the balance sheet inhibits the financial institution's capacity to play a key role in economic development. Moreover, it may seem rational to banks to continue to approve loans of non-performing borrowers in order to keep the biggest debtors afloat and to disguise the extent of the 'bad- loan' problem and the evidence of their possible bankruptcy (Mullineux, 1996). As the liabilities of financial institutions consist, to a large extent, of deposits from households, the households, in essence, are paying the cost of restructuring. This induces economic agents to loose confidence in the financial market system. For this reason, the reform of the banking system has to occur carefully and should proceed the privatization of non-financial firms. This is because the main source of finance for privatized firms and newly created small and medium sized enterprises will be the banks (Mullineux, 1996).

Along side the privatization and liberalization process, the restructuring of existing enterprises leads to a considerable shedding of labor. If the unemployment level is to be contained new sources of employment need to be established. In the OECD (Organization for Economic Cooperation and Development) countries job creation occurred most rapidly in the small and medium sized enterprise (SME) sector in the 1980s (Mullineux, 1996). Therefore, a thriving small and medium sized agricultural and non-agricultural enterprise sector seems to be crucial for employment and thus for a successful transition from a centrally planned to market economy. Banks as financial intermediaries should provide capital for start-ups, joint ventures and restructuring in the SME sector. However, the combination of uncertainty (information, legal framework, prices, output) in transition economies and the relatively low risk threshold of banks as a result of limited information is expected to lead to credit rationing (Mullineux, 1996, Stiglitz and Weiss, 1981). As a result attention needs to be paid to the incentives used to induce banks to lend to the SME sector.

2.1.4 Discussions on transformation and the financial sector in Romania

In the discussion on growth and finance it was hypothesized and empirical evidence was presented that the performance of the financial system has a major influence on the

performance of the overall economy. An efficient financial sector appears to directly induce investments and restructuring of enterprises and to contribute to economic growth by mobilizing and collecting domestic and foreign savings and by efficiently allocating these funds to investment opportunities. A sound financial sector, therefore, provides a mechanism for allocating risks and capital, spreading financial losses (EBRD, 1998) and transforming maturity of capital. Conversely, an unsound financial system imposes impediments on the development of a market economy and constraints economic growth. For this reason, the financial sector has been seen as of increasing significance for economic development in transition countries.

The OECD Report on Romania (1998) describes the rural financial markets as poorly performing with a diminishing supply and demand for credit. The reasons for the insufficient availability of credit and investment capital in rural areas include the uncertain macroeconomic environment which favors the inter-bank lending and investment in treasury bills instead of promoting credit to the highly risky and far less attractive agricultural sector; failures to establish an appropriate institutional and legal framework for assets that can be used as collateral, the lack of pre-financing schemes for crops and the limited use of leasing; and the past practices of the government which provided subsidies to finance agricultural inputs of mainly loss making large agricultural enterprises and therewith inhibited financial institutions and farmers to rely on economic principles (OECD, 1998).

Heidhues and Schrieder (1998) identified five factors limiting the development of the financial sector in Romania. These are: some inefficient former state enterprises, the government enforced subsidized lending to loss making state enterprises, the ‘bad-loan’ issue, the finance problems for small agricultural, backward and forward linked enterprises as well as the lack of economic diversity in rural areas. The suggested approach to overcome the constraints in rural financial markets in transition countries focuses on innovations at four levels: the macroeconomic level comprising the promotion of economic stability and confidence in a reliable and efficient financial sector through the enactment of trade and bankruptcy laws and the establishment of an independent central bank promoting monetary policy that is conductive to economic stability; the financial sector level entailing the establishment of a reliable, legally binding and regulatory framework for the financial sector and the implementation of laws and regulations which govern the capital structure, the risk management and the valuation of assets; the organizational structure including organizational financial innovations that support the restructuring of banks and reduce market entry barriers; and the product level referring to product innovations that satisfy the financial demand of the rural clientele (Schrieder, 1999). Contrary to Holstrom’s (1993) arguments to overcome information asymmetries by collateral lending, in the case of Romanian small scale farmers, the collateral requirements of financial institutions are still considered as an access constraint to credit for small agricultural enterprises. This is because the asset endowment of small scale farms or the asset “market value”, if any, is low

and many farmers have not yet received all their land titles. However, the completion of land title distribution as well as a competitive land market is expected to ease the collateral problem in the credit market (Schrieder; 1997).

2.1.5 Discussions on transformation and the agricultural sector in Romania

The main actors in the development of rural areas and the rural financial sector are branches or agencies of financial institutions, rural households and small enterprises. In Romania, agriculture represents the predominate economic activity in rural areas with approximately 60% (NIS, 1998) of the total employment in the private sector. Rural areas are classified as (1) predominantly rural areas were more than 50% of the population lives in rural communities, (2) significantly rural areas where 15-50% of the population lives in rural communities and (3) predominately urbanized areas where less than 15% of the population lives in rural communities (OECD, 1996). In Romania, about 45% of the population lived in rural areas (NIS, 1998). In this context, a community is classified as rural if the population density per square kilometer is less than 150 persons. The overall population density in Romania is presently 100 persons per square kilometer (World Bank, 1999).

The agricultural sector representing a large part of the SME sector in rural areas, plays a key role in the development of rural regions. Agriculture is considered as important because it employs much of the labor force in the early stages of development and rising farm incomes are spent largely on products of the rural sector boosting local demand and generating further increases in employment (Mellor, 1995). Hence, agriculture produces spill-over effects on the backward and forward linked sectors through its income generation, which in turn, leads to an increase in demand for input factors and consumption goods in rural areas. The spin-off effects on local activities from the spending of increased farm incomes are called agricultural growth linkages and they are considered to be an important element in the creation of rural industry (Delgado, Hazell, 1998). Further, the agricultural sector absorbs redundant labor forces from rural and urban areas and provides an additional labor force to firms in periods of labor scarcity and economic development.

In the beginning of the transformation process the agricultural sector was restructured and many small private farms, a few cooperatives and a few large scales farms have emerged. The former economic structure was built around large scale farms, and mainly due to the lack of markets individual farmers face huge problems in getting inputs and marketing their products (Schrieder, 1997). Further, the endowment of human and financial capital is limited. Moreover, there is a lack of experience in cultivation, management and marketing among the “newly created” private farms which are often managed by former employees of state enterprises and cooperatives (ACE-PHARE, Farm Survey, 1997). To overcome the main problems on the farm level, the market and financial infrastructure, farm management and know-how needs to be improved. A better access to markets increases the input supply and the marketing opportunities. As regards the financial constraints, a better access to term

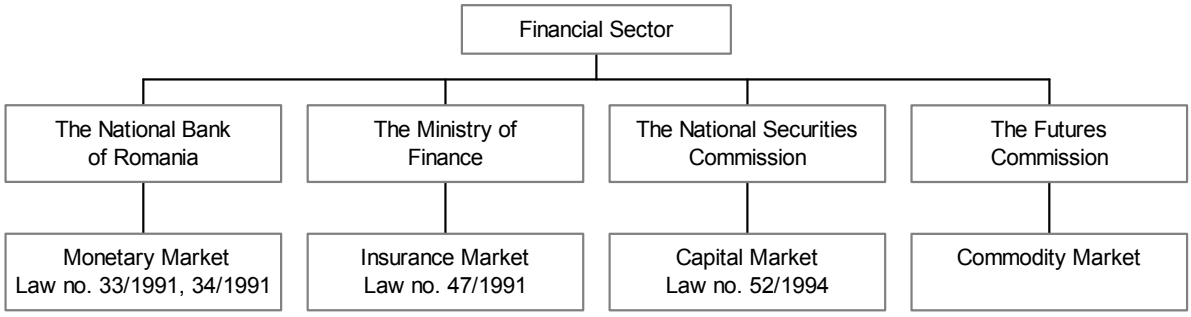
finance through intensive information on financial products, simple application procedures and appropriate credit conditions may improve asset accumulation and facilitate firm growth (Caprio et al, 1996).

The banking sector, however, especially the large commercial banks are not interested in lending to agriculture, in particular not to the small scale private farm sector. Even the former agricultural bank is reluctant to lend to small scale farmers due to the uncertainty of returns (Banca Agricola, 1997), the high transaction costs related with small loan sizes, seasonal incomes and the low value of farm assets available as loan security (Bank Interview, 1997/98). It is evident that credit expansion in the farm sector is hampered by farmers' lack of knowledge on the availability and the conditions of credit, and by the shortage of well trained bank staff who have experience in evaluating farm business' performance and in dealing with small farmers (FAO, 1998; GTZ, 1998). Therefore, most of the small private farms in Romania, established since the 1990 reforms, are excluded from formal lending (EU-PHARE Farm Survey, 1997). There is no doubt that if the private individual farm sector is to develop, there is a need to improve its access to credit and other financial services (Schrieder, 1997). Without rapid progress in this area, the start-up of new private enterprises will be delayed, the sustainability of existing ones will be endangered and agricultural market development policies and investments will be greatly hindered (Heidhues, 1995). Since the small enterprises of this sector have an important role to play for the development of the overall economy and of rural areas in particular, the economic and financial constraints are analyzed as regards to their access to financial services later in this study.

2.2 Description and analysis of the financial sector in Romania

As a result of the changes during the transformation process, the financial sector in Romania presents itself today as a financial market with agents offering and demanding financial services and a legal and regulatory framework controlling financial transactions. According to the responsibilities and legal statute/legislation, the financial sector in Romania is roughly divided in four segments (Figure 4-1). Following is a discussion of the monetary, insurance and capital markets. In particular, with respect to the hypothesis of this study, the functioning and performance of the banking sector as the principal agent of the monetary market in Romania is discussed.

Figure 2 Financial sector



Source: National Securities Commission 1997, Breitschopf

2.2.1 The monetary market

The money market and the monetary market discussed in this study represents two distinct markets. The money market consists of the foreign exchange market and of a market for short term loans in which money brokers arrange for loans between the banks and the government in the UK (Business, 1990). In Romania, the monetary market includes all financial transactions from financial institutions with corporations and individuals for all types of credit and deposit transactions as well as operating the payment system. [The supplier of financial services are formal and informal financial institutions such as banks or savings organizations and the customers are individuals and corporations such as insurance, service, retail and manufacturing companies, local authorities and governments as well as all kinds of funds.

The legal and institutional framework

With banking laws being passed in Romania in 1991, the parliament created the legal basis of the monetary market. It consisted of the Law on Banking Activities (no.33/1991) and the Law concerning the Status of the National Bank of Romania (no. 34/1991). In drafting these

laws, the lawmakers took into account the European Union banking directives and standards (Invest Romania, 1999).

The National Bank Law defines the central bank's tasks, rights, operations and organization. The central bank is headed by a Board of Directors which are appointed by the Romanian parliament. According to the law, it enjoys independence from the government. According to the law no 34, the Board of Directors takes policy decisions and measures in the field of monetary policy, foreign exchange and credit policy as well as in the area of payment transfers. The overall objective is price stability which is ensured by the instruments of the monetary, foreign exchange and credit policy. Further, the central bank has the sole authority to issue bank notes and coins, to establish rules and regulations for banking activities, to license and supervise all entities operating as banking companies, to request from all financial institutions documents and information on financial activities and to verify this information. It is also responsible for foreign exchange operations, foreign reserves, gold transactions, establishing data on external assets and exchange rates as well as supervising and regulating foreign exchange transactions. The central bank also acts as the fiscal agent for the government with respect to the issuance, sale and redemption of bonds and other government securities. Further, it can grant limited advances to the state to cover temporary deficits.

The Banking Law no. 33/1991 declares the National Bank of Romania as the sole institute with the authority to issue regulations in the monetary policy, credit, foreign exchange and payment domain and to supervise the activities of all banking companies. The banking companies have to submit to the central bank their monthly financial statements. However, saving banks, mutual benefit societies, credit cooperatives and other credit societies as well as investment funds will be supervised by the supervisory personnel in their respective associations. Thus, they are not subjected to regulation and supervision by the central bank.

Several regulations limit banking activities. For example, a financial institution is restricted to owning 20% of the capital of companies whose activities have no connection to any banking activity. Further, a single loan must not exceed 20% of the bank's capital and reserves and insider lending is permitted under certain provisions issued by the National Bank of Romania. Any credit granted exceeding a minimum amount specified by the central Bank has to be reported to the central bank .

According to the Law 33/1991 a banking company is defined as a juridical entity whose main business purpose is to collect funds from and to grant credit to both legal and natural persons and has full liability. This definition of banking companies excludes savings banks, mutual benefit societies, credit cooperatives and other credit societies which, according to this definition are not considered as banks. The banking companies may operate only with a license issued by the central bank. To receive a banking license a minimum paid-up capital of 50% for the social capital is required, and the authorized capital must be paid-up completely within two years. Additional regulations include conditions like a minimum capital

requirement of 5 million Euro. The banking activities may include deposits, credits with and without guarantees or collateral, monetary asset operations, transfer and clearing operations, foreign exchange, precious metal transactions, securities operations, banking consulting services and guarantees as well as other activities that the law permits. To build a sound capital base, the banks will distribute 20% of the annual gross profit to the reserve fund until the fund reaches a specified level. Banking companies may establish a risk fund for non-performing loans up to 0.5% of the total amount of outstanding credits granted. To protect the depositors, voluntary funds may be established to insure the money deposited in banking companies for the benefit of natural persons. These funds will be supervised by the central bank. However, corporations have no deposit insurance, and neither the deposit insurance nor the publication of the non-participation in the deposit insurance fund is mandatory for banks.

The depth of the money market

The efficiency of a formal financial market can be described by its financial deepening measured in terms of the monetarisation of the economy, the number of formal financial institutions and the quantity and quality of financial services (Heidhues, 1997).

The indicator M2/GDP is a measure of the degree of monetarisation of an economy. The broad money reaching approximately 29% of GDP in 1996, 25% in 1997 and 27% in 1998 (NBR, Quarterly Bulletin 4/98, CNS, 1998) points to a low level of financial deepening in Romania. Further, the number of formal financial institutions and branches are still small. In total, Romania has approximately 1,250 bank branches and agencies or one branch for about 18,000 citizens (The Banker, 1998). The quantity of financial services or the development level of the money market (Meier, 1995) is reflected by the amount deposited or lent with financial institutions compared to GDP. Romania can still be considered as a cash society, since bank deposits and lending are each equivalent to no more than 25%-30% of GDP (The Banker, 1998). The range of financial services is relatively wide but restricted to the banks' headquarters in the city, to large companies and influential individuals.

The monetary policy

The National Bank of Romania is the only institution that is responsible for the monetary policy of the country. Hence, the main objective for the National Bank of Romania is price stability which it seeks to achieve by influencing the quantity of money in circulation and by fixing interest rates. The instruments used are the reserve requirements, the lombard credit and discount rate, the deposit taking operations, the open-market operations and the foreign exchange transactions of the central bank. Some monetary indicators and instruments are listed in Table 2.

Table 2 Monetary indicators

	Dec. 1995	Dec. 1996	Dec. 1997
Consumer price index, change in % *[1]	27.8	56.9	151.4
Broad money (M2), change in % *[1]	73.3	63.3	131.5
Domestic Credit	85.4	84.7	50.8
Reserve requirement ratio for lei deposits, in %	n.a.	7.5	10.0
Lombard interest rate in %	96.7	90.0	140.0
Discount rate in %	34.1	35.0	40.0
Deposit rate on lei reserves in %	9.1	12.0	15.0
Average lending rate of commercial banks to non-bank customers in %	47.5	53.6	55.6
Average deposit rate of commercial banks to non-bank customers in %	32.4	38.9	34.1
Change of exchange rate, Lei to US$ *[1] in %	45.9	56.5	98.8
Government securities and T-Bills in billion Lei	0	0	3,271.0

Source: National Bank of Romania, Monthly Bulletin 8/1997, 2/1998, own calculations
Note: *[1] annual changes

Monetary policy was eased in early and mid 1997, leading to a lowering of interest rates in the banking system and the resumption of the lending process. Although, the broad money growth rose toward the end of 1997 compared to the end of 1996, the increase in consumer prices outweighed the increase in broad money leading to a real decrease in money supply. In line with the increase in broad money, the commercial banks' interest rates, exchange rates and required reserve ratio increased at the end of 1997 while the lending and deposit rates of the central bank remained unchanged. The refinancing policy with the lombard credit and discount rate was used only occasionally and had less significance in forming monetary policy. Since the introduction of government bills and the emergence of open market operations through the central bank in 1997 the government securities operations have played a minor role in liquidity control while the deposit taking operations have served as the main instrument for the absorption of the banking system liquidity in 1997 (NBR, Quarterly Bulletin 3/1997).

Against a background of large foreign capital inflows and the depreciation of the national currency, the central bank continued its foreign exchange purchases and foreign borrowings but at a lower level than in the previous years. This also affects the monetary base.

The banking sector

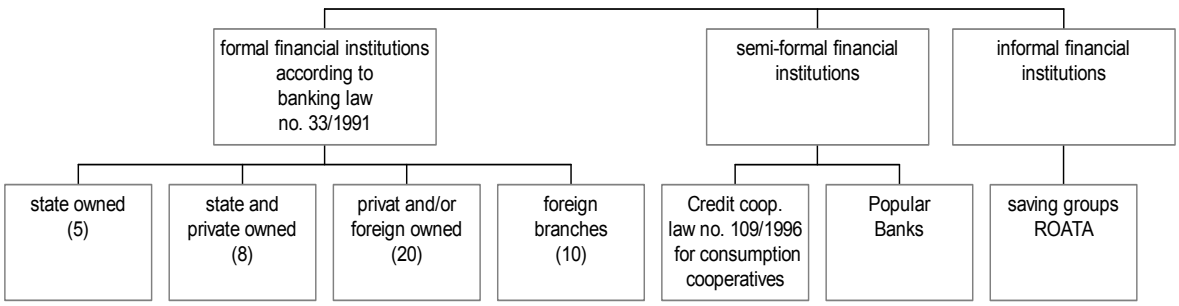
This part of the work describes and analyses the structure of the banking sector, the main financial institutions and their performance, the financial products and the loan application process for non-agricultural enterprises and farms.

The structure of the banking sector

The structure, size and network of the banking sector and financial institutions reflects their ability or capability to serve a certain segment of the population (e.g. rural, urban) or certain sectors or enterprises in the economy with financial services. Hence, these factors represent a kind of measure for the supply of financial products in rural areas.

By the end of 1997 the Romanian banking system enjoyed a two-tier banking structure consisting of the National Bank of Romania, 33 Romanian commercial banks and 10 foreign commercial banks. The Romanian commercial banks were all joint stock companies, of which five were totally state owned, eight are state and private ownership while the remaining were totally privately owned with some foreign participation. The foreign commercial banks in Romania are all branches (not subsidiaries) of foreign European or American banks. Besides the official registered banks (Figure 3), credit cooperatives as part of consumption cooperatives and under the cooperative law no. 109/1996 are not recognized as banks but play a major role in savings mobilization and lending, especially in rural areas. The results of the farm survey in 1997 reflect this fact (Heidhues, 2000). Further, some newly founded Popular Banks, not registered officially as banks and hence not subject to banking laws contribute to savings mobilization. In addition to the formal or semi-formal financial institutions, some informal organizations like savings groups, Roatas, exist in rural areas but their actual outreach and expansion seems to be small since according to the farm survey, only a few farmers participate in these kind of groups (Heidhues, 2000).

Figure 3 Banking sector



Source: National Bank of Romania, 1/1998

Performance of the banking sector

The 1997 central bank's balance sheet is summarized in Table 3. About 55% of its assets are invested in foreign currencies[2] comprising mainly gold (18%), deposits with foreign banks (20%) and US treasury bills (10%). Another 26% of its assets are in domestic currency but in foreign institutions. Approximately 14% of its assets consist of government securities and interbank assets. In comparison the Deusche Bundesbank holds around 44% of its assets in

[2] compared to 37% of the Deutsche Bundesbank, 01/1999

interbank operations (Deutsche Bundesbank, 1999). On the liability side 29% of liabilities are held in foreign currencies and the remaining liabilities/equity are interbank liabilities (24%), loans and deposits from foreign institutions in domestic currency (22%), currency issue (20%) and equity (1%). The net foreign assets, amounting to about 25% of the assets/liabilities, represent a reserve against currency depreciation and thus a security against exchange rate risk. The net position of the interbank liabilities (17% of liabilities) indicates the binding of the banking system's liquidity into national bank deposits as a major monetary instrument for the control of the quantity of money. In line with this, the engagement of the central bank in open market operations through treasury bill transactions is very limited. The net credit to the government reaches around 5% of all assets.

Table 3 Balance sheet of the National Bank of Romania, end of 1997

Assets	Asset ratio in % *[1]	Liabilities	Liability ratio in % *[1]
Total assets	100.0	Total liabilities and equity	100.0
Assets in foreign currencies	54.7	Liabilities in foreign currencies	29.3
Assets in domestic currency	45.3	Liabilities domestic currency	70.7
Credit to government	6.7	Public deposits	1.4
of which treasury bills	1.7	of which state treasury account	1.4
of which gov't securities	5.0	Currency issue	19.8
Interbank assets	6.9	Interbank liabilities	24.0
Deposits in foreign institution in lei	15.7	Loans and deposits from foreign	
Other assets	15.9	institutions in lei	22.4
of which settlements with IMF	10.3	Other liabilties	2.1
		of which revaluation gains	1.3
		Equity and reserves	1.1

Source: National Statistic Commission 1998, National Bank of Romania, 1998, own calculations
Note: *[1] Ratios refer to total assets or liabilities + equity

The observations from the balance sheet of the National Bank of Romania in 1997, depicted in Table 3 are that it hardly invests in domestic securities. The focus of monetary policy is on deposit taking operations to absorb liquidity. The operation with government securities is a new market started in 1997 and there still seems to be a lack of confidence in the fiscal and financial discipline of the government (budget policy).

The 1997 commercial banks' aggregated sheet encompasses the assets and liabilities of the formal financial institutions registered at the central bank. It shows a focus on domestic assets (86%), while the interbank assets and other non-defined assets comprise 17% and 23% of all assets, respectively. Approximately 47% of the assets are invested in domestic credit comprising of government credit (11%), credit to the population (2%) and to business (14%). However, almost 50% of all credits to enterprises receive majority state owned companies. Almost 20% of all assets are credits to domestic persons but in foreign currencies. This points to a great amount of import financing. Nine percent of all assets

represent overdue credits (almost 20% of domestic credit) and the cash holding is rather small. The deposits as well as loans from the central bank are included in the interbank operations. A large part of the liabilities consist of domestic deposits composed of deposits in foreign currency (17.6%) and in domestic currency (35%). The share of households deposits, almost 27% of all liabilities is relatively high, but in general is of short-term maturity.

Table 4 Aggregated balance sheet of Romanian commercial banks, end of 1997

Assets	Asset ratio in % *[1]	Liabilities	Liability ratio in % *[1]
Total assets	100.0	Total liabilities and equity	100.0
Foreign assets	13.5	Foreign liabilities	9.2
of which in cash	0.4	of which deposits	1.9
Domestic assets	86.5	Domestic Liabilities	81.2
Domestic credit	46.8	Domestic deposits	54.9
Credit to gov't	11.1	Public deposits	2.2
Credit to non-gov't	35.7	Non-bank deposits	52.7
Credit in lei	16.2	Deposits in lei	35.1
Short term in lei	12.8	Demand deposits	20.5
Medium & long term in lei	3.3	Time, restricted, certificate deposits	32.2
Credit to population in lei	1.6	Household deposits	26.8
Credit to enterprises in lei	14.5	Enterprise deposits	21.7
Credit to majority state owned firms	6.6		
Overdue credit	9.0		
Credit in foreign currency	19.6	Deposits in foreign currencies	17.6
National currency holding	0.5		
Interbank assets	16.7	Interbank liabilities	8.7
Other assets	22.6	Other liabilities	17.5
		Equity and reserves	9.7

Source: National Statistic Commission 1998, National Bank of Romania, 1998, own calculations
Note: *[1] Ratios refer to total assets and liabilities + equity

The aggregate balance sheet of the commercial banks, depicted in Table 4, allows the following conclusions:

- There is no excess liquidity in the formal banking sector. Rather, there seems to prevail a liquidity constraint manifested by the high share of overdue credits and interbank operations.
- The banking sectors' share of securities and participation is not indicated explicitly and seems to be relatively small as investment opportunities are rare.
- The short term deposit structure gives evidence of a prevailing uncertainty in the banking sector with respect to future economic development.

Among commercial banks the largest banks with respect to assets and equity are the state or joint state and private owned banks, Bancorex, Bank Comerciala Romana, Bank Agricola,

Romanian Development Bank and the National Savings Bank. The core business of Bancorex is export and import financing. Similar to other state owned banks there was and still is no supply of loans to individuals. The Romanian commercial banks and the agricultural bank were formerly specialized banks serving firms but nowadays they have the permission to deal with all group of clients. In the commercial banks' loan portfolio, the loans to state enterprises dominate while the share of individuals loans is close to zero. However, in 1997 the parliament passed a draft law on the privatization of majority state owned banks. The purpose of this law is to increase efficiency of the commercial banks and to provide a better allocation of financial resources (Invest Romania, 1999).

Since Banca Agricola (BA) was the former "housebank" of the agricultural sector, most of its assets (74%) are investments in loans to customers engaged in the agricultural sector or in associated businesses by the end of 1995. About 61% of the assets, or 82% of the loan portfolio are short term loans, while the remainder are advances. The second largest asset position are accrued interests, with 12% of all assets. According to the annual report of Banca Agricola in 1995, around 40% of its loan portfolio and thus, 25% of the assets, represented loans to companies or farmers outside the state sector. In addition, 40% of the loan portfolio (25% of all assets) are advances on loans to agricultural enterprises and farms unable to repay the amount due. Approximately 38% of the liabilities are funds from the central bank, 21% are amounts due to other banks and 29% are short term deposits or sight deposits due to customer. BA seems to have a leading position amongst the commercial banks since it has kept 30% of loans in the economy and together with the National Savings Bank it attracts around 80% of the public savings. Further, its branch and agency network is the second largest after those of the National Savings Bank (Annual Report 1995, Banca Agricola S.A. Romania).

The Romanian Development Bank (RDB) supports mainly the manufacturing sector since the share of this sector on the loan portfolio amounts to around 20% of RDB's assets. Besides the manufacturing, commercial and construction sector it lends around 8% of its assets to the agricultural sector, but only 3% to individuals.

The leading bank with regard to employees and branches is the National Savings, Bank (Table 5) a former savings institute that was not allowed to lend money before the reform process. Its liabilities are 60% from deposits and availabilities of individuals while about 2.5% of its assets are loans to the population. The average savings balance per passbook was around 150,000 lei in 1996. The profit derives from interest revenues, bank deposits and Treasury Certificates.

One of the largest private banks is Bankcoop, whose founders and shareholders are the consumer and credit cooperatives, individuals, other organizations and economic agents along with private, mixed and state owned capital. Approximately, 60% of the bank assets are loans and comprise of 12% in production companies, 17% trade companies, 4 % agricultural enterprises or individual farms and 6% individuals. In contrast, Banca Comerciala

Ion Tiriac approved 0.2% of its assets for loans to individuals and 1% of its assets for loans to the agricultural sector.

Table 5 Commercial banks end of 1996

Name	Number of branches or agencies	Number of employees	Assets in % to all Romanian commercial banks	Equity in % to all Romanian commercial banks
Bancorex	36	3579	23.3	10.3
Banca Comerciala Romana	211	11342	15.7	15.5
Banca Agricola	310	11593	14.9	8.2
Romanian Development Bank	182	3755	6.8	11.7
National Savings Bank (CEC)	2233	12687	5.8	7.1
Bankcoop	240	5100	3.9	3.3
Banca Comerciala Ion Tiriac	24	n.a.	2.9	4.4

Source: The Banker, 06/1998, Annual Reports of Commercial Banks, 1996, National Statistic Commission 1998

The consumer cooperatives with the Central Cooperative Union (CENTROCOOP) as the head organization have a long tradition in Romania. Today, they have representatives in all districts and in many communities. At the community level 2,500 primary consumer cooperatives and 840 primary credit cooperatives are active. At the district level (judet) they are affiliated to 41 Federal Consumer and Credit Coop unions, which, in turn, are affiliated to the joint apex body CENTROCOOP. The credit and consumption cooperatives on the community level are said to be independent, each having its general assembly and board of directors (Heidhues, 1995). Besides the consumption and credit cooperatives, the CENTROCOOP also has cooperative training centers, marketing and consulting cooperatives, a publication, statistic and data center. The credit cooperatives are widely represented in rural areas and operate on the basis of their members' funds made up of members' shares and savings deposits. For every loan made, one fifth has to be deposited with the credit cooperative's social fund. The credit cooperatives extend loans and take deposits only from members which are natural persons, mainly farm households (Heidhues, 1995). The deposit interest rates and 'large' loan rates are market rates while the rates for small loans are below the market interest rates. In 1999, for loans up to 3 million lei the rate was 30-50% p.a.. For large loans the credit cooperatives require a collateral of about 120% of the loan amount plus interest rates, and small loans are secured by two cosigners or guarantors. The assets of the cooperatives consist of credits to its members and of investments in small enterprises and bank deposits. The liabilities comprise members' shares, savings, interbank liabilities and a so called savings fund (Bank survey, 1998).

The lack of deposit insurance impedes the mobilization of savings. The intermediation between the credit cooperatives is limited. A credit cooperative with surplus funds is unable to transfer money to those which are in need of funds (Heidhues, 1995). For these reasons

the credit cooperatives are capital constrained and their outreach (in loans size) is limited. The CENTROCOOP has considerable influence and control over the activities of the federal and primary credit cooperatives, which are not subject to the banking law and the supervision of the National Bank.

Briefly, the characteristics of the Romanian banking sector can be summarized as:

- The largest banks with respect to assets and equity are partly or fully state owned banks.
- The main activities of the large partly or fully state owned banks focus on lending to corporations and not to individuals. The private farm sector is also neglected.
- The National Savings Bank, due to its large branch network, is the only organization which is able to mobilize a large amount of savings from the households. It transfers the money from the households to the state, banks and enterprises, via securities, deposits and loans.
- The largest private banks seem to recognize the private sector as a potential business partner since they have a higher share of outstanding loans to individuals than the state banks.
- The credit cooperatives with their large network, although not recognized as a banking institute only offer services to individuals including farmers. The lending capacity of these services is rather limited.

Financial products in rural areas

The information on financial products offered in Romania outlined here come from a detailed interview of a private bank in Timis county and from several interviews with bank agencies and branches in the rural areas of Brasov and Dolj counties. The types and features of financial products offered to certain segments of customers reflect the supply of financial services - in this case the supply of services to the rural population.

The main financial products offered are payment transfers, saving facilities and loans to individuals and legal entities. While the savings facilities are accessible for any type of person in possession of a minimum amount of money, several types of loans are limited to a certain type of customer.

In the savings business, the banks differentiate interest rates and minimum required deposit amount between individuals and corporations. To encourage the formation of savings deposits the individuals' interest rates are higher and the minimum deposit amount is lower than for corporations. In general, the financial institutions offer the following products:

1) Checking account from which the owner is able to draw checks and deposit or withdraw cash.

2) Savings deposit where the depositors receive a passbook with which they are eligible to deposit or withdraw any time a limited amount of money within a given period of time. The minimum deposit was around 200,000 lei in 1997.

3) Term deposits are short and medium term certificates with a maturity of one to 18 months and a minimum deposit of 200-500,000 lei for individuals in 1997. The money deposited is available after the maturity of the contract.

In the credit business, the banks distinguish not only between individuals and legal entities, but also between sectors, types of investment and working capital financing for corporations as well as between consumption and investment loans for individuals as illustrated in Table 6.

For loans to private households, the financial institutions require in addition to the actual purchased and financed good other collateral such as a car or house and two or three guarantors or cosigners as security. However, since consumption loans are rather small and mainly used for the purchase of housing equipment, the actual purchase and the guarantors are considered as sufficient securities for the banks. But for the financing of a car, truck, or house a financial institution requires either the ownership certificate of the car or a mortgage as security. To be eligible for the loan application the potential individual borrower must provide proof of employment and have a regular sufficiently high income. Further they have to agree to a credit insurance contract which compensates, in case of a loan default, the bank's loss after the forfeiture or execution in the collateral. In such cases the banks make use of the guarantee (cosigners) and the pledged items which were provided as securities and then use the credit insurance to cover the remaining debt. One of the banks interviewed had a special agreement with the retailer and household equipment shops in its city. Here, if a private customer intends to buy household equipment on credit basis, the shops became responsible for the screening of the client, the collecting of documents and for filling out of the required credit application forms. The banking institute's sole task is to check the completeness of the documents, to decide whether to issue the loan and to administer the loan reimbursement. This procedure helps the bank to reduce the working time spent on a loan application and to access customers immediately at the shops.

In contrast to these private consumption loans, the application procedure for corporations or legal entities is time consuming. They have to reveal their financial situation by submitting diverse reports, such as the annual report, monthly reports on revenues/expenses and income statements, business or operation plan, etc.. Further, they have to provide securities such as buildings, machinery, stocks and equipment even for short term loans. The financial institute has to examine and evaluate all the documents and to assess the financial situation of the enterprise. In case of a loan default, however, the banks are able to cease all assets of an enterprise, as well as the pledged assets.

Treatment for the private farmer is again different. They are able to receive credit as individual even for the financing of agricultural inputs or machinery if they are able to show sufficient regular income and have one family member with outside employment willing to guarantee the loan. If the individual farmer fails to repay, the financial institutions have access only to the pledged assets and to the guarantors. In cases where the farmer or family member is unable to show a regular income or employment, the financial institution theoretically accepts a loan application as a legal entity. Here the financial institution requires the presentation of a wide range of additional documents or certificates such as owned and cultivated area, cultivation plan, annual profit/loss statement, monthly income statement from the mayor, input supply contracts, sales contract and proof of credit use. In the case of loan default all assets of the agricultural enterprise can be ceased.

Table 6 Loan types [*1]

	credit to							
persons	individuals			corporations				
credit type according to sectors	households			agricultural enterprises		manufacturing/production enterprises		Commercial enterprises
credit type according to credit purpose	consumption credit in cooperation with retailer, shops, e.g. loans for living facilities	consumption credit direct from bank, e.g. loan for TV, PC	investment credit direct from bank, e.g. loan for housing, car, tractor	for input factors e.g. for fertilizer, seeds, herbicides	for investment e.g. for tractor, plow, stable, barn,	for input factors, e.g. raw materials	for investment, e.g. for building, machinery	
maturity	1-12 months	1-12 months	1-5 years	1-12 months	1-5 years	1-12 months	1-5 years	1-12 months
securities	3 guarantors, credit insurance	2 guarantors, equipment credit insurance	2 guarantors, mortgage machine, credit insurance	mortgage, machines, stable	mortgage, machines, buildings	mortgage, machines, buildings	mortgage, machines, buildings	mortgage, equipment, traded goods
required documents	employment prove, wage statement	employment prove, wage statement	employment prove, wage statement	annual report, monthly revenues and expenses	annual report, monthly revenues and expenses	annual report, monthly revenues and expenses	annual report, monthly revenues and expenses	annual report, monthly revenues and expenses
Interest rates as of 11/1997, variable in % [*2]	59	60	60	60	60	50-55	50-55	55-60

Source: Bank interviews 1997/98
Note: [*1] of one of the interviewed banks (Bankcoop) [*2] the consumer price index compared to the end of the previous year was 252,4 (1997) and 140.6 (1998), Quarterly Bulletin No 4/1998 of the NBR

In Romania, generally evaluations experts or specialists are in charge of the evaluation of the pledged assets of individuals and corporations. Normally, there are three approaches that can be used to estimate the security values of pledged assets. This is either according to the market value, to the purchase or construction value, or to the income contribution value or discounted value of returns of say house rental. The purchase and market value for new bought housing equipment is almost equivalent to the value at resale markets. However, the

value of used machinery and houses is rather difficult to evaluate since a market rarely exists, the quality of a used good is hard to estimate and the internal use or subjective utility of a car, machinery or building on a farm is higher than the value estimated for external use or sale. The expert estimates the market value for new products according to the purchase price and for used products according to the value of alternative uses (sale) of the asset. In general, the estimated values range around the lower bound of the existing market prices. The financial institutions accept about 40%-60% of the estimated value for machinery and equipment and around 60%-80%[3] of the estimated value for buildings as loan security. Banks require loans to be covered by at least 100% plus interest rates for one year of the total amount (bank interview 1997). This practice led to loan coverages of at least 160% at the end of 1997. The interest rates charged for the loans are variable rates, indexed with the inflation rate. Under high inflation, the variable interest rates rise enormously and lead to a large increase in the nominal debt.

Besides the regular loan types, the agricultural sector has had access to special financial support designed by the government to promote the agricultural sector. The main mechanism by which agriculture has been financed in Romania includes the following "loan products" (Davis, J. R., 1997):

1) Preferential interest rates (PIR): the National Bank of Romania (NBR) provides a credit line with PIR below the market rates. These are financed through refinancing facilities and channeled through Banca Agricola (BA) with a margin of six percent for BA to input providers (called integrators in Romania). The objective was to provide credit at zero interest rates for private farmers covering approximately 50% of the value of crops that are contracted to the integrators. The credit is used to finance inputs (fertilizer, fuel, etc.) and the cost of the credit is covered by the integrators' fee.
2) Credit at subsidized interest rates: the commercial banks lend at market rates and offer an interest subsidy of 60-70% p.a. that is provided from the state budget to the final borrower. The funds are based on the deposit mobilization of the commercial banks. Besides the cost reduction for loans, this mechanism introduced some competition in the rural financial market as most of these funds were provided by Bankcoop and RDB rather than BA. However, this mechanism proved costly in administrative terms for the commercial banks because of the complex supervision, control, checking and wetting procedures required.
3) Interest subsidies covered by NBRs profits: The NBR on-lent at market related interest rates to BA and state mandated storage agents. The BA margin was set at five percent and the final borrower costs were set at 15% p.a.. The difference was covered by variable interest rate subsidy paid out of NBR profits. The storage agents with access to this cheap credit benefited from these non-transparent subsidies.

[3] bank interview 1997/1998

4) Financing agriculture through state budget funds: these funds were provided to finance the autumn 1994 and spring 1995 agricultural campaign with state budget and commercial bank resources. The interest rates for the state funds was charged at the prevailing refinancing rate.

5) Financing agriculture through preferential lending, variable and ad valorem interest rate subsidies: The funds come from NBR refinancing at preferential interest rates. BA as intermediaries of these funds was allowed to charge a five percent margin. An interest rate subsidy paid by the government covered around 60% p.a. of the interest rate charged to the borrower which paid the final cost of around 15% p.a..

6) Special preferential lending, interest rates subsidies and bad debt rescheduling: other mechanisms for providing agricultural finance included special preferential lending and interest rate subsidies, bad debt rescheduling for default borrowers and the use of private ownership funds to finance the restructuring of the state owned commercial companies in agriculture. This mechanism has had some worrying consequences. First, the rescheduling of the commercial banks' overdue loans reduced their ability to recover bad debts or impose hard budget constraints and second, the clients with outstanding loans were allowed access to further finance suppressing the screening and monitoring function of the banks.

All these special financing funds for the agricultural sector lead to the following results:

- The quantity of loans to agriculture at market interest rates approached zero, as the banks as well as the agricultural clients preferred the subsidized loans where the real interest rates were negative and did not require a real positive return. The interviewed banks in 1997 noted they had only approved state funded or subsidized loans to the agricultural sector.
- Since the state guaranteed the loans and since the interest rate was so low that even bad performing farms were able to repay the loan, the financial institutions were not forced to perform the screening and monitoring function properly. This resulted in an inefficient allocation of capital.
- Farmers got used to subsidized interest rates and considered market rates as extraordinarily high, as these rates reflect inflation. The true risks and transaction costs associated with lending to agriculture were omitted.

Loan application process

In this section the procedure from the application to the redemption of the loan with its corresponding working hours is presented. The working hours spent for processing loans are used to measure part of the transaction costs as they are considered a potential impediment for the supply of loans in rural areas. As the focus of this study is on financial rural markets, in particular on agricultural financing, the differences between the loan application and

approval process for different loan types is shown in Table 7. comprises loans to private consumers and to private farms (individuals) as well as input financing credit and investment credit for small and large scale enterprises (corporations) and for agricultural enterprise. Each step from loan application to redemption is divided in sub-steps and the estimated working[4] time is indicated, reflecting part of the transaction cost related to lending. The figures represent averages, and may deviate from case to case.

For consumption loans and short term input financing loans the financial institution has to screen but not to monitor applicants, while they are forced to both, screen and monitor the performance of corporations for investment financing. However, the screening and monitoring process for these loans relies largely on the thorough examination of annual reports. Since the financial institutions require from private farmers, whose sole income source is farming, and from agricultural enterprises various documents and reports confirmed by the mayor or notary, the verification, examination and evaluation of these documents and the business exceeds the working time of all other loan types. The data in Table 7 show that the consumption loan offered in cooperation with the retail sector is the least expensive in terms of labor hours, followed by the direct consumption loan. The risk or default levels of these loan types are similar. Although input financing of an individual farmer requires less working time than that of an agricultural enterprise, the interests of these rather small loan sizes may hardly compensate the transaction costs related to the size of an individual farmer's loan.

Comparing investment loans of the agricultural and production sector, the differences in working time are not striking. The default rates, however, are averages of all investment loans and do not account for the different risk and default levels of individuals, corporations and sectors. Since agricultural enterprises are, in general, state owned and are known to have severe financial difficulties, their default rate may exceed the average default rate. Further, the industrial enterprises are located around urban areas while the agricultural enterprises are dispersed in rural areas where the access to firms causes additional inconvenience for bankers.

For this reason the financial institutions favor investment credits or lending to the production sector. Furthermore establishing contacts is relatively easy, transaction volumes are large and the probability of foreign capital being brought in is higher.

[4] estimated by bank employees in Romania, bank interview 1997

Table 7 Procedure for different loan types

	Bank activities		Con-sump-tion credit, direct	Consump-tion credit in cooper-ation with retailer	Input financing of private farmer (without employ-ment)	Input financing with agricul-tural enter-prise	Invest-ment credit for agricul-tural – enter-prise	Invest-ment credit for manufac-turing enter-prise
1.	**Information on:**							
	loan conditions and required documents	min	30		35	35	60	60
2.	**Loan application:**							
	checking of answers in the loan application	min	7		7	10	10	10
	checking of the income statements, employment proves of the applicant and the guarantors	min	1		1			
	in agriculture: checking of the cost planning for the cultivation period, approved by the mayor	min			2		2	
	in agriculture: checking of the product sales contract	min			2	2	2	
	setting up of the interest and redemption plan	min	5		5	5	5	5
	comparison between available monthly income and monthly repayment obligations	min	10		10			
	checking of the monthly revenues and expenses calculations	min				30	30	30
	evaluation of the annual report, income statement	min			30	30	30	30
	evaluation of the feasibility study or the investment plan	min					30	30
	filling in of the guarantor forms	min	2		2			
	Ausfüllen der Sicherheitenübertragungsformulare für Mobilien und des Meldungsformulars an das Notariat/Burgermeisteramt (Registrul de Gajuri)	min	12		12	12	12	12
	Ausfüllen der Sicherheitenübertragungsformulare für Immobilien und des Meldungsformulars an das Notariat/Burgermeisteramt (Sectia de Carte Funciara)	min	12		12	12	12	12
	contacting the external expert for the evaluation of the securities	min	5		5	5	5	5
	calculation of the acceptable security value (around 60% of the evaluated asset's value or the new purchase price)	min	5	3	10	10	10	10
	checking of all required forms from shops	min		10				
	putting together all forms and documents for loan approval in the agency, branch or headquarter	min	5	5	5	5	5	5
	up to 50,000,000 Lei in agency (filiala)	min	10	10	10			
	up to 100,000,000 in branch (sucusala) in the capital of the county (time for traveling includes around 30-60 min)	min				50	60	60
	over 100,000,000 lei in headquarter in Bucharest (time for traveling includes 1-2 days and 4 hours in the headquarter)	min						
3.	**After loan approval**							
	joint visit to the mayor or NOTAR due to the securities	min	45	45	45	45	45	45
	filling out of the loan contract, signature of the borrower and guarantors	min	15	15	15	15	15	15
	filling out of the title such that the bank as direct and immediate access to the security	min	2	2	2	2	2	2
	filling out of the insurance contract for the loan and eventual for the security	min	5	5	5	5	5	5
	checking the use of the loan	min	1		2	2	10	10
	transferring of the risk amount in the risk fond	min	1	1	1	1	1	1
	opening of a checking account and a loan account	min	4	4	4	4	4	4
	transferring the credit amount from the loan account to the checking account	min	2	2	2	2	2	2
	signing of the payment form by the credit officer	min	1	1	1	1	1	1
	Interest and redemption payments (monthly 5 min.)	min	60	60	60	60	60	60
4.	**Loan default (40% default rates up to 60 days, 20% default rate up to 90 days, 2 % default rate more than 90 days)*[1]**							
	default up to 60 days: phone call (10 min), letter (15 min), visit (60-120 min)	min	36	24	48	48	48	48
	default up to 90 days: letters and at least 2 visits	min	24	24	48	48	48	48
	default over 90 days: transfer of the case to a lawyer	min	0.1	0.1	0.1	0.1	0.1	0.1
5.	**Regular monitoring of the enterprise success**							
	evaluation of the annual reports and income statements and cultivation plans for agricultural enterprises	min					40	30
6.	**Total working time in minutes for a loan officer**	min	**300.1**	**211.1**	**381.1**	**439.1**	**554.1**	**540.1**

Source: Bank interview 1997, Breitschopf 1997
Note: *[1] figures from one interviewed private bank

Under the prevailing loan types, application process and risks, the following preferences dominate the behavior of the economic agents:

1. From the perspective of the financial institutions with regard to collateral values, risks and in particular transaction (working) costs compared to the loan size, they prefer consumption loans at market rates and loans to the non-agricultural sector to loans to private farmers and agricultural enterprises. Regarding the farm sector, the financial institutions prefer state guaranteed or subsidized loans, where due to the low interest rates the default rate seems to be small.
2. From the perspective of the private farmer with regard to interest rates, required securities and transaction costs to the provision of the required documents, the farmer usually prefers subsidized or guaranteed loans to loans under market conditions.

The banking sector and the loan business: A summary

Albeit the development of the financial market through the adoption of laws, through the establishment of new branches or institutions and through the application of a strict monetary policy, the financial intermediation is still limited to urban areas and to large enterprises. Some characteristics of the financial sector reflect the observed limited financial intermediation in the private agricultural sector, regarding the loan business:

- The banking sector with its established and still predominant state banks, its structure, network and recent business strategies focus on the enterprise sector and not on households or the private farm sector. But these established financial institutions have recognized the necessity of mobilizing savings from households to build up their capital (liability) base and thus their lending capacity. Only the credit cooperatives as semi-formal institutions address explicitly households and individual farms, but their lending capacity is restricted due to a lack of capital and capital transfer between credit cooperatives.
- The commercial banks offer loan types designed for the consumption purposes of individuals and for financing corporation investments or input factors. They have not developed a special kind of credit for the private farm sector. The government provides financial support for the total agricultural sector in the form of subsidized or granted loans hindering the development of the credit business in this sector.
- The credit application procedure for farmers from the first information on loan conditions to the final repayment of the principal shows considerable transaction costs for both sides. This results from the high informational needs, but are still insufficient to reflect the actual financial performance of the farm business.

With these characteristics of the monetary market and the banking sector, leasing appears to be one solution to solve intermediation problems. However, since the banks require an equity contribution of at least 40% per loan and an equity ratio (equity to assets) of around 20% in the balance sheet of an enterprise is generally considered sufficient, also leasing companies

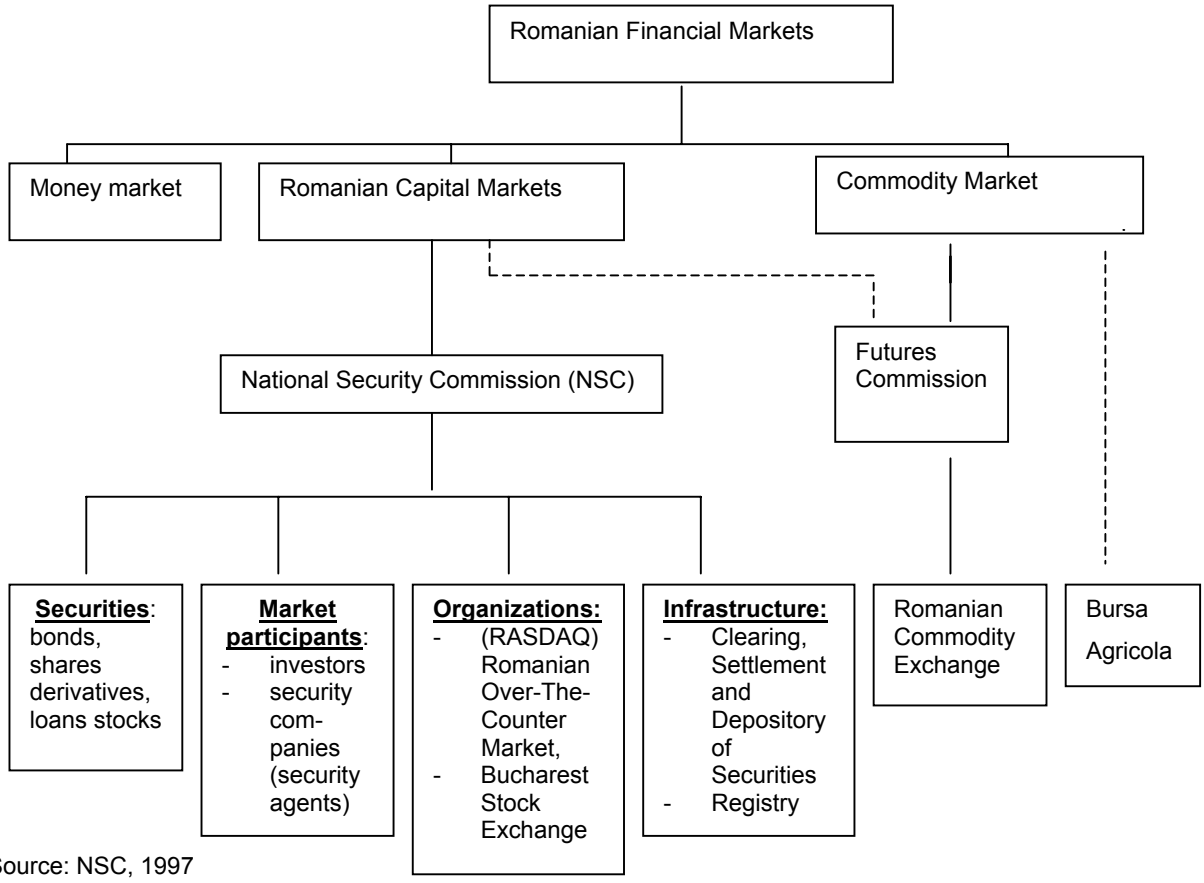
experience severe equity or capital constraints in their leasing business (leasing company interview, 1997).

2.2.2 The capital market

The capital market is a market in which long term capital[5] is raised by corporations (industry and commercial enterprises), the government and local authorities. The money comes from private investors, pensions funds, investment funds, insurance companies and banks and is usually arranged by merchants or issuing banks (Business, 1990). The commodity and stock markets are part of the capital market as they provide the market with futures, bonds, shares and loan stocks.

The National Security Commission (NSC) is the main organization controlling and regulating the Romanian capital market. It is an autonomous authority consisting of five members which are elected and appointed by the parliament. It submits annual reports to the parliament. The NSC's tasks are the administration, enforcement, survey and control of compliance (security and stock exchange law no. 52/1994), the functioning of the security market, the protection of investors against unfair and fraudulent practices, information on securities issued and the establishment of a framework for the activities of security intermediaries such as security agents (broker and dealer).

Figure 4 The structure of the capital and exchange market in Romania



Source: NSC, 1997

[5] long term capital with a maturity between five an ten years

The law no.52/1994 defines the main capital market concepts and securities, and regulates the establishment, statutes, organization and tasks of the National Security Commission. Further, it defines and regulates the procedure of a public offer and the intermediation of securities. The central issue of the law is the organization, supervision and administration of the stock exchange. It includes the definition, regulation and authorization of the operations and transactions, the investor's protection, external auditing, investment advisers, security settlement and the collective depository systems as well as the liabilities, sanctions and provision issues of the stock exchange.

The Romanian capital market's structure is illustrated in Figure 4. The NSC as the main controlling and regulating entity has competencies in all fields of the capital market. The actors in the capital market are the investors, such as commercial enterprises, investment funds, individuals, foreign companies and the state. They are mainly represented and intermediated by security agents. Banks are not allowed to engage directly in the security business, but they can set up separate security trading companies. The products traded in the capital market are predominantly shares of private or privatized companies and some bonds. No market for derivatives exists.

The Bucharest Stock Exchange (BSE) was set up in 1995 as a public institution and is the primary market[6] for shares and bonds. The BSE is self financed by funds from commissions and managed by its members which are security companies. It can adopt rules and regulations regarding the registration of members, the listing standards, trading mechanism, and the clearing and registry activities of its clearing, settlement and registry departments. The stock exchange has two listings distinguished in base category and first category requirements, which the listed company has to comply with. The daily volume of transactions at BSE reached approximately 17.6 billion lei on 10/22/1997 with 4160 transactions (trades per day) and around 3.7 million shares traded. The total number of companies listed is 67, of which 12 belong to the first category (ZINA, 1997).

The RASDAQ is a company with limited liability. Its purpose is the operation and maintenance of the automated trading system. It supports trading by shares distributed to Romanian citizens through the Mass Privatization Program (MPP)[7] and the trade of securities from issuances of the primary market (NSC, 1997; Unicapital, 1997). In September 1997, about 60,000 transactions, or 90,000,000 shares and over 600 billion lei were traded at RASDAQ (RASDAQ, 1997). With 659 firms registered, the daily transaction volume amounted to 3006 transactions on 10/22/1997 with 1 to 115 transactions per firm per day and a modal value of one transaction per firm and day. The total amount of shares sold on 10/22/1997 reached 4,330,164 shares or13.5 billion lei (ZINA, 1997).

The Romanian Registry is an independent organization responsible for the maintenance of accurate sharholders' records. It was set up and is owned by eight Romanian commercial banks.

[6] A primary market is the place where the securities are issued and where companies raise funds from investors (Unicapital, 1997)

[7] Under the MPP the Romanians received coupons with which they could bid for stakes up to 60% on nearly 4000 companies (30% of all privatizable companies) or could invest in one of the five regionally based investment funds (Private Ownership Fund). Separately, the State Ownership Fund as the main privatization body representing initially 70% of registered share capital, is selling off the remaining stakes in companies (Financial Times, 1996).

The intent is to provide informational services to the issuer community and to confirm the ownership of securities.

As a public utility, organized in the form of a stock company and owned by 164 Romanian financial organizations, the National Company for Clearing, Settlement, and Depository for Securities provides a centralized custody of securities, trade records and trade settlements. It represents a facility for the book entry transfer of security ownership between participants of the Depository. It promotes a clearing, settlement and depository system for securities to ensure speedy, fair and safe securities transactions while maintaining the operating expenses at a very low level (ANSVM, 1997).

The commodity market for commercial and agricultural goods is linked to the Romanian capital market through the futures and forwards business. The Romanian Commodities Exchange (RCE), founded in 1992, is a joint stock company with 96 shareholders (banks, producers, foreign trade companies, etc.) and without any legal regulations for the commodity exchange until August 1997 when the parliament decided to regulate the commodity exchange through a Futures Commission. This commission is an independent authority, constituted as a legal entity and subject to the control of the parliament. The RCE consists of three markets, the first market is for fungible commodities according to international standards, the second market is for a great variety of agricultural and food products, chemicals etc., and the third market offers trades with services and goods of all kind. The trade occurs with spot or forward contracts. A goal is the launching of future contracts and the establishment of a clearing house (BRM, 1997) The only commodity market for agricultural products is the Bursa Agricola which is a private company, located in Arad. It mediates the trade of agricultural products as well as counsels activities in the same field (Bursa Agricola S.A., 1999)

The Romanian capital market is in its development stage. Despite the legal and institutional framework, the trade level or volume is rather small, shown by the number and size of transactions at the Bucharest Stock Exchange and the RASDAQ. The supply of shares offered for sale is higher than the actual demand (quantity purchased). Thus, the capital market's role as fund raiser for start-ups and investment and as capital and risk allocator is relatively insignificant in Romania.

2.2.3 The insurance market

The Ministry of Finance is the subordinated body in charge of controlling and monitoring the insurance-reinsurance activities of companies. The government, in turn, defines the responsibility and mission of the Ministry of Finance with regards to insurance.

The law no. 47/1991 defines insurance activity, regulates the set-up, and organization and operation of commercial insurance activities. It stipulates that the establishment of foreign insurance companies is only allowed in association with Romanian [corporations. Further, the foreign company should have operated without any default (e.g. severe financial problems) for at least ten years in the insurance business. The companies acting in the insurance business might be set-up as joint stock or as limited liability companies. The activity of an insurance company includes the acceptance of a premium paid by the insured or reinsured entity to cover a certain risk

and compensates in case of loss (occurrence of risk). The insurance companies may cover one or more insurance categories such as life, personal, vehicle, transport, aviation, fire and assets, civil, credit and guarantee, financial losses and agricultural insurance. The accounts, funds and financial statements of the life insurance, however, must be separated from the other types of insurance accounts.

At the end of 1997, there were 55 active insurance companies registered at the ministry. Of those companies three were public enterprises and 23 were private Romanian companies. The remaining 29 companies were private joint venture companies with foreign participation. The main activities of this insurance sector, according to the premium amount received, comprise of insurance against compulsory third party and motor insurance (each with 24% of all premium paid), followed by fire and assets insurance with a 13% premium share, life and third party liability and transport insurance each with 6% share. Life insurance had at the end of 1997 around 578000 policies, of which 99% were endowment policies. Thus, about 6 % of all employed people had a life insurance policy. The total premiums of approximately 34.6 billion lei, gives an average endowment life insurance premium of approximately 60,000 lei per policy (NCS, 1998).

The assets of life insurance companies are composed to 11% of land and buildings and up to 87% of bank deposits. Similarly, the deposits and cash at banks held by the non-life insurance companies amounts to 55% of all their assets. Further assets include receivables up to 12.5% of all assets, government securities of about 8%, and land and building investments of about 7% of all non-life insurance companies' assets. Only 2% of the assets are invested in shares and participations in companies (NCS, 1998).

The insurance sector has two main features. Firstly, the persons benefiting from the rather small life endowment insurance is limited to 6% of the active population. This fact points to a low significance of capital accumulation by life insurance companies. Secondly, the insurance companies' asset structure shows missing investment opportunities or very precautionary investment behavior, since most of their assets are investments in bank deposits and bank cash.

2.3 Description of the agricultural sector in Romania

2.3.1 The agricultural production

The agricultural sector is a key sector for Romania's development and economy, accounting for about 18.8% of GDP, 37% of employment (EBRD, 1998) and 3% of exports in 1997 (NCS, 1998). It is heavily affected by the economic transformation. During the transition process the agricultural sector has undergone extensive changes including (i) the adoption of redundant labor forces mainly coming from the industrial sector, (ii) the distribution of cultivable land to private owners and (ii) the lack of capital resulting from the slow reallocation of capital through financial institutions from state enterprises to the private farm sector. The largest change was the redistribution of land tenure to former owners and community members moving large scale farms to small family or individual farms with a reported average farm size of around 2.2 hectares (Toderiu, 1997) in 1995. With the beginning of the privatization process the labor force shifted from cooperatives and state enterprises to the private agricultural sector (Breitschopf, 1999; Schrieder, 1999). This shift contributed to an increase in agricultural production indices by 5.6% between 1990 and 1997 while employees increased in the agricultural sector by 8.7% in the same period (NCS, 1998). Furthermore the high percentage of people employed in the agricultural sector (37% in 1997) compared to the low contribution of agriculture to GDP (18.8%) reflects a low productivity level of this sector.

In Romania, the vigorously pursued privatization in agriculture led to four farm types coexisting at present: large scale state farms heavily dependent on subsidies from the government; farm associations with legal status, often successors organizations of former production cooperatives; farm associations without legal personality, representing a new organizational form since 1990; small private farms also created after the 1990 reform (Schrieder, 1999)

The private agricultural sector[8] engages approximately 37% of the active population and 60% of all people employed by private enterprises in 1997 (NCS, 1998). Not surprisingly, in the agricultural sector the share of the labor force working on private farms, compared to state farms, was approximately 95% in 1997. Between 1992 and 1997, total agricultural production from the private sector rose 9% to 89%, of which 63% comprised of crop, fruit and vegetable production (NCS, 1998). However, comparing agricultural output from the private sector to the size of the labor force on private farms, the private sector[9] seems to be less efficient than the state or mixed farm sector.

In 1997, about 70% of the agricultural area and approximately 81% of the arable land was in private ownership and hence under private cultivation. About 63% of the total agricultural area is cropping land, 23% pastures and 10% hayfields; the remaining area includes vineyards, nurseries and orchards (NCS, 1998). The main crops with respect to cultivated area are cereal grains with corn as leading crop, followed by wheat and rye, oil seeds particularly sunflowers and potatoes.

[8] according to the NCS statistic the private sector includes household farms, individual farms, private companies and partnerships.
[9] including household farms, individual farms, partnerships and legal companies but not cooperatives

The average yield per ha over the entire sector is 30 dt for wheat and rye, 42 dt for corn, 11 dt for sunflower and 125 dt for potatoes. However, the average yield from the private sector is 28 dt/ha for wheat and rye, and 41 dt/ha for corn, which is slightly lower than the total average and illustrating a lower productivity level of the private sector (NCS, 1998). Furthermore, although the private farm sector cultivates around 78% of the wheat and rye area, its share of production is only 74% of total wheat and rye output.

The number of livestock in 1997 owned by the private sector ranged between 90% and 100% of all cattle, sheep, goats and horses while the share of pigs and poultry ranges between 58% and 69% (NCS, 1998). Animal production measured in live weight is higher percentage wise for pork (66%) and poultry (74%) than its share of actual livestock numbers in the private sector (NCS, 1998). This indicates a greater concentration in the private farm sector of pig feeding, while the public and mixed sector seems to be more breeding oriented. In contrast, the percent of cattle is higher than its share of beef in the private sector. Overall, the private farm sector contributes around 74% of all animal production for consumption, but has on average 84% of all livestock.

National statistics figures show there is an average of 57 ha arable area per physical tractor (67 ha for the private sector) indicating a rather high level of mechanization. The private sector has approximately 70% of all tractors, ploughs, cultivators and seeders, and 50% of all harvest combines. These numbers suggest on average a relatively equal distribution of agricultural machinery and equipment throughout the agricultural sector, but does not reflect the availability, age and quality, access of private farms to machinery services and the actual functioning of the equipment in the private farm sector. The average input of chemical fertilizer in the private farm sector is approximately 70% of the total chemical fertilizer input during a cultivation period while the share of the area cultivated by the private sector is 80% of the arable land. The average application rate of chemical fertilizer is 37 kg per ha for the private farm sector and an average of 43 kg per ha for the entire agricultural sector. This suggests that fertilizer could be a production constraint in the private farm sector (National Statistics, 1997). Since the transformation process began in 1990 the consumer price index has risen from 100% to 42872% by December 1997. In 1995 and 1996 the consumer price index moved between 132% (1994=100%) and 138% (1995=100%) in comparison to the corresponding previous year and in 1997 to 254.8% (1996=100%). The largest price increase occurred in the service sector, while the smallest was in the food goods sector (see Table 8).

The industrial production price index in 1997 showed an increase of 300% over the previous year, while the agro-food prices in the peasant market augmented around 210% on average clearly show the lowest increase. The small increase of the agricultural product prices combined with highly augmented energy, water and machinery prices entails a relative price decrease for some agricultural products and has put the agricultural sector under financial pressure. Besides the relative price decrease for several agricultural products like wheat, potatoes, fresh milk, the varying seasonal prices of many agricultural products causes price uncertainty and may lead to price speculation. Further, the regional price differences for agro-food of up to 100% (NCS, 1998) partly reflects a lack of market transparency, missing transportation facilities and a bad infrastructure.

Table 8 Selected price indices, Dec. 1996 = 100, otherwise indicated

Item	Index 12/1997
Food goods (consumer price)	245.6
Services (consumer price)	303.9
Non-food goods (consumer price)	242.6
Chemicals	214.0
Fuels	300.4
Electric energy, gas, central heating	309.2
Water, sewage	298.1
Industrial production, total	300.2
Food and beverages	282.3
Machinery and equipment	290.8
Means of transport	247.7
Chemistry	293.8
Agro-food-products sold at peasant markets *[1]	210.4*[2]
Wheat	215.6
Potatoes	146.3
Pork meat	279.7
Fresh milk	199.8

Source: National Commission for Statistics, 1998
Note: *[1] index for all agro-food products is based on average annual prices and not on prices of Dec. 1997, *[2] average of wheat, potatoes, pork and milk price indices

2.3.2 Agriculture from a regional perspective

The agricultural sector in Timis and Dolj counties have relatively fertile soils and a large part of its active population is engaged in farming. The agricultural sector in Brasov county, on the other hand, is less important, due to the amount of industry and service businesses in the area. The average monthly salary for agriculture is highest in Brasov, as the low income farms are abandoned in favor of industrial or service sector employment, or the farm income is supplemented by tourism revenue. In all three regions, the main cash crops are cereals, especially in the private farm sector (Table 9). Despite the fertile soils in Dolj and Timis the average yields lie below the national average. As Brasov is mountainous with forest, pastures and meadows (over 50%) extensive livestock farming, in particular, cattle and sheep dominates. In Timis many farms have started intensive pig raising, feeding and breeding. For agricultural equipment, tractors, harvesters and plows, Brasov and Timis seem to be above the national average. However, information on the age of the agricultural equipment or the type of private enterprises owning tractors etc. is not available at the regional level.

Table 9 Selected data from the three regions in 1997

	Brasov	Dolj	Timis	Romania
Employment in agriculture (%)	16.6	48.4	34.7	36.8
Share of agricultural production in each county (%)	1.8	3.7	4.5	100
Average nominal monthly salary for agriculture (Lei)	550,000	451,000	475,000	469,000
Cultivated agricultural area (thousand ha),	108.4	475.5	498.7	9059.8
- private sector area (%)	82.2	82.7	71.8	81.6
- total cereal grain area (%)	47.6*[1]	76.4	74.6	69.7
- private sector cereal grain area (%)	84.2	87.1	73.2	83.5
Average yields per ha for *[2]: - wheat and rye (dt)	28 (27)	28 (27)	29 (27)	30 (28)
- corn (dt)	28 (28)	39 (39)	41 (38)	42 (42)
- potatoes (dt)	142 (138)	97 (98)	125 (125)	125 (125)
Livestock per 100 ha of ag. land *[2]: - cattle	26.1 (27)	14.0 (16)	11.2 (11)	22.7 (25)
- pigs	117.8 (71)	31.4 (37)	203.6 (49)	76.0 (61)
- sheep, goats	87.9 (99)	55.3 (67)	56.8 (67)	67.1 (76)
Machinery, equipment per 100 ha of private sector				
- tractor	3.6	1.3	2.0	1.5
- plow	2.3	1.0	1.5	1.1
- cereal harvester	0.4	0.3	0.3	0.2

Source: National Commission for Statistics, 1998
Note: *[1] over 50% of the cultivated area are fodder crops and perennials, *[2] figures in parenthesis indicate the average yield or stocking rate of the private farm sector

2.3.3 Structure of the villages interviewed

The selected villages in the three regions have in average 89% (Brasov), 73% (Dolj) and 82% (Timis) of their community land privatized. Although the private land holding is highest in Brasov, the agricultural land in private ownership accounts for only 72% of the land, while in Dolj and Timis 72% and 89% of the agricultural land is privately owned. The agricultural ownership structures in one village in Brasov was not destroyed by the former communist regime. For this reason, 100% of the individual land holdings are private. In Brasov, about 52% of the active population is engaged in agricultural activities, in Dolj about 71% and in Timis around 50% (community survey, 1997).

The private farmers interviewed in the three regions own on average 5.7 ha cultivable land per farm but have extended their cultivated area through renting on average an additional 2.7 ha of land. The main crop is wheat (568 ha) followed by corn (471 ha), sunflower (127 ha), barley and potatoes. The average area cultivated for wheat is 3.1 ha/farm and 2.9 ha/farm for corn. The average yield per ha is 14.5 dt, 34.4 dt and 66.7 dt for sunflower, wheat and corn, respectively. The large number of mixed animal and cropping farms shows that livestock plays an important role as a non-seasonal income source, as a supplier of fertilizer and as a means to save in kind for family farms. Poultry and feeder pigs are raised on 90% of private farms, while 60% have milk cows, 40% have sows and 42% have sheep. Breeding farms have on average 2.8 milk cows, 2.2 sows and 66 breeding ewes.

Table 10 Selected data from the individual farm survey, 1997

	Brasov	Dolj	Timis	Total survey *2
Cultivated agricultural area ('000 ha)	684	248	914	1846
- grain cerealarea (%)	32	75	82	62
Average yields per ha for: - wheat (dt)	29.9	36.6	35.8	34.4
- corn (dt)	30.1	63.5	86.1	66.7
- potatoes (dt)	153.6	0	0	153.6
- sunflower (dt)	0	17.4	10.5	14.5
Livestock per 100 ha of agricultural land *1:				
- cattle	101	32	27	49
- pigs	199	238	234	225
- sheep, goats	1744	209	126	597
Machinery, equipment per 100 ha of private sector				
- tractor	11.4	3.7	5.5	6.9
- plow	4.2	2.9	4.8	4.4
- harvester	0.4	0.4	1.3	1.0
- planters	1.1	4.1	4.1	3.3

Source: farm survey 1997, own calculations
Note: *1 over 50% of the cultivated area are fodder crops and perennials, *2 average of all villages surveyed.

Buildings, stables and barns were on average constructed before 1945 and equipped with old or few technical devices. In some cases private farmers had enlarged or repaired their buildings with materials mainly coming from old and abandoned buildings.

The machinery and the technical equipment for crop cultivation is rather rudimentary. On average the interviewed farmers own 0.5 tractors, 0.07 harvesters, 0.3 plows and 0.2 sowing machines per farm. The harvesters on average are 20 years old and the tractors, in general, are over 8 years. However, compared to the national level the agricultural machinery and equipment in these counties lies significantly above the average (see Table 10 and Table 9).

In the county of Dolj, each interviewed village had access to a peasant market which was either organized periodically or permanent. Further, the services of former input suppliers as well as the marketing structures established for former large state farms were still functioning and available for the farmers in these three villages (community survey, 1997) because the successors or remainders of the large agricultural units are still operating in these places. In the other two counties there were no markets, farm input suppliers or product marketing companies such as Romcereal or Agromec operating close enough to the interviewed villages to offer services.

About 50% of the farm household income was supplemented by non-farm employment averaging 11 million Lei per farm household per year (farm survey, 1997). According to the farmers interviewed, the main problems for private farms are (i) low producer prices compared to input prices, (ii) liquidity constraints and (iii) old and unreliable machinery, equipment and buildings. The farmers do consider, though, that the possibility of directly marketing their products is a huge advantage for the private farm. Their main area of development on private farms is to increase the

quality and quantity of farm products through direct sale to the public and to invest in modern farm technologies (machinery, building, technical appliances).

2.3.4 The path to economic development

Two observations are central to the analysis of the agricultural sector in Romania:

1. In general, the agricultural sector displays, despite its large share of the population engaged in farming, a small contribution to GDP reflecting a low labor productivity level compared to other sectors. In particular, the private farm sector has relatively low productivity with respect to output per labor.
2. Average yields per ha in the private sector are lower than the average yields of the total agricultural sector.

The first observation reflects the reallocation of labor forces in a transformation process. The private farm sector necessarily absorbs part of the redundant labor forces from the former state sector. This is because the ownership of a small piece of land allows no registration as unemployed and therefore excludes the land owners from unemployment support. Only the cultivation of land provides food security for people with no other income. Therefore, the temporary function of the private agricultural sector is a buffer for unemployment and an assurance of food for private farmers. Having achieved food security, private farmers begin to consider the farm as a source or means for income generation. Increasing farm income, though, entails risk taking and implies that a restructuring of the private farm sector is necessary. This includes the restructuring of land, inputs, and produce markets as well as the development of a non-farm sector to absorb any underemployed or redundant labor force within the agricultural sector.

The second observation is closely tied to the first observation. The primary objective of private farmers is to ensure their food and housing needs are guaranteed. This leads to the refusal by farmers to undertake any actions or activities such as capital intensive production that involves financial risks. The risk aversion entails the continuation of a capital extensive, labor intensive farm development path. Low yields correspond to the low assets endowment level of individual farms and the lack of supplementary, non-agricultural income sources means that the private farmers continue to operate on a low input-output level.

If the farm livelihood is fully assured and satisfied, the farmers may direct their actions to increase farm income through small investments and small risk taking. The shift from security dominated to profit maximizing behavior requires not only changes of the farmer’s wealth and attitude against risk, but also changes in the macroeconomic environment, the structure of the private farm sector and the infrastructure linked to agriculture. The latter two are pre-requisites for improving the asset endowment of farms. Therefore, development in the private agricultural sector is supposed to be based on development of the infrastructure in a wider sense. This is:

1. Increasing land purchases and sales, renting or leasing to increase the available cultivable area per farm and thus the benefit from economies of scale.

The average farm size is 2 to 3 ha. Although the law allows renting and selling of land, there exists no real agricultural land sales or rent market. This results from farmers unwillingness to invest in land, or to sell their land for a low price. Some verbal agreements on land renting exists, but these are short term informal contracts. Some farmers refuse to give up their land due to security aspects and others refuse to rent or buy land because of the low expected incremental profit per unit of land rented.

2. Improved access of input supply markets for small scale farming, and organization of markets for farm products and equipment.

   The input supply and produce markets are still dominated by the former state owned monopolies which existed to deal with large scale farms. Small input or produce markets rarely exist and individual farmers face problems in getting inputs, marketing their products (farm survey, 1997). Moreover, they face price uncertainty. Information on prices, quantities and qualities demanded or offered are equally important for a transparent market economy. Therefore, the establishment of a communication and information network that supports farmers in their decision making process, may reduce uncertainty and transaction costs, and increase farm income.

3. A broad and adapted array of financial services to improve farm liquidity and thus the purchase of farm equipment and input factors.

   The financial capability or capacity to buy agricultural equipment and input factors is a key factor in farm development. Small individual land holdings only have a limited liquidity. In addition, small land holdings have serious problems for credit approval, as the demanded loan amount for input factors is rather small compared to the transaction costs of the financial institution servicing the loan. In other cases, the demanded loan amount for agricultural equipment may be too high compared to farm size and income. Furthermore, agricultural income is seasonal and volatile, agricultural land is not used for collateral as no effective land market exists and finally the acceptance of agricultural equipment and buildings as collateral is almost zero since their resale value in cases of default is uncertain (bank interview, 1997). Therefore, most small private farms in Romania, established since the 1990 reforms, are excluded from formal lending (ACE-Phare, 1998). There is no doubt that if the private individual farm sector is to develop, there is a need to improve its access to credit and other financial services (Schrieder, 1997). Without rapid progress in this area, the establishment of new private enterprises will be delayed, the sustainability of existing ones will be endangered and agricultural market development policies and investments will be greatly hindered (Heidhues, 1995).

4. Reliable information and communication network to disseminate information on prices, quantity and quality of products and assets.

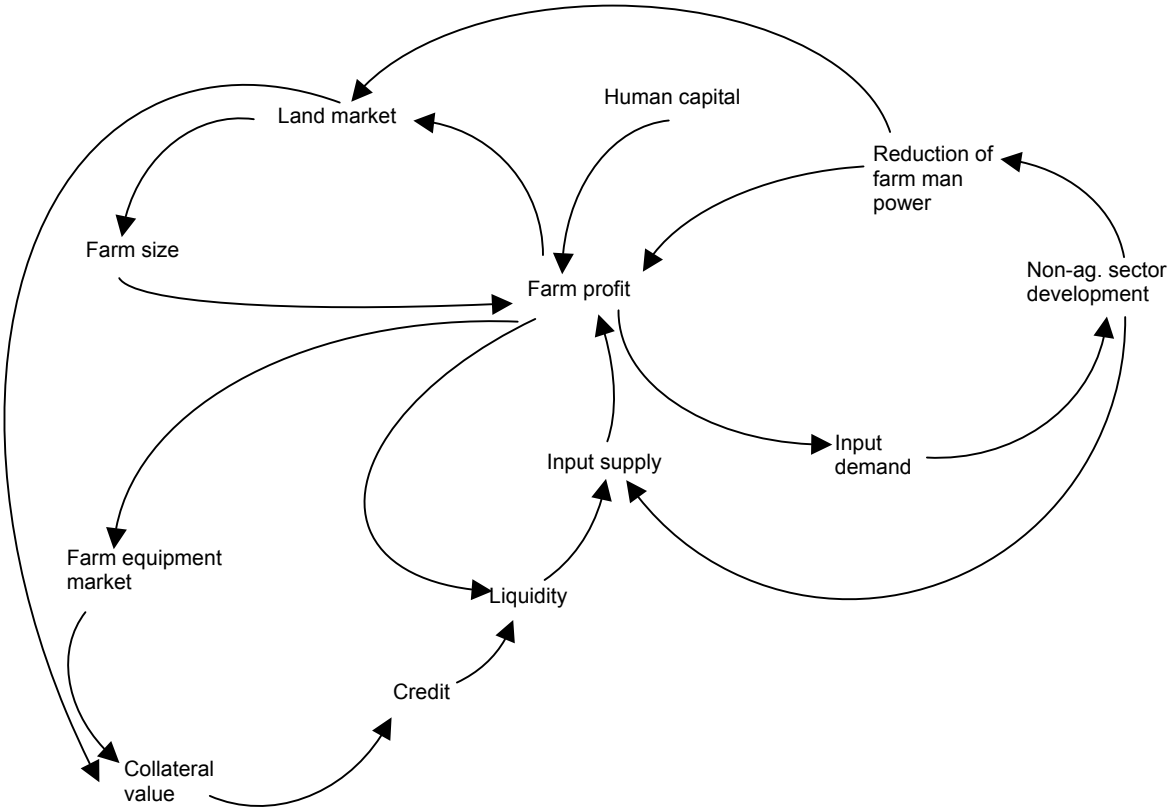
   To reduce at least to some degree the uncertainty surrounding prices, quality and quantities of agricultural products, input factors and farm assets, the establishment of an information network is considered necessary. By reducing uncertainty leads to a decrease in transaction costs and reduces the reluctance among individual farmers to take risks.

5. Creation of employment opportunities.

   The development of the non-agricultural sector offers employment alternatives to farming and provides a guaranteed income source for the farm family. This additional income may enlarge the wealth of the farm household, and increase the willingness or readiness to make investments that involve taking risks. In addition, it decreases the redundant labor force in the agricultural sector increasing income per unit of man power on the farm. If agriculture is to yield a respectable standard of living, the number of engaged laborers per hectare must be reduced and this will only be possible if new employment opportunities can be created outside agriculture (Meier, 1995).

Indeed, the development of the agricultural sector is linked to the development of markets and the development of the non-agricultural sector and vice versa (Figure 5). The extraction of labor from the farm sector will induce small farms to fold as the income earned in the non-agricultural sector is higher. This will lead to increases in farm profit as available land increases and the supply of inputs becomes reliable and sufficient. To purchase inputs the farms need sufficient liquidity, which depends on the availability of financial services and on the access to sufficient non-volatile income sources. In turn, credit will be approved by financial institutions if farm income and the value of the asset pledged as collateral is considered as sufficient to cover the loan plus interest. However, the estimated value of the pledged farm asset reflects only the real asset value if there exists a transparent market for agricultural input factors and equipment. This market will exist if the demand by the agricultural sector is high for used farm assets. That is, if there is sufficient liquidity and the capital to buy the ‘collateral’ is available. The farmer only buys additional farm assets if he obtains extra profit by using this asset. The farm will only make a profit if the farm size is sufficiently large, inputs are available and redundant labor leaves the sector. The extraneous labor will only leave the agricultural sector if there are job opportunities in the non-agricultural sector. This sector, in turn, will develop if the agricultural sector demands consumption goods, services and input factors from backward and forward linked enterprises, which means that the increased income in the agricultural sector has multiplicative effects on a region when the income is respent on local goods and services (Delgado, Hazell, 1998). But the agricultural sector only will demand these goods and services if its income is sufficiently high, etc.. This is, agricultural growth has a major impact in generating demand for output from the labor intensive rural sector (Mellor, 1995). Part of these linkages are represented in Figure 5.

Figure 5 Development circle



3 Data and methodology

The first part of this chapter describes the data used for the analysis while the second part explains the econometric procedures and the model applied in this study.

3.1 Data

A short outline of the origin, the data sampling process, the data selection and a small statistic analysis is given in the following.

3.1.1 Origin of the data

The research project ACE-PHARE-1995-Project by the European Union 'Rural Financial Markets for the Small Private Farm Sector' in Romania focused on the analysis of the private farm sector and its relationship to financial markets. As part of this project a survey was carried out in 1997 covering a sample of 220 private individual farms and farm associations in 9 villages of Romania. Further, an elaborated community questionnaire taken at the end of 1997 provides information on the natural conditions, the population and infrastructure at the community level. The villages surveyed are located in three zones that are distinct in their natural, economic and social conditions and characteristics.

In addition to the quantitative data selection in the agricultural sector, quantitative and qualitative data of the financial intermediaries were also collected. In semi-standardized interviews with six representatives of financial institutions in the banks' central and three representatives of leasing, the current business strategies with respect to private farmers, and the issues related to collateral evaluation and seizure, plus the business (income) analysis and risk management were discussed. Besides the interviews in the banks' central office, branches in the surveyed villages were visited and asked about their products and main activities, clients, strategies and experiences with the farming sector. Furthermore, several days were spent at a financial institution in one of the regions surveyed to analyze in detail the credit business from the loan application, project and asset evaluation and approval through to the installment of the loan. Differences in the procedure between loans to farms and non-farms or between consumption loans or investment loans were observed, analyzed and quantified in bank employee labor hours. They served as a measure for transaction costs needed to gather and analyze the required information.

3.1.2 Sampling process of the farm data

The sampling procedure was a three stage process. First, there was a stratified selection from counties, then a random selection of the villages within each county and a random selection of the farms within each village. Using the rank method the stratified selection of the counties took place on the basis of agricultural area, percentage of arable land out of the agricultural area and socio-economic indicators like farm size, population per km² and mechanization level. The following three counties were identified:

(1) Dolj located in the south-west along the river Donau. This county is 80-200 m above sea level and has a flat landscape, fertile soils but a dry climate. The average precipitation is 533 mm per year, with an average temperature of 11°C. Besides state farms there are also farms operating as family associations. The private farms and associations were, in general, founded in 1990 or later. The agricultural sector engages around 70% of the active population. Only 73% (72%) of the total land (agricultural land) is in private ownership. Former large industrial state enterprises are still operating either as private companies or state owned companies.

(2) Brasov located in the center of Romania has a mountainous landscape with plains ranging from 400 to 1200 m above sea level. The average precipitation is 765 mm per year and the average temperature is 8.1°C. It is a tourist region benefiting from a landscape marked by a small private farm sector focusing on extensive livestock production. Many farms were founded before 1990. However, only about 52% of the active population is engaged in the agricultural sector. Eighty nine percent of the total land belongs to private persons. The private farm sector owns 72% of the agricultural land.

(3) Timis is a flat region in the west of Romania bordering Hungary with an altitude between 100 and 125 m above sea level, with an average precipitation of 533 mm per year and an average annual temperature of 9.2°C. It has fertile soils cultivated by private farms and associations. Some of the farms were founded before 1990. Approximately 82% of the total land is in private ownership, and 89% of the agricultural land belongs to private farms. About 50% of the active population is engaged in the agricultural sector.

Within each of these counties three villages were randomly selected, and in each village about 20-25 farms were interviewed. The villages surveyed for Dolj were Motatei, Isalnita, Segarcea; for Brasov, Viola, Feldioara, Moeciu; and for Timis, Dumbravita, Varias, Masloc. In each of the villages, the formal financial institutions and the credit cooperatives run one to four branches or agencies. Besides the formal financial intermediaries, input supply companies, retailers, employers and land owners as well as credit groups provide a kind of credit service. Roads, communication, public transport, water and electricity supply has been constructed, but these services may not be very reliable. Besides the basic infrastructure every village has an agricultural service, a postal office, one or more public schools, bakeries, grocers and butchers and a general market. Except for two villages an office of the cooperative for agricultural product sales and technical service for agriculture is established in every village. The population size ranges from 2,500 (Dumbravita) to around 8,500 (Segarcea) people. In Moeciu only about 15% of the active population works in the agricultural sector, but in Voila this proportion rises to 87%. In the other counties the agricultural sector engages approximately 50% of all employed people (Community survey, 1997).

The farm interviews comprise 3 modules: the agricultural production module, the financial module and the farm household module. Detailed and reliable data were collected from a total of 220 farms. The community questionnaire comprises natural, financial, demographic and infrastructure components. The semi- standardized bank interviews and leasing company interviews focus on the credit approval procedure, the asset evaluation, the security requirement, equity share, the

business strategies regarding the agricultural sector, the credit risks and the structure of the actual loan portfolio.

3.1.3 Data selection and analysis

The data from the farm survey were sorted, cleaned and analyzed. The final farm data set for the econometric analysis comprises of 181 observations from individual farms. For the purpose of this study, the capital expenditure as well as the farm output in monetary units was calculated based on the data from the production module. Further information on family labor, cultivated land, farmers' education, and farm establishment were gained from other modules within the questionnaire. Some missing values like prices, yields or inputs were either replaced by local, regional or national averages or the observation was skipped.

The calculated farm output (Y) represents all cultivated, bred or fed products from the farm that were either sold, consumed or stored and is evaluated at market prices. Further it includes all revenues from a farmer for agricultural services such as plowing or harvesting services. The capital expenditure (K) contains all variable and fixed capital needed for production also included the service providers for e.g. harvesting. Only buildings and arable land (A) were exempted. The first was excluded due to low investment levels for buildings and due to missing values like age, size, market prices and construction cost. The latter is included separately as an exploratory variable in the production function because of its specific meaning in agricultural production. The exclusion of buildings probably would not have a strong effect on the capital expenditure value because agricultural buildings on individual farms were rather simple and in some cases have been built and renovated with old materials by the farmers themselves. All family members (L) occupied in full or part time work on the farm are taken into account[10]. Due to the high inflation rate in Romania all prices were standardized to December 1997. The consumer price index served as a measure for inflation. It was published by the National Bank of Romania, Monthly Bulletin 8/1997 and 2/1998.

The final data set comprises 181 observations of individual private farms between 1 to 25 ha of arable land. A few observations with unexplainable, high or low values or ratios with regard to farm type, labor input and land size were excluded from the data set. The data gained from the bank and leasing company interviews as well as from the community survey serve as descriptive data which partly supplement the model with some necessary information on the credit business. Furthermore, the data help to illustrate the economic environment of the agricultural sector in these regions, to describe the financial activities of the banks and to outline the structures and constraints under which the financial intermediaries operate.

[10] the input of a few seasonal or non-family laborers indicated as service providers for e.g. harvesting has no significant impact on the regression results.

3.2 Methodology

The first part of this chapter outlines the principal models used to quantify the capital demand and supply. The second and third part supplement the findings of the model with a qualitative analysis of the capital demand and supply that is based on the issues of asymmetric information and risk aversion of farm households.

3.2.1 Rural financial markets: a quantitative analysis

The theoretical concept and the model with its assumptions is represented in the following. First, the model relies on the basic production function, from which the profit and demand function is derived. The functions are analyzed under conditions where the agricultural revenues first are not and than are subject to price and production uncertainties, and under consideration of own capital sources and utility aspects. Second, a basic partial profit function of a representative financial institution is outlined. Finally, follows a comparison of the capital demand and supply.

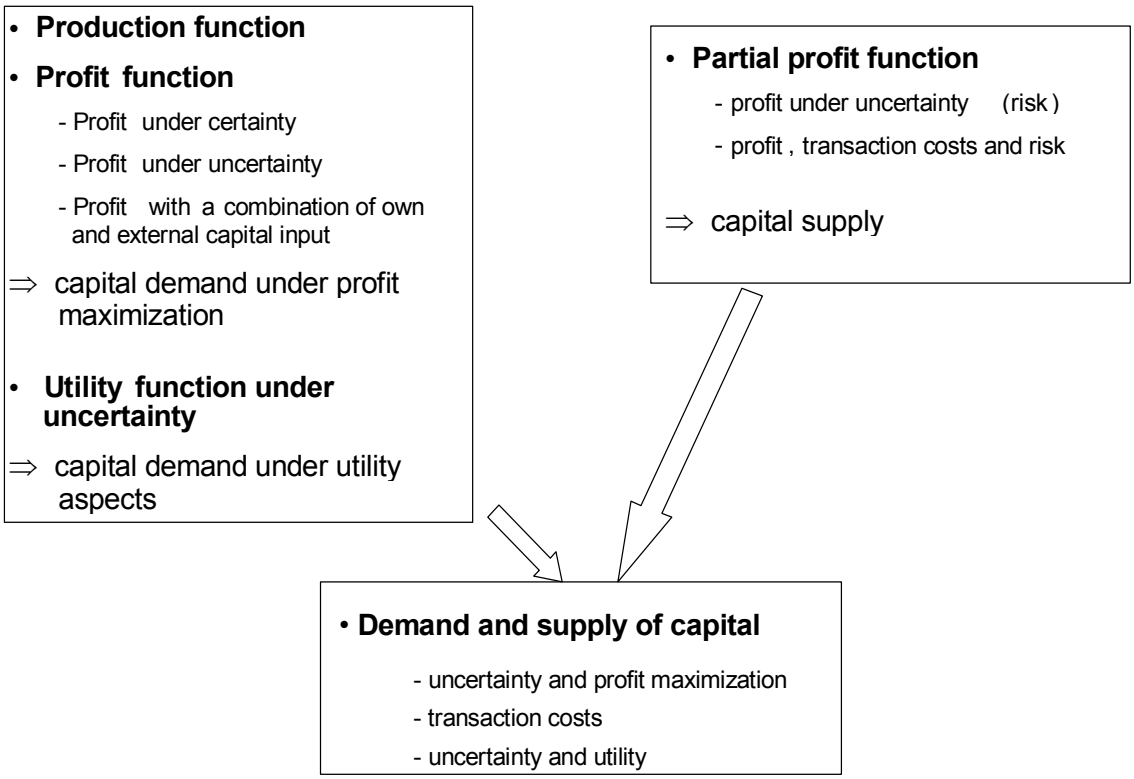
The theoretical concept

This discussion on rural financial markets focuses on the demand for loans and supply of loans for individual farmers. It attempts to quantify the influence of the factors agricultural outcome, uncertainty, collateral requirements and costs on the amount of capital demanded by individual farmers and on the capital offered by financial institutions.

The model in this study is based on the neoclassical theory of production, where the production function is supposed to display diminishing returns to capital and decreasing returns to scale. Several other functional forms were taken into account but their regression results displayed no advantages against the Cobb-Douglas technology (Annex 7.4). Since the model focuses on the micro-level of a family farm and bank, further factors like infrastructure, management abilities, innovations and know-how which are equally important for rural development were excluded in the quantitative analysis.

In the initial first step some descriptive statistical data and the distribution of net farm income in relation to capital expenditure are illustrated as shown in chapter 4.1. When a financial institution arbitrarily selects a borrower from the sample of the interviewed farmers, the distribution of the net income gives the probability of selecting a farm with a high, low or average debt service capacity. Thus it provides a measure for the probability of selecting a “good or bad” borrower from the set of individual farmers interviewed.

Figure 6 Model structure



Next, a regression of the output - measured in monetary units - on capital, labor and land input to obtain the monetary production function is completed. Based on this regression function, the capital demand is derived through the maximization of farm profit under cost constraints. By introducing utility aspects of the farm household and by varying several possibly constraining factors of the capital demand function the impact of these factors on the demand of capital can be estimated. The introduction of a partial profit function for a representative financial institution permits the derivation of a capital supply set. It takes into account the risk and transaction costs. The assumption of the classical market equilibrium between demand and supply through a market clearing interest rate is maintained. But, since in reality the market is not perfect, some market imperfections such as differing information on collateral values or probability perceptions are included in the demand and supply function. The discussed model is a static model, with cross sectional data and considers one production period (year). The single steps of the model are illustrated in Figure 6.

Statistical tests

A correlation between the variables land inputs (A) and capital inputs (K) is likely to exist. In an extreme case where the correlation coefficient is equal to unity, the parameters become indeterminate. One might suggest that the standard errors, the partial correlation coefficients and the total R^2 may all be used for testing for multicollinearity. Therefore, a revised version of Frisch's Confluence Analysis (Annex 7.5) or 'bunch-Map-Analysis' is used (Koutsoyiannis, 1977): This

procedure regresses the dependent variable on each of the explanatory variables separately. Choosing a simple regression appears to give the most plausible results. Inserting further explanatory variables and finally examining their effect on the standard error and on the R^2 enables the classification of these variables as useful, superfluous or detrimental (Koutsoyiannis, 1977). The test shows that the influence of A on the regression results of Y on K is still positive and the residual variance, the absolute error sum as well as the R^2 still improve with the inclusion of A and L. In addition, the partial correlation coefficient between K and A is 0.68 (n=181). For this reason multicollinearity is not considered a severe problem. The results of this analysis as well as the correlation coefficients of the parameters are listed in Annex 7.5.

In many econometric applications the assumption of a constant variance (homoscedasticity) for the random variable is not always expected to hold. The error term (u) is an expression of the influence of errors in the measurement, of erratic variations and the influence of omitted variables on the dependent variable - briefly, it includes everything that is not explained by the exogenous variables. Many of the variables that are omitted from the function tend to move in the same direction as the other explanatory variables causing an increase in the variation of the observations from the regression line (Koutsoyiannis, 1977). For example, in the estimation of a Cobb-Douglas production function for farm output the error term absorbs factors such as entrepreneurship, technological differences between farms, and different organizational skills. These factors do not vary considerably in small firms but are expected to vary widely for large firms (Koutsoyiannis, 1977).

In summary, there are reasons to believe that the homoscedasticity assumption is often violated in practice. It is suggested to examine what the consequences of heteroscedasticity are on the estimated OLS-parameters and their standard errors (Koutsoyiannis, 1977). In general, if the variances of the error term are not equal, the variance of the estimated OLS-coefficients can not be used to construct confidence intervals. The OLS estimates are also unbiased but inefficient and the prediction of the dependent variable based on these OLS estimates will have a high variance (Koutsoyiannis, 1977).

The maximum likelihood method is predominantly used for non-linear functions. These functions better explain the real world. (Kennedy, 1992). It is impossible to establish the finite sample properties for maximum likelihood. In particular, the properties of the best linear unbiased estimations do not carry over from the linear model (Judge et al, 1982). However, it is possible to consider asymptotic properties, namely asymptotic consistency, unbiasedness, efficiency and the normality of the estimated parameters (Koutsoyiannis, 1977). The assumption for this method is that the dependent variable is distributed normally, the error terms are independent of each other and any sample is representative of the underlying population. If the assumption of homoscedastic disturbance is not fulfilled, the coefficient will be statistically unbiased, the prediction of the dependent variable will have a high variance and the prediction would be inefficient (Koutsoyiannis, 1977).

To identify heteroscedasticity the Spearman-Rank-Test is applied. The plotting of the absolute error term (u) against K shows no clear relationship and hence heteroscedasticity is not considered

as a severe problem. However, a possible high variance of the coefficient of the dependent variable should be kept in mind. The test results and the distribution of the error terms are listed in Annex 7.6.

The functional form

The impact of capital expenditure, labor input and land on agricultural production is quantified using a production function. In this study, the dependent variable represents the farm output (Y) of all farm activities expressed in monetary terms. The explanatory variables are capital expenditures (K), the cultivated area (A) and the family labor input (L). These four variables are continuous and are used to specify the functional form of the production function. For further subdivisions of the sample, the education level (E) taking into account the managerial/organizational abilities of a farmer, the year the farm was established (F) which accounts for farmer experience and the production focus (D) on livestock or crop as proxy for specialization are surveyed. According to these variables, the interviewed farmers are classified in sub-samples and the coefficients of each sub-sample for capital expenditure, land and labor input are calculated to show some possible differences of their production technology. Shazam (Version 8) and MS Excel 95/97 are used for the econometric and statistical analysis.

The general form of the production function is:

(1) $Y = f(K;A;L;u)$ with u as the disturbance term.

where: Y: yield in monetary units (million Lei)
K: capital expenditures/employment of capital (million Lei/yr.)
A: agricultural land input (ha/yr.)
L: family labor input (manpower/yr.)

Referred to Frank (1990), Paris (1992), Mas-Colell (199), the functional form of agricultural production shows the following characteristics: (1) decreasing marginal returns after a certain point, (2) a partly linear relationship, (3) diminishing marginal rates of substitution between the production factors, and (4) an output plateau or asymptotic constant output level after a certain input level.

In Annex 7.4 nine specified functional forms and their regression results are listed. In terms of the overall significance (t-value, R^2, residual variance, absolute errors) eight out of the nine specified functions show a relatively good fit. The simple handling of the Cobb-Douglas production function and the good fit supported the choice of this technology for this model[11]. The basic functional form is given by:

(2) $Y = f(K,A,L) = c\, K^{\beta} A^{\alpha} L^{\gamma}$

where c: intercept
β: parameter for capital expenditure K
α: parameter for land input A
γ: parameter for labor input L

Using this production function it is possible to show the maximal amount of output that can be produced using alternative combinations of the input factors K, A and L (Varian, 1992). In addition, the sample is divided in sub-samples according to the features education level (E), farm establishment (F) and specialization (D). Regressions on each of the sub-samples deliver different regression coefficients. However, their interpretation lies beyond the purpose of the model.

The elasticity of input measured by the expression [m f(K,A,L) >=< c $(mK)^{\beta}$ $(mA)^{\alpha}$ $(mL)^{\gamma}$], the marginal product of capital expenditure obtained through the derivative of [$\delta Y / \delta K$] and the marginal rate of technical substitution [RTS (L for K) = $- \delta K / \delta L \mid_{Y=Y0} = \delta Y/\delta L / \delta Y/\delta K$] provide some basic information on the production technology.

Profit and demand functions under certainty

The profit and demand functions of an individual farm[12] with certain outcomes and no risks is described first. With the Cobb-Douglas production function Y=f(K,A,L) and the corresponding linear cost function C(i,r,w) the direct profit function Π of an individual farm can be written as:

(3) $\Pi = Y(K,A,L)\,P - C(i,r,w)$

$= c\,K^{\beta}\,A^{\alpha}\,L^{\gamma} - (Ki + Ar + Lw),$

where: i: 1+interest rate/100,
r: opportunity cost for land use (million Lei/ year),
w: wage or opportunity cost for labor (million Lei/ manpower/year)
P: price of output, normalized to one since Y is indicated in monetary units

Assuming profit maximizing behavior for the farm taking the first order conditions with respect to K and solving for K gives a capital demand function of (Varian, 1992):

(4) $K(i) = (i / (\beta c A^{\alpha} L^{\gamma}))^{1/(\beta-1)}$.

To be consistent with profit maximization the capital demand function must be homogeneous of degree zero in i which is equivalent to K(ti) = K(i). Similarly, the labor demand and land demand functions are:

(5) $L(w) = (w / (\gamma c K^{\beta} A^{\alpha}))^{1/(\gamma-1)}$.

(6) $A(r) = (r / (\alpha c K^{\beta} L^{\gamma}))^{1/(\alpha-1)}$.

The derivative of the capital demand function K(i) with respect to (i) , indicates how the factor demand responds changes. It gives the slope of the demand function, which is negative (Varian, 1992):

(7) $\delta K/\delta i = 1/(\beta-1)\,(i)^{\beta/(\beta-1)} / (\beta c A^{\alpha} L^{\gamma}))^{1/(\beta-1)} < 0$ [13]

[11] The regression results of a translog function supports the choice of the Cobb-Douglas technology. The values of the coefficients were close to zero (Annex 7.4).
[12] the farm is first considered as firm and later as a combination of firm and household,

Replacing capital expenditure (K) in the profit function by equation (4) and considering A and L as arguments only[14], gives a restricted indirect profit function (Π) which can be written as a function of the factor price:

$$(8) \quad \Pi(i) = (i / (\beta c A^{\alpha} L^{\gamma} P)^{1/(\beta-1)} \; i^{(1-\beta)/\beta}$$

This profit function meets the overall properties of the indirect profit function which are (i) non-increasing in input prices and non-decreasing in output prices, (ii) homogeneous in prices (iii) convex and (iv) continuous in prices (Varian, 1992).

Capital demand with collateral requirements and uncertainty

Capital expenditure from own or external sources

In the real world, an economic agent, for example a farmer, makes production decisions under many uncertainties. Uncertainty and risk mean that some variables in the objective function are random variables. Incorporating risk in the production function means incorporating random variables in the decision problems faced by farm managers. This can be done by incorporating the probability distribution of the random variables (Antle,1983). The incorporation of stochastic values reduces the probability distribution to a few outcomes. In this work the complexity and diversity of the real world is reduced to two possible outcomes of the action 'taking a loan'. It is assumed that a farmer receives either an output (Y) with probability q which reflects the possible monetary farm output of the year the farmers were interviewed. This output depends on the size of (K, A and L) and is supposed to cover the production costs. Or he receives an alternative output (Y*) with probability (1-q). It is assumed that in this case the farmer is only able to repay the capital expenditures (K) but not the interests. Therefore, the alternative farm output (Y*) is equal to capital expenditures (K) and in case the farmer takes a loan, he faces a loss of assets given as collateral of the size $K\eta$ with probability (1-q). The pledged assets or collateral are expressed as the share (η) of the loan amount (I) which is set in this model equal to K[15].

Transaction costs in rural areas comprise mainly of non-interest charges by lenders, travel expenses, and time and money spent promoting and following up the application (Von Pischke, 1991). In the model, only a small share of the transaction costs of borrowing in rural areas are included in the profit function. They are represented through the fees (f) which are a share of the loan amount (K). This is because the required fees for loan insurance and collateral registration in Romania depend on the loan amount and on the collateral value, and because no detailed information exists on the extent of the borrowers' further actual transaction costs. The designed profit function Π comprises the possible outputs and a cost function depending on the source of capital use:

[13] where $1/(\beta-1) \leq 0$ since $0 \leq \beta \leq 1$

[14] the analysis focuses on the optimal capital expenditures K. There is also a high underemployment in rural areas and the market for agricultural land is not yet developed. Hence the opportunity costs for land and labor are very low.

[15] The coverage of collateral is 100% of the principal plus the interest rate p.a..

1) all capital expenditure (K) as own capital (K_o) with the deposit interest rate as the capital opportunity costs under uncertainty, or

2) all capital expenditure (K) as external capital (K_f) borrowed from a bank with the interest rate under uncertainty.

(9) $\Pi = q\,Y(K,A,L) + (1-q)K - C(i,j,r,w,q)$ [16]

where for $K = K_o$ $= q\,(c\,K_o^{\beta}\,A^{\alpha}\,L^{\gamma}) + (1-q)K_o - (K_o i + Ar + Lw)$

and for $K = K_f$ $= q\,(c\,K_f^{\beta}\,A^{\alpha}\,L^{\gamma}) + (1-q)K_f - q\,K_f j - (1-q)K_f \eta - K_f f - (Ar + Lw)$

where
- K : capital expenditure, either 1) own capital $K = K_o$ or 2) external capital $K = K_f$,
- i : real average deposit interest rate/100 + 1
- j: real average loan interest rate/100 + 1,
- q: probability of the outcome Y (success), $0 \le q \le 1$,
- 1-q : probability of the outcome K (in case of a loan contract, failure to repay the borrowed capital amount K or the interests),
- f : fees for loan insurance, application and approval as a share of the loan amount K, where there is no loan: f = 0,
- η : share of K to be repaid in form of pledged assets to the bank, $\eta > 1$ in case of a loan, where there is no loan: $\eta = 0$.

Using again the first order conditions and solving for either $K = K_o$ with j, f and η equal to zero or for $K = K_f$ with i equal to zero, the capital demand function under uncertainty is:

(10) $K_o = [\,(i - (1-q)) / (q\,\beta c A^{\alpha} L^{\gamma})\,]^{1/(\beta-1)}$ for $K = K_o$

(11) $K_f = [\,(qj + (1-q)\eta - (1-q) + f) / (q\,\beta c A^{\alpha} L^{\gamma})\,]^{1/(\beta-1)}$ for $K = K_f$

The capital demand under uncertainty is smaller than the capital demand under certainty ($K_{uncertainty} < K_{certainty}$) since per definition $i \ge 1$[17].

To assess the impact of capital cost, the required loan coverage ratio (η) and of the probability (q) on capital demand, the partial derivatives of the capital demand function are taken:

(12) $\delta K_f/\delta j = (\Phi^{\epsilon-1}\,\epsilon\,q) / (q\theta)^{\epsilon} < 0,$

(13) $\delta K_f/\delta q = (\Phi^{\epsilon-1}\,\epsilon\,\xi) / [q(q\theta)^{\epsilon}] > 0,$

(14) $\delta K_f/\delta \eta = [\Phi^{\epsilon-1}\,\epsilon\,(1-q)] / (q\theta)^{\epsilon} < 0$

where
- Φ = $(q\,j + (1-q)\,\eta - (1-q) + f)$ >=< 0
- θ = $\beta c A^{\alpha} L^{\gamma}$ > 0,
- ξ = $[q(1 - \eta + j) - (\Phi)]$ < 0, since $\eta \ge 1$
- ϵ = $1/(\beta-1)$ < 0 for $\beta < 1$

[16] P is normalized to one

[17] setting $K_{certainty} > K_{uncertainty}$ and solving the inequality gives $i < (i-(1-q))/q$ and since (q-1) is negative, the result is i>1

The sign of the derivatives which gives the direction of the slope of the capital demand function depends on Φ. By setting Φ greater than or equal to zero ($\Phi \geq 0$) the pre-condition for the assumed values of the derivatives becomes:

(15) $i + jq + (1-q)\eta - (1-q) + f \geq 0$

In this context, two cases are identified according to the source of capital expenditure:

1) Capital expenditure under uncertainty from the farmers' own or internal sources (own capital), where (i-1) equals the opportunity costs of own capital, η and f equals zero (η , f=0). Thus, equation (15) reduces to

   $(1-q) \leq i$

   This shows that as long as the probability of default changes accordingly with the interest rate such that the equality is true, the capital demand remains unchanged. Subsequently,

   $\delta K/\delta i < 0$ only if $(1-q) < i$.

   This result confirms the assumption that, as with certain outputs, a decreasing interest rate leads to increasing capital demand and vice versa. This is true for real positive interest rates.

2) Capital expenditure under uncertainty from external sources (loan), where (j-1) equals the real loan interest rate, the collateral requirement (Kη) is $\eta \geq 1$ and the fees (f) are $0 < f < 1$. The equation (15) now becomes

   $q \geq (1-\eta-f) / (1-\eta+j)$

   For $\eta \geq 1$, the expression on the right hand side of the above equation is negative for all $j \geq (\eta - 1)$. Since the probability q is already, by definition, larger than the negative expression on the right side of the above equation, Φ is larger than zero ($\Phi > 0$). Hence, the demand function is negatively sloped with respect to j and η ($\delta K/\delta j < 0$ and $\delta K/\delta \eta < 0$), and positively as regards the derivative $\delta K/\delta q$. Under theoretically large real negative interest rates with $j < (\eta - 1)$, the expression on the right hand side of the equation becomes positive and can be larger than q. Then the capital demand increases with increasing j and η while it decreases with increasing q.

Capital demand with collateral requirements, uncertainty and a combination of external and own capital expenditure

In many cases, the capital expenditure of an individual farm or a firm consists of a combination of own and external capital. To take this combination into account capital expenditure in the model becomes

(16) $K = K_o + K_{f,}$

where K_o: own capital expenditure,
K_f: external capital expenditure.

Consequently, the profit function Π becomes

(17) $\Pi = q\,[\,(c(K_o+K_f)^{\beta} A^{\alpha} L^{\gamma}) - (K_o i + K_f j + K_f f + A r + L w)\,] + (1-q)\,[\,(aK_o + bK_f) - (K_o i + K_f \eta + K_f f + A r + L w)\,]$

where j: real loan interest rate/100 +1
a: share of own capital returned, $a \leq 1$
b: share of external capital returned, $b \leq 1$

Again, assuming profit maximizing behavior for the farm, applying the first order conditions ($\delta\Pi/\delta K_o$, $\delta\Pi/\delta K_f$) and solving for K_o and K_f the demand for external capital K_f^D is:

(18) $K_f^D = [(qj + \eta(1-q) + f - b(1-q)) / q\theta]^{\epsilon} - K_o,$

and for own capital K_o^D:

(19) $K_o^D = [(i - a(1-q))/ q\theta\,]^{\epsilon} - K_f$

where $\theta = \beta c A^{\alpha} L^{\gamma}$

It is anticipated, that the derivatives with respect to j, n and q are

(20) $\delta K_f/\delta j = (\Psi^{\epsilon-1} \epsilon\, q) / (q\theta)^{\epsilon} < 0$

(21) $\delta K_f/\delta q = (\Psi^{\epsilon-1} \epsilon\, \mu) / [q(q\theta)^{\epsilon}] > 0$

(22) $\delta K_f/\delta \eta = [\Psi^{\epsilon-1} \epsilon\, (1-q)] / (q\theta)^{\epsilon} < 0$

where $\Psi = (qj + \eta(1-q) + f - b(1-q))$
$\epsilon = 1/(\beta-1) < 0$ for $\beta < 1$
$\mu = (q(j-\eta+b) - \theta) < 0$
$\theta = \beta c A^{\alpha} L^{\gamma} > 0$

Since it is assumed that $\eta \geq 1$ and $0 \leq b \leq 1$, the expression for Ψ is greater than zero ($\Psi > 0$)[18] and the slope of the demand function has the anticipated signs.

Capital demand and utility

In the last few years micro-finance studies have encompassed the economic and social aspects that accrue to potential borrowers. This shift in emphasis on a more holistic view of the clients has caused a redirection of attention also to the clients' household (Cohen, 1998). Analogous, agricultural micro-enterprises or agricultural households represent two units of microeconomic analyses, the household and the firm (Meier, 1995). While in a firm the shareholders, as principals, aim to maximize shareholder value and thereby profit, the farm household's objective is different from pure profit maximization. The farm provides consumption goods and employment for household members. This procurement of labor, income and food, assured through a certain

endowment level of farm assets (wealth), gives a certain utility to household members. Thus, farm activities focus on maximizing farm household utility which depends on farm profit. When the household is a price taker in all markets and for all commodities produced and consumed, the optimal farm household production can be determined independent of consumption and leisure choices. Then, given the maximum income level derived from profit maximization, consumption and labor supply decisions can be made. Given this sequential decision making process the appropriate analytical framework is a recursive model with profit and utility maximizing components (Meier, 1995).

In this work, the farm household's utility (U(W)) is reduced to wealth (W)[19] as the sum of an initial asset endowment (W_s) and return (h_{ij}) which signifies a gain (h_{i1}) with probability q for j = 1 or a loss (h_{i0}) with probability (1-q) for j = 0 [20]. The potential gain or loss is a function of some actions. Assumptions of the model include concavity of the utility function, a low asset endowment level of farm households in Romania and a von Neumann-Morgenstern expected utility. Given these assumptions, the expected utility of wealth expressed in equation (23) is smaller than the utility of the expected gain or loss (wealth).

(23) $U(W) = q\,U(W_s+h_{i1}) + (1-q)\,U(W_s+h_{i0}) < U(W_s+qh_{i1}) + U(W_s+(1-q)h_{i0})$ [21].

where $(h_{i1}) = [\,Y - (K_o i + K_f j + K_f f + Ar + Lw)\,] \triangleq \Pi$ [22]

$(h_{i0}) = [\,(aK_o + bK_f) - (K_o i + K_f \eta + K_f f + Ar + Lw)\,] \triangleq \Pi$

$b \leq 1$

q: probability of success or gain

$Y = c(K_o+K_f)^{\beta} A^{\alpha} L^{\gamma}$

W: wealth, $W=W_s+h_i$ where W_s= initial asset endowment and h_i = potential outcomes

To take into account the sequential decision making process of a farm household (Meier, 1995) a capital demand for production (equation (24)) is derived from maximizing the expected profit function (max. exp.$\Pi = q\,h_1 + (1-q)\,h_0$, $\delta exp.\Pi/\delta K = 0$).

(24) $K_{exp.\,\Pi} = [(qj+f+Ar+Lw-(1-q)(b-\eta)) / (qc\beta A^{\alpha}L^{\delta})]^{1/(1-\beta)}$

Taking the first order conditions (equation (25)) for the expected utility function ($U(W) = q\,u(W_1) + (1-q)\,u(W_0)$), where the production function (Y) is considered independent of capital (K) gives the capital demand function (K_f^D) with respect to utility (equation (26)). The expected capital demand, based on expected profit maximization (equation (24)), is then substituted into the production function (Y) of the capital demand function (K_f^D). The resulting capital demand (K_f^D) in equation (26) is a sequential result of the maximization of expected profit and expected utility. It reflects a recursive model, since the production function (Y) in the demand function (K_f^D) is a function of

[18] For $\Psi > 0$ the condition is $q > (b-f-\eta) / (j-b-\eta)$. Since per definition $0 \leq b \leq 1$, $\eta \geq 1$, the right hand side of this expression becomes negative and the capital demand shows the anticipated slope but only if $j > b+\eta$. Otherwise as in cases of highly negative real interest rates, the slopes of the demand curve reverses.

[19] W reflects the consumption capacity

[20] j and i do not represent interest rates as in the chapters before.

[21] Assuming a concave utility function of the form $u = \ln(W+h\Pi)$

capital (K) which in turn is replaced by the capital demand ($K_{exp.\,\Pi}$) (equation (24)) obtained through maximizing expected profit.

(25) $\delta U/\delta K_f = q\,\delta U/\delta(h_1\Pi)\,\delta(h_1\Pi)/\delta K_f + (1-q)\,\delta U/\delta(h_0\Pi)\,\delta(h_0\Pi)/\delta K_f = 0$

(26) $K_f^D = (1-q)(W-Ar-Lw+Y)/(j+f) - q(W-Ar-Lw)/(b-\eta-f)$

where $Y = cK^{\beta}A^{\alpha}L^{\delta} = c\,[(qj+f+Ar+Lw-(1-q)(b-\eta))/(q\beta A^{\alpha}L^{\delta})]^{(\beta/(1-\beta))}\,A^{\alpha}L^{\delta}$

The resulting capital demand function (equation (26)) shows the impact of interest rates, of the initial wealth level and the possible loss on capital demand. Since the utility function is a concave function with respect to W_s and h_{ij} and the profit functions or actions h_{ij} themselves are linear, the farmers display a risk averse behavior. Suppose it is true that the input of e.g. borrowed capital increases the risk of net returns, then the consequences of risk depend on the extent of risk aversion among farmers (Binswanger, 1979).

Supply of capital

In this work the essential elements of a partial profit function from the lending side of a financial institution comprise capital costs, probability of repayment, interest rates charged, fees, value of collateral obtained and transaction costs. Transaction costs are expressed as labor costs in this study. The input factors for the 'product loan' such as material and building costs are omitted since they have no relevance to the problem in question and are minor costs compared to the personal and capital costs of the Romanian banks[23]. The costs associated with the risk of non-repayment of the loan or interest is incorporated through the probability p. In this model the partial profit function is a linear function in terms of capital (K), with two possible revenue streams. The first is the revenue from fees and principle-interest payment ($K_f j + F$) that occurs with probability p and the second ($\eta K_f + F$) is the revenue from fees and collateral seizure or sale which occur with a probability (1-p). The opportunity costs of capital ($K_f i$) and the transaction costs (Hv) from labor input represents the main cost factors in the model. In general, transaction costs in rural areas are high compared to urban areas because of problems with collateral provision; low, uncertain and irregular income flows; and the relatively small size of transactions (FAO, 1998; GTZ, 1998). The special problems in rural areas require a high level of information on the actual financial performance of the farm. In this model, it is assumed that there is no cost for collateral enforcement and seizure or resale so that the collateral value (ηK) equals the final 'income' for a financial institution in case of a loan default. This occurs, because any estimation about possible collateral seizure costs may vary enormously and are not available. The described profit of the supplier π_s for any financial institution takes the form:

[22] Since the utility function is concave the profit function $h_1\Pi$ is assumed to be linear in K and thus, for the utility maximization independent of K , here: j and i do not represent interest rates as before.
[23] According to the bank interview in 1997, the total monthly costs (100%) are split into 84% interest, 8.7% risk provisions, 5% personal costs, 1.7% material costs, and 0.4% other costs.

(27) $\pi_s = p(K_f j + F) + (1-p)(\eta K_f + F) - (K_f i + Hv)$

where p: probability of receiving the principal-interests payment $K_f j$, $0 \leq p \leq 1$,
1-p: probability of receiving the income through the collateral value ηK_f ,
F: fixed amount of fees (revenue) before the loan installment,
H: labor hours,
v: average wage per labor hour of a credit officer,
i: 1 + real interest rate for deposits/100
j: 1 + real interest rate for loans/100

In order to receive a profit (π) of at least zero, the linear profit function is set greater than or equal to zero ($\pi \geq 0$) and is solved for K_f .

(28) $\pi = p(K_f j + F) + (1-p)(\eta K_f + F) - (K_f i + Hv) \geq 0$

(29) $K_f^S >=< \frac{(Hv - F)}{(p(j - \eta) - (i - \eta))} = S$

where: $S = (Hv - F) / m$
$m = [p(j-\eta) + (i-\eta)]$

The resulting expression represents a capital supply set which indicates the minimum or maximum possible loan size offered under given conditions. The supply depends on the fees (F), working hours (H), probability of repayment (p), capital opportunity costs (i-1), capital revenues (j) and collateral value (η), and it includes all loan sizes yielding at least a zero profit for the financial institution. Since the equation is an inequality, the sign of the inequality reverses if the expression of the denominator ($p(j-\eta) - (i-\eta)$) is negative. Therefore, two cases for $\pi \geq 0$ are identified.

(a) in the case of $K_f^S \geq S$ the denominator must be greater than zero:

$p(j-\eta) - (i-\eta) > 0.$

Solving for p, the condition is

$p \geq (i-\eta)/(j-\eta)$ for $j > \eta$ and
$p \leq (i-\eta)/(j-\eta)$ for $j < \eta$.

(b) in the case of $K_f^S \leq S$, the denominator must be less than zero:

$p(j-\eta) - (i-\eta) < 0.$

Solving for p, the condition is

$p \leq (i-\eta)/(j-\eta)$ for $j > \eta$ and
$p \geq (i-\eta)/(j-\eta)$ for $j < \eta$.

These results show that capital supply or the offered minimum/maximum loan size for $\pi \geq 0$ depends on the ratio of interest rates to (p) and collateral value (η) to capital opportunity costs (i) and capital revenues (j).

The partial derivatives of the capital supply show, how the minimum or maximum loan size changes when either the capital cost (i), capital revenues (j), the transaction costs (H), or the probability p changes while all other variables remain unchanged.

$$\delta K_f/\delta H = v / m \qquad > 0$$

$$\delta K_f/\delta i = - (Hv-F) / m^2 \qquad < 0$$

$$\delta K_f/\delta j = (Hv-F)p / m^2 \qquad > 0$$

$$\delta K_f/\delta p = (Hv-F)(j-\eta) / m^2 \qquad > 0$$

$$\delta K_f/\delta \eta = (Hv-F)(1-p) / m^2 \qquad > 0$$

where $m = (p(j-\eta) - (i-\eta)) \qquad > 0$

Under the assumption of positive real interest rates and moderate security requirements, that is if $F < Hv$, $j > \eta$ and $(j -\eta)p > (i -\eta)$, the sign of the derivatives are what is expected. In cases of negative real interest rates the signs of the derivatives with respect to j (since it becomes $j < \eta$) may reverse. A negative sign on the derivative means a decrease of the potential offered capital amount per loan contract.

Whether an increase of probability (p) occurs along with an increase in labor hours (H) causes a positive change in capital supply depends on the partial derivatives of the capital supply equation with respect to H and p. The increase in H reflects higher transaction costs resulting from the stringent screening process of the individual farm business by financial institutions. The increased screening effort is thought to reduce risk, increasing the probability of repayment.

Supply and demand of capital

Under the assumptions of (i) a competitive, transparent market where all characteristics of traded items are observable, and (ii) the existence of a convex set of production and preferences and publicly known prices, then a competitive market equilibrium yielding a pareto-optimal[24] outcome exists (Nicholson, 1995). To maximize the utility or profit of economic agents the market equilibrium (Walrasian equilibrium) requires that there is a equilibrium price for each good demanded and offered. Assuming a competitive market equilibrium and the pareto-optimality condition, the market interest rate should clear the rural financial markets in Romania, such that capital demand equals capital supply:

$$(30) \quad K_f^S \approx K_f^D$$

To find the market clearing interest rate all other variables except for the interest rate are held constant. The capital supply (K_f^S) represents a set of possible loan sizes offered per loan contract. Equation (31) shows the necessary conditions to obtain a profit greater than or equal to zero for financial institutions.

(31) $(Hv - F) / (p(j-\eta) - (i-\eta) \approx [(qj + \eta(1-q) + f - b(1-q)) / q\theta]^{\epsilon} - K_o$

However, some of the welfare theorem assumptions[25] do not hold in Romania and the market equilibrium is not pareto-optimal. Many types of market failures including externalities, public goods, market power and asymmetric information prior or subsequent to contract signing (Mas-Colell, 1995) may occur. The rural financial markets in Romanian predominantly suffer from asymmetric information and uncertainty in outcomes.

From the perspective of the financial institutions, the asymmetric information pertaining to actual farm financial performance and the actual value of farm assets before contract signing is an impediment for a competitive market equilibrium to exist in rural areas. Therefore, the evaluation of a pledged asset may differ between the borrower and lender. Thus, the capital demander's collateral value of η ($\eta = \eta_B$) does not necessarily correspond to the capital supplier's value of η ($\eta = \eta_F$). In addition, the information on a farm's financial performance is asymmetric causing high transaction costs for the financial intermediary to obtain the true information and reduce the risk of default.

Besides market failure through asymmetric information, farm households acting as utility maximizers and the uncertainty surrounding yields and prices affects the credit market. For the borrower, uncertainty about his actual outcome (yield and prices) in combination with risk aversion may prevent him attaining profit maximization. For that reason, the right hand side of equation (31), the capital demand of an individual farm household, may be based on the assumption of expected utility maximization and not pure profit maximization.

Including the differences in asset evaluation, the utility of wealth (asset endowment) and the high transaction costs of the lender for improved screening efforts in equation (31) gives the market clearing price. This price, if it exists, differs from the one under pure profit maximization.

(32) $(Hv-F) / [p(j-\eta) - (i-\eta_B)] \approx (1-q)(W+Y-Ar-Lw)/(j+f) - q(W-Ar-Lw)/(b-\eta_F-f)$

where: $Y = cK^{\beta}A^{\alpha}L^{\gamma}$

To illustrate the differences between capital demand and supply from the diverging assets evaluation caused through asymmetric information, the collateral requirement η takes the value $\eta_B = Kj$ for financial institutions and $\eta_F = Kj/(1-x)= v$ (see chapter 4.2) for the borrower's actual asset value of the pledged assets. The probability of repayment p for the financial institutions and the probability q for farm output Y are included to represent uncertainty and risk. Further, it is shown, that high transaction costs caused by increased screening efforts to reduce uncertainty for financial institutions heavily affects the supply. Finally, some degree of risk aversion is integrated through utility maximization aspects.

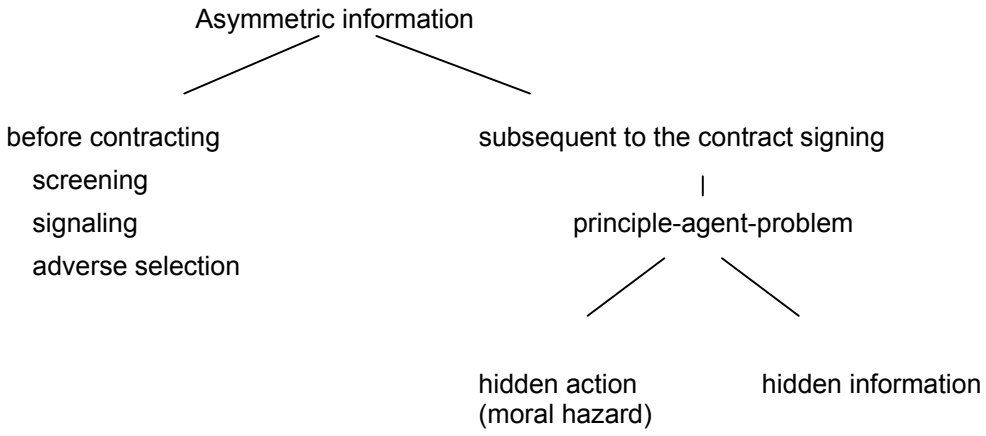
[24] An economic outcome is said to be pareto-optimal if it is impossible to make some individuals better off without making some other individual worse off (Mas-Colell, 1995).
[25] Welfare theorem I states that any competitive equilibrium is pareto-optimal, the welfare theorem II says, that any pareto-optimal outcome is a competitive equilibrium if appropriate lump-sum transfers of wealth are arranged (Mas-Colell, 1995).

3.2.2 Rural financial markets and asymmetric information: a qualitative approach

This part of the work relies on a qualitative analysis of the problems resulting from uncertainty in quality and prices of assets. It is argued that the lack of information on the value of farm assets leads to adverse selection through financial institutions. The discussion on adverse selection in the rural financial markets in Romania refers mainly to Akerlof's lemon market (1979).

Asymmetric information represents one type of market failure. It might occur before or after the contract signing or agreement. According to Mas-Colell (1995), the asymmetric information before contracting relies either on insufficient signaling or screening and results in adverse selection. Asymmetric information after a formal agreement is often referred to the principal-agent-problem and includes the moral hazard (hidden action) and the hidden information problem (see Figure 7). In this study on rural financial markets, asymmetric information is considered the main factor leading to no loan agreements. This is partly due to insufficient screening from the side of the financial institutions, a weak signaling from the side of potential borrowers and due to adverse selection.

Figure 7 Asymmetric information



Source: Mas-Colell, 1995

The quality of a particular farm asset is not observable to financial institutions and, moreover, there is relatively little information on the market prices or resale values of used farm assets. Because of this missing or very small secondary market, it is assumed that there prevails uncertainty on the quality of the asset as well as on its alternative use which is normally signaled through it's resale value. As with the car sellers in the case of the lemon markets (Akerlof, 1979), the farmers are considered as the so called 'sellers' since they provide assets as collateral in exchange for a certain loan amount. The financial institutions in turn, are considered to be the 'buyers', since they 'sell loans' and require assets as securities for the approval or installment.

The farmers (n) valuate their asset with a value (v_n). This value takes into account (i) the farmers' knowledge of the true quality of the asset, (ii) the real utility or return of this asset and (iii) any subjective considerations and evaluations regarding the particular farm asset.

The financial institutions or, like for some Romanian banks, the external evaluation experts are unable to observe the true quality of each single asset. Furthermore, no or a rather small secondary market for farm assets exist. Hence, the financial institutions set the value of any farm asset (v_f)[26] equal to the expected value (v) of a small pool of similar assets[27] without having much information on the market prices and the economic yield of such assets. Because of the uncertainty of the real value of farm assets and the prudential and cautious estimation of the value of these assets, the expected value ($v = E(v_f) \neq E(v_n)$) of these assets is assumed to be downwardly biased, reflecting the underestimation of farm asset values.

Only those farmers or potential borrowers whose individually estimated asset value (v_n) is smaller than the expected value (v) are going to be willing to use their assets as collateral[28]. Subsequently, all farmers whose asset value (v_n) is higher than v ($v_n > v$) drop out and only those with values of v_n equal or lower than v ($v_n \leq v$) remain interested in the loan business. That is, the pre-condition for a potential borrower to accept a loan contract is:

(33) $v_n \leq v$ [29]

Being aware of adverse selection, the financial institutions may reconsider their expected value (v). The reconsidered or 'new' expected value of say v/2 is based on the pool of remaining interested farmers and thus, on the pool of the remaining farm assets with value $v_n \leq v$. But as before, only those farmers with asset values $v_n \leq v/2$ remain interested in a loan contract. The final stage of this adverse selection process is an expected value close to zero (v = 0). Subsequently, not a single agreement on a loan contract between a farmer and a financial institution will be signed.

However, the farmers are not actually selling their asset, rather, use it as collateral which can be seized if the loan defaults. However, they face uncertainty about his ability to repay the loan depending on their annual income. To assess the possible income through an investment the farmer calculates the expected cost of a loan, which is the sum of the loss of an asset (v_n) weighted by the probability (1-q) of defaulting plus the loan interests ((j-1)K) payable weighted by the probability (q) of successfully repaying the loan, and compares these expected costs with the expected gain of q Y(K). Thus, a farmers' perception of his asset value includes the probability of loss. Therefore, the condition for accepting the collateral requirements changes to:

[26] for f = 1 to any number
[27] set of assets v_f with f from 1 to any number
[28] the farmers do not directly compare their asset value v_n with the bank's estimation of the asset value v, but with the potential loan size they may get for the assets. And the bank just allows a loan size covered by the value v.
[29] it is assumed that v_n ~ loan size demanded and v ~ loan size supplied. And since loan size demanded and supplied are supposed to be equal, v_n ~ v.

(34) $(1 - q)\, v_n \quad \leq \quad v.$

where 1-q: probability of default,
v: estimated average asset value from the perspective of the financial institutions,
v_n: perceived asset value by farmer n,
j: here: nominal loan interest rate/100 plus one

It is common practice at financial institutions to accept only a certain percentage of the expected assessed asset value (v) as the security value (B). This security value (B) is smaller of the factor (x) than the expected asset value (v) and is expressed here as v x = B. Furthermore, for a loan of the size (K) the financial institutions require at least a security of the size jK (principal plus interests). Hence, the pre-condition for the financial institution to supply a loan are :

(35) $v\, x = B = K\, j$

where K: loan amount,

Rearranging equation (35), v can be expressed as

(36) $v = Kj/\, x$ or

(37) $K = v\, x / j$

where x: factor between 1 and 0, expresses a share of the asset value accepted as security

Since the potential borrower is ignorant about the expected value (v) evaluated by a financial institution, the borrower focuses on the exchange value he gets for the asset accepted as collateral, namely the loan size (K). The pre-condition to be willing to accept the loan contract with the collateral requirements[30] becomes for him:

(38) $(1 - q)\, v_n \quad \leq \quad K.$

Replacing K in equation (38) by the expression in equation (39), the final expression for an agreement between a potential borrower and lender to occur is :

(39) $(1 - q)\, v_n \quad \leq \quad v\, x / j$

Under adverse selection the potential borrowers who remain interested in a loan contract are farmers with individually assessed values (v_n) less than or equal to the loan size K offered (indicated by equation (39)). This is, the 'bad' borrowers e.g. farmers with low actual quality assets or only those with probabilities of default close to zero may pursue the contract offered. The difference between the asset evaluation due to the prevailing uncertainty with respect to quality and market values of assets as well as the uncertainty about default rates induces adverse selection.

[30] at time zero, that is at the time of the contract agreement

3.2.3 The agricultural micro-enterprise, risk and risk aversion: a qualitative analysis

This section on the agricultural sector tries to elucidate the economic behavior of individual farmers from the standpoint of neoclassical theory of utility maximization under uncertainty. It is a qualitative analysis supplementing the results of the quantitative analysis on rural financial markets.

Under classical consumption theory, the consumer's utility function u(c) comprises consumption (c) as utility. The budget to 'buy consumption' is constrained by available wealth (W), which in turn constrains utility. Utility maximization underlies the following objective function:

(40) max. $u(c) = \ln c$ [31]

s.t. $W \geq cp$

where: c: consumption
p: price of consumption goods
W: wealth

It is assumed that the initial asset endowment or wealth level (W_s) of an economic agent provides certain utility, since it allows him to satisfy some of his needs such as consumption either directly with the purchasing power given by wealth or indirectly by using part of its wealth in a production process[32]. That is, $u(W_s) \equiv u(c)$. Normalizing p to one and replacing c by W equation (40) becomes

(41) $u(c) = u(W) = \ln W$ [33].

The wealth level is not considered as given or independent of the action of an agent. Rather, the wealth level is affected by the expected outcomes (h_i) of an action leading to a decline in initial wealth (W_s+h_{i0}) or to an increase in wealth (W_s+h_{i1}).

Any economic agent is supposed to make efforts to increase his wealth (W), and thus, his utility. The farmer is assumed to have clear preferences for some asset bundles and activities. These asset bundles and activities promise a certain wealth level (W) that guarantees a certain level of living standard . To order their preferences they satisfy certain standard properties such as completeness, reflection, transitivity, continuity, monotonicity, local nonsatiation and convexity. The convexity assumption is a generalization of the neoclassical assumption of 'diminishing marginal rates of substitution'. There exists a continuous utility function representing the preferences if the above assumptions are satisfied (Varian, 1992).

The farmer makes his action choices under uncertainty. This means taking a particular action to reach a desired wealth level (W), e.g. investment through external capital may lead to a loss or gain of some assets (W_s+h_{ij}) with an unknown or known probability. The choices which the farmer faces take the form of lotteries where the farmer receives an outcome such as a prize (W_s+h_{i1}) with probability q or a prize (W_s+h_{i0}) with probability (1-q). The prizes may be money, assets or goods.

[31] The utility function is assumed to be concave
[32] or even by directly fulfilling his longing for prestige

Most situations involving behavior under risk can be put into this lottery framework (Varian, 1992). In this study the farmers have the choice between a bundle of assets and actions (W_s+h_{ij}) for j = 0 or 1, giving different levels of utility. However, the final utility of the outcome (h_{ij}) of an action at a certain wealth level (W_s) depends on the probability (q).

(42) Expected Utility = U (W) = $\sum_{i=1}^{n} q_i\, u(W_s+h_{i1}) + (1-q_i)\, u(W_s+h_{i0})$. [34]

where
- W: resulting wealth level consisting of the asset endowment and outcome, $W=W_s+h_{ij}$
- W_s: initial wealth level
- h_{i1}: outcome of an action h_i with a gain of assets, j=1
- h_{i0}: outcome of an action h_i with a loss of assets, j=0
- U: expected utility [maybe use E(u) for expected utility]
- u: utility
- q_i: probability of the outcome gain (h_i1) of an action i, with $0 \leq q \leq 1$.

The utility in equation (42) is based on the von Neumann-Morgenstern technique which defines utility as the expected utility U(W) of a gamble (Nicholson,1995). The expected utility property says that the utility of a lottery is the expectation of the utility gained from its prizes. Thus, the utility is additively separable over the outcomes and linear in the probabilities. Since the utility function is concave, the farmer prefers the utility of the expected prizes over the expected utility of the prizes:

(43) $u\,(q_i\,(W_s+h_{i1}) + (1-q_i)(W_s+h_{i0})) > q_i\, u(W_s+h_{i1}) + (1-q_i)\, u(W_s+h_{i0})$.

This behavior is called risk aversion. Several measures of risk aversion rely on the ratio of the first and second derivative of the expected utility function. The more concave the expected utility function, the more risk averse the farmers (Mas-Colell, 1995).

In the case of Romanian farmers, the asset endowment level of farms with one to four hectares is very modest. This endowment level provides a level of utility towards the lower bound of the utility function. Due to the concavity of the utility function, the additional utility from one more unit of assets is decreasing and the slope of the utility function becomes flatter with increasing wealth. In line with the decreasing slope (second derivative) the risk aversion decreases with increasing wealth. Not surprisingly, private farmers with low utility levels display a rather high degree of risk aversion against any kind of investment endangering their available assets or wealth.

When a consumer wishes to maximize his preferences, he chooses an optimal bundle of goods under a given budget constraint in order to receive the maximal utility value. The basic hypothesis of consumption theory is transferred to farmers' wealth and choice of action bundle. Here, a rational farmer will always choose the most preferred action and base his choice on a given initial level of wealth (W_s+h_{ij}). These decisions are made from a given set of actions and asset bundles to achieve a certain wealth level (W) under the restriction that the expected gain from the action is equal to or greater than zero, or that the resulting wealth level W will not fall below the minimum wealth level W_0. That is:

[33] ‚ln' represents the natural logarithms
[34] the signs i and j do not represent interest rates as used before in this chapter

(44) max. $U(W)$

s.t. $\sum_{i=1}^{n} (q_i h_{i1} + (1-q_i) h_{i0}) \geq 0$ or

$\sum_{i=1}^{n} (q_i (W_s+h_{i1})+ (1-q_i) (W_s+h_{i0}) \geq W_0$

where W_0: minimum level of required wealth to satisfy essential needs

Combinations of outcomes (h_{ij}) with corresponding probabilities q which provide the same level of utility and among which the farmers are indifferent form indifference curves (Nicholson, 1995). A high potential loss of wealth with a low probability 1-q and a low potential loss with a high probability 1-q may yield the same utility. This infers that the optimal bundle of assets and actions depends on the probability ratio.

4 Rural financial markets

The results of the analysis represented in this chapter are divided in six subsections: the descriptive results of the sample; the production function received from the multiple regression; the profit function derived from the production function under different conditions; the demand function taking into account several constraints; the supply of capital by financial institutions and finally a comparison of capital supply and demand.

4.1 Descriptive statistical results

The sample finally used for the analysis comprises 181 observations of individual farms. The descriptive statistical findings are listed in Table 11. It shows the maximum and minimum value, the mean and standard deviation of the variables output (Y), capital (K), land (A) and labor (L) input as well as the values of the year of farm foundation (F), the educational level (E) of the farm manager and the net income to capital expenditure (X) in one production period. All variables show a relatively high variance, which reflects the great variety and diversity of the individual farm sector in Romania.

Table 11 Statistical figures of the observed variables

	Revenues Y in million lei	Capital K in million lei	Land A in ha	Labor L in man power per year	Foundation F, year of foundation	Education E, levels *1	income to capital expenditure X *2
Number	181	181	181	181	76	73	181
Minimum value	4.8	2.5	1	1	1950	1	-2.88
Maximum value	190.8	166.2	25	7.5	1997	8	2.36
Mean	60.9	35.3	6.3	3.1		4.4	0.1
Stand. deviation	40.5	27.4	5.2	1.1		1.7	0.8

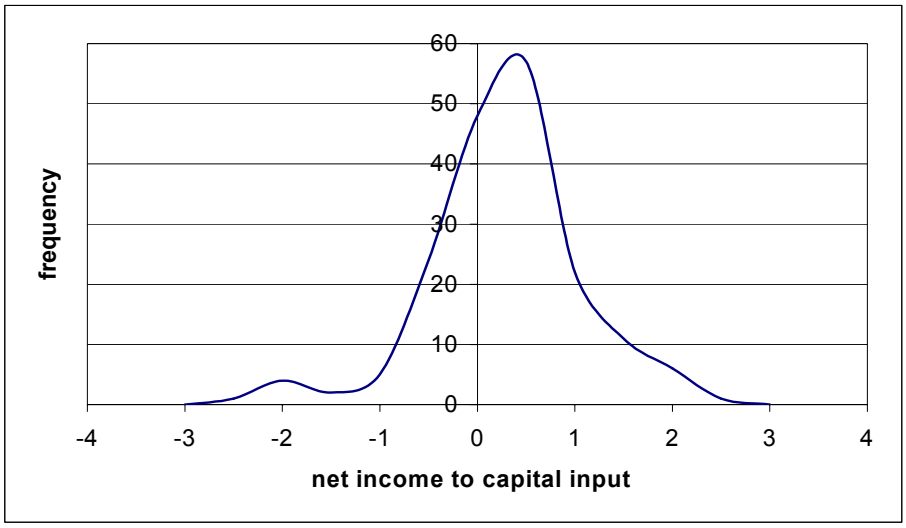
Source: Own calculations

Note: *1 The educational level from 1-8 comprises no school, elementary, secondary, high school, agricultural and technical school, undergraduate and graduate. *2 capital expenditure includes family labor remuneration of about 450,000 lei per month, corresponding about to one third of wages in agriculture.

To understand better the functioning of rural financial markets not only macroeconomic, structural, and sectoral features of the financial system needs to be considered, but also microeconomic information e.g. the participants economic performance are important. In this context, the debt service capacity of individual farms is of interest. The distribution of the net income in relation to the capital expenditure in consideration of family labor remuneration represents a proxy for the potential debt service. The proxy roughly shows what interest rates an individual farm is able to pay on its capital expenditure. The frequency distribution of the proxy is depicted in Figure 8. When a financial institution arbitrarily selects a farmer out of the sample of interviewed farmers, the distribution gives the probability of selecting a farm with a good or low debt service capacity. Therefore, it can be used also as a proxy for the risk of credit default (1-p). The variable (X) displays a normal distribution with mean 0.1 and standard deviation 0.8. The frequency

distributions of the explanatory and dependent variables are listed in Annex 7.1. Their distributions are normal, with a skew to the left.

Figure 8 Frequency distribution of the net income in relation to capital expenditure



Source: Own calculations, sample n = 181
Note: The net income to capital expenditure (X) is indicated as decimals, e.g.: X% / 100%

4.2 The production function

The multiple regression analysis includes regressions with several functional forms like the Cobb-Douglas technology, the Mitcherlich-Baule function, the trans-logarithmic, quadratic and linear relationship between the output (Y) and the input factors (K), (A), and (L) (see Annex 7.4). The regression results of most of the functional forms are significant. However, the Cobb-Douglas technology depicted in Table 12, promised to be the most suited and convenient functional form for the model developed in this work and the regression results of the trans-logarithmic function underpins this choice.

Table 12 Regression results of the Cobb-Douglas production technology

	parameter	t-value	mean
Constant	5.91	6.21**	
K	0.52	11.22**	35.3
A	0.25	5.80**	6.3
L	0.07	1.56*	3.1
Residual sum	-79.1		
Residual variance	405.2		
R^2	0.75		

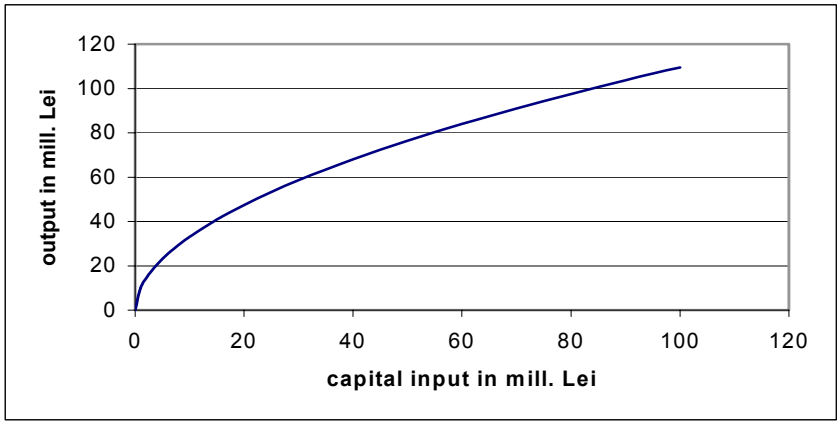
Source: Own calculations
Note: The sample comprises 181 observations, the significance level for ** is $\alpha = 0.01$and for * $\alpha = 0.1$

The regression results for the Cobb-Douglas technology display a high significance as regards the variance of the residual, the R^2 and the t-values and allows a relatively uncomplicated technical handling[35]. Accordingly, the Cobb-Douglas production function is given by equation (45). The t-values and residuals of this technology are shown in Table 12.

$$(45) \quad Y = c\, K^{\beta} A^{\alpha} L^{\gamma} = 5.91\, K^{0.52} A^{0.25} L^{0.07}$$

Since the addition of the parameters β, α and γ yields a value smaller than one (0.52+0.25+0.07 = 0.777), the production function displays decreasing returns to scale, as expected. The elasticity of output indicated by the parameters β, α and γ reflects the increase of the output (Y) caused by one per cent change of the input factors (K), (A) and (L). Hence, the contribution of capital (K, comprising all production inputs) to output (Y) is 0.52 per cent, of land (A) 0.25 per cent and of family labor (L) 0.07 per cent. The production function for an average individual farm[36] is depicted in Figure 9, with output (Y) in million lei on the y-axis and capital expenditure (K) in million lei along the x-axis.

Figure 9 Production function of an average individual farm



Source: Own calculation

Plugging the average values of the input variables (K), (A) and (L) in the corresponding derivative gives small marginal products for capital and land input (Table 13). The second derivative of the production function with respect to capital expenditure (K) is negative, and hence the marginal product of capital is diminishing with increasing capital expenditure. Based on the average values of the input factors[37], the marginal products indicate that an additional capital expenditure of one million lei increases the output (in this case the revenues) by 0.95 million lei, an additional hectare of cultivable land increases the output by 2.6 million lei and one additional family labor leads to an increase in revenues of 1.5 million lei per year. A remuneration for labor input of about 450,000 lei per month amounts to a wage of 5.4 million lei[38] per year. When the value for land input is augmented and those for the other input factors remain unchanged, the marginal product for

[35] The regression results of coefficients of the trans-log. function support the choice of the Cobb-Douglas technology.
[36] Three family labor forces and 6 hectares of cultivable land
[37] Average capital, labor and land input see Table 13.
[38] 5.4 million lei per annum corresponds to a monthly wage of 50 EUR

capital expenditure increases and the marginal product for land declines as depicted in the four last columns of Table 13. Furthermore, an increase of capital expenditure in line with an increase of land input still yields a marginal product of capital expenditure smaller than one. Evidently, these results suggest that at this stage in the development of the small-scale private farm sector in Romania land input is a very crucial factor for agricultural production.

Table 13 Marginal products

Input factors	Para-meters β, α, γ	Average values for input factors	marginal product δY/δ... *	values for input factors	marginal product δY/δ.	values for input factors	marginal product δY/δ.
K	0.52	35.3	0.953	35.0	1.071	35.0	1.185
A	0.25	6.3	2.566	10.0	1.802	15.0	1.329
L	0.07	3.1	1.460	3.0	1.682	3.0	1.862
constant c	5.91						

Source: Own calculations
Note: * For capital expenditure the marginal product is: $\delta Y/\delta K = 0{,}52 * 5.91 * 35.3^{-0.48} * 6.3^{0.25} * 3.1^{0.07} = 0.95$

At the same average input level, the marginal rate of technical substitution (RTS) reveals a rather low substitution of labor or cultivable land through capital as depicted in Table 14. An additional capital expenditure of one million lei substitutes 0.65 units of man power or 0.37 hectares of cultivable land. In contrast, one additional hectare of cultivable land would replace 1.8 units of man power per year or 2.7 million lei per year while keeping the output (Y) constant.

Table 14 Marginal rate of technical substitution (RTS)

K replaces	RTS	A replaces	RTS	L replaces	RTS
L	-0.65	L	-1.76	K	-1.53
A	-0.37	K	-2.69	A	-0.57

Source: Own calculations

To briefly illustrate whether the level of education, specialization or experience in farming have an influence on the parameters and hence on production, the sample is divided into sub-samples. The criteria for the sub-samples for education comprises: low or high educational level, for specialization: livestock, crop or mixed farming, and for experience in farming: old and new farms. The regression results for the Cobb-Douglas technology of each sub-sample are listed in Annex 7.2. The parameters for capital expenditure and land input are significant in all sub-samples. The coefficient of the input factor K is comparatively high for private farms with a manager of low education[39], with unspecialized production and with a short farm history (new farms). The constant appears to be high for samples with high education, with specialization in crop production and with farms founded before 1990. Obviously, education, specialization and experience are positively related to a higher initial production level. Farms with specialization in crop production show a high average capital expenditure and a high initial production level, while their parameter for capital expenditure (K) is low. Although the coefficient of (K) for the sample with a low educational

[39] education levels range from 1 to 8, the low education level comprises 1 to 3 (no school, elementary and secondary school)

background is larger than for higher education, their average capital expenditure is of the same size. This may indicate a more productive use of capital for the group of less educated farmers. The sub-sample of 'new farms' shows a higher parameter value for (K) and a higher average capital expenditure (K) than its corresponding sub-sample. Overall, the differences in the parameter values between the sub-samples are not striking. To estimate the impact of education, specialization and experience on farm production precisely further analyses have to be undertaken which are, however, beyond the objective to this study.

4.3 The farm profit and demand function

This chapter discusses the demand for own or external capital under certainty conditions (with no price or production risks), without taking into account any further costs for capital except the interest rates as opportunity costs of capital. To outline the effects of economic instability like high inflation, the models also takes into account varying real interest rates.

While the production function reveals some features on the technical side, the capital demand function and the farm profit function refer also to the financial side of farm production. Plugging the values from the regression analysis and the average deposit interest rate for own capital or the average loan interest rate[40] for external capital in the demand functions developed in Chapter 3.2, the capital demand function becomes the following shape:

(46) $K(i) = [(1-0.47) / (0.52 * 5.91 * A^{0.25} L^{0.07})]^{1/(0.52-1)}$

$= [0.53 / (3.07 * A^{0.25} L^{0.07})]^{-2.08}$

Similarly, the demand functions for agricultural land and man power are:

(47) $A(r) = [r / (1.48 K^{0.52} L^{0.07})]^{-1.33}$

(48) $L(w) = [w / (0.41 K^{0.52} A^{0.25})]^{-1.08}$

where: r: opportunity cost for land
w: opportunity cost for labor

Plugging the values of (K), (A) and (L) as indicated in the first row and column of Table 15 below in the corresponding equations above, assuming for (r) one million lei per year as opportunity costs for land use, and for (w) 5.4 million lei per year as necessary family labor wage income[41], the demand for labor, land and capital is obtained and listed in Table 15. The results in Table 15 show that the impact of one more unit of labor on the demand for agricultural land or capital is rather small, while the impact of one more unit of land (or capital) increases the demand for capital (or land) significantly. As a result of the temporarily negative real interest rates in Romania, the calculated demand for capital in general is rather high, since any capital use causes no costs but

[40] Real interest rates (-38% for loans, -47% for deposits) are based on the Fisher effect; the actual nominal interest rates were 34% for deposits and 55% for loans; the inflation rate in Romania was 151% in December 1997 (NBR, 1998).
[41] The opportunity costs for land are based on the low rent income of agricultural land and the family wage corresponds to a monthly income of 50 EUR, which is about two-thirds of the average wage for employees in agriculture in December 1997 (NCS, 1998).

benefit. However, the huge difference in the opportunity cost of own or external capital, based on deposit or loan interest rates, produces a large difference in demand for own or external capital. As anticipated, the capital demand function has a negative slope in respect of the capital opportunity cost, since the derivative of the demand function is negative.

Table 15 Demand for input factors

Capital demand in million lei for external capital with a negative real loan interest rate at Dec. 1997					
Input of A in ha	*Input of man power per year*				
	0.5	*1*	*1.5*	*2*	*3*
1	25.38	28.08	29.79	31.06	32.95
5	58.68	64.92	68.87	71.83	76.20
10	84.19	93.15	98.82	103.05	109.33
Agricultural land demand in hectares					
Input of L in man power per year	*Input of K in million lei*				
	10	*20*	*35*	*50*	*100*
1	8.31	13.43	19.80	25.35	40.99
2	8.86	14.33	21.12	27.04	43.73
3	9.20	14.88	21.93	28.09	45.42
Labor demand in man power per year					
Input of A in ha	*Input of K in million lei*				
	10	*20*	*35*	*50*	*100*
1	0.22	0.33	0.46	0.56	0.82
5	0.35	0.52	0.71	0.86	1.27
10	0.42	0.62	0.85	1.04	1.54

Source: Own calculations

Note: The opportunity costs for capital were assumed to correspond to the real deposit interest rate, which was about –47% p.a. in December 1997 and to the real loan interest rate of about –38% in Dec. 1997[42] (NBR, 1998).

Table 16 Demand for capital under positive real interest rates

Capital demand in million lei for own capital with a positive real deposit interest rate					
Input of A in ha	*Input of man power per year*				
	0.5	*1*	*1.5*	*2*	*3*
1	8.47	9.37	9.94	10.37	11.00
5	19.58	21.66	22.98	23.97	25.43
10	28.09	31.08	32.97	34.39	36.48
Capital demand in million lei for external capital with a positive real loan interest rate					
Input of A in ha	*Input of man power per year*				
	0.5	*1*	*1.5*	*2*	*3*
1	7.69	8.50	9.02	9.41	9.98
5	17.77	19.66	20.86	21.75	23.08
10	25.50	28.21	29.93	31.21	33.11

Source: Own calculations, 1999

Note: The opportunity costs for capital were assumed to correspond to a real deposit interest rate of about 5% p.a. and to a real loan interest rate of about 10% p.a.

[42] Calculated according to the Fisher effect (Shapiro, 1996), with a nominal deposit rate of 34% and an inflation rate of 151 %, both for Dec. 1997 (NBR, 1998).

Positive real interest rates show a rather different result with regard to the capital demand as depicted in Table 16. The capital demand and the gap between the demand for own and external capital expenditure is significantly reduced compared to the demand under negative rates. However, this demand is considered without uncertainty in output and prices, and without further costs for external capital such as loan application costs, insurance and credit security costs.

Farm profit is calculated according to the profit function developed in Chapter 3.2 and represents the maximal possible profit under a given input set of land and labor. The capital expenditure is chosen optimally so that the profit is maximized. The labor input in Romania's small scale farm sector varies largely depending on the availability of jobs[43] for family members. To eliminate the effect of this variation on the farm profit, labor remuneration is assumed to be zero in the profit calculations. Further, the impact of land prices -unknown prices since there hardly exists a market- on profit is excluded too. The farm profit displayed in Annex 7.7 is calculated under different input levels of land and family labor, as indicated in the first column and third row of the table.

The average monthly net wage in the Romanian agricultural sector for December 1997 was around 0.65 million lei (NBR, 1998), which adds up to about 7.8 million lei per year per worker. Under the temporarily prevailing high inflation an adequate remuneration of labor and land input in the private agricultural sector seems to be possible. However, besides wages, the profit (see Annex 7.7) also has to cover re-investments.

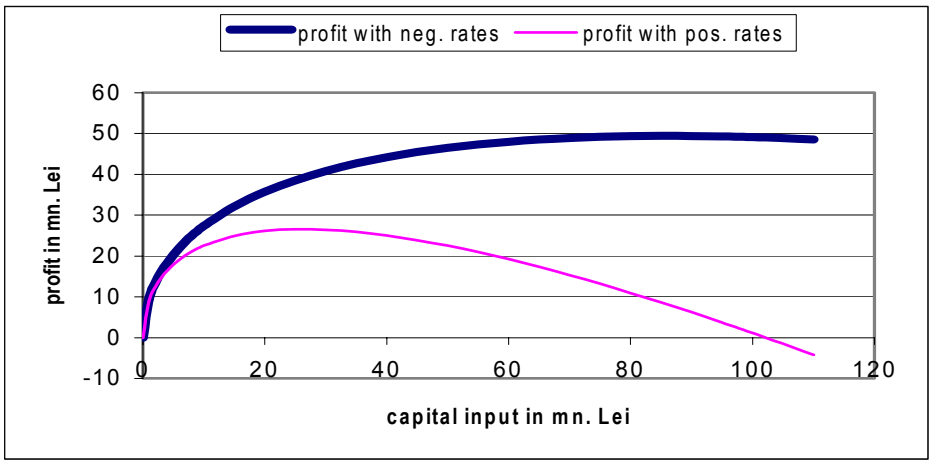
A comparison of the farm profit under positive and negative real rates draws a rough picture of the effect of temporarily high inflation on farm income (see Annex 7.7). The real interest rates and thus the capital costs are assumed to correspond to 5 % for own capital and of 10% for external capital. As soon as the real interest rates become positive, the profit of an average farm (six hectares of agricultural land and three family workers) declines by more than 22 million lei. With increasing labor input the remuneration of labor and land use omitted in these calculations becomes difficult.

Figure 10 illustrates graphically two different profit situations of an average individual farm with varying capital expenditure under certainty and under zero transaction costs for external capital funds, (1) under negative real interest rates (thick line) and (2) under positive real rates (thin line). As before, the opportunity costs for land and labor input are set to zero. It becomes clear that even under positive real rates an average farm makes a profit that allows it partly to remunerate the land and labor input. Further, the optimal capital expenditure for an average farm seems to range around 20 million lei under positive real interest rates.

However, it should again be emphasized that these profit calculations underlie certain outcomes and with the exception of the interest rates no further costs for external capital are taken into account. The influence of uncertainty and external capital costs such as tough collateral requirements, risk and fees on capital demand is discussed in the next chapter.

[43] non-agricultural jobs

Figure 10 Profit of an average individual farm under negative and positive real interest rates.



Source: Own calculation

4.4 Capital demand, uncertainty and collateral requirement

4.4.1 Capital demand for own or external capital

Under uncertain production and market conditions, the farmers are not sure about their farm income and thus about their capability to repay a loan and the interest. Moreover, financial institutions only approve a loan application if they are able to seize sufficient and real assets as collateral. Consequently, the capital demand function is affected by the uncertainty in farm returns and by collateral requirements and becomes, for own capital demand K_o in Romania:

(49) $K_o = [(i-(1-q)) / (q \cdot \beta c A^{\alpha} L^{\gamma})]^{1/(\beta-1)}$.

$= [(0.53+(1-q)) / (q\ 0.52 \cdot 5.91 A^{0.25} L^{0.07})]^{1/(0.52-1)}$.

And for external capital K_f demand:

(50) $K_f = [(q\ j+(1-q)\eta-(1-q)+f) / (q\ \beta c A^{\alpha} L^{\gamma})]^{1/(\beta-1)}$..

$= [(q\ 0.62+(1-q)1.6-(1-q)+0.05) / (q\ 0.52 \cdot 5.91 A^{0.25} L^{0.07})]^{1/(0.52-1)}$.

where
1-q: probability of default, $0 \le q \le 1$
j: loan interest rate/100 + 1
i: deposit interest rate/100 + 1

As before, the capital opportunity costs are assumed to correspond to the real interest rates in Romania. The collateral requirements (η) amount to at least 160% of the loan amount[44] (η=1.6). The fees (f) for insurance, registrations and loan approval are considered as a share of the loan

[44] The collateral has to cover the principal and the interest for one year. Under a nominal loan interest rate of 60% p.a. the collateral value has to cover 160% of the loan amount.

amount of up to 5% [45]. The capital cost for own capital corresponds to the deposit interest rate, for external capital to the loan interest rate. The uncertainty of repayment is incorporated through the probability of default (1-q).

Table 17 Capital demand under negative real interest rates with tough collateral requirements and uncertainty of return

Demand for own capital in million lei							
q = 0.95		*i = 0.53**					
Input of A in ha	*Input of L in man power per year*						
	0.5	*1*	*1.5*	*2*	*2.5*	*3*	*3.5*
1	38.87	43.00	45.62	47.58	49.15	50.47	51.62
5	89.87	99.43	105.49	110.01	113.65	116.71	119.36
10	128.95	142.67	151.36	157.84	163.06	167.46	171.26
Demand for external capital in million lei							
q = 0.90		*j = 0.62***	*f = 0.05*			*η = 1.6*	
Input of A in ha	*Input of L in man power per year*						
	0.5	*1*	*1.5*	*2*	*2.5*	*3*	*3.5*
1	17.44	19.30	20.47	21.35	22.06	22.65	23.17
5	40.33	44.63	47.34	49.37	51.01	52.38	53.57
10	57.87	64.03	67.93	70.84	73.18	75.15	76.86
q = 0.95		*j = 0.62***	*f = 0.05*			*η = 1.6*	
Input of A in ha	*Input of L in man power per year*						
	0.5	*1*	*1.5*	*2*	*2.5*	*3*	*3.5*
1	19.46	21.53	22.84	23.82	24.61	25.27	25.85
5	45.00	49.79	52.82	55.09	56.91	58.44	59.77
10	64.57	71.44	75.79	79.04	81.65	83.85	85.76

Source: Own calculations
Note: * 1 + average real deposit rate/100 at commercial banks at Dec. 1997, calculated using the Fisher effect
** 1 + average real loan interest rate/100 at commercial banks at Dec. 1997, calculated using the Fisher effect.

Two different default rates (1-q) 5% and 10% are assumed.[46] The resulting demand levels of the model for own and external capital in million lei per production period (year) is indicated in Table 17. It shows the capital demand in dependence of farm size which is expressed by varying land and labor inputs. The increase in the default rate (1-q), the collateral requirement (η), the loan fees (f) or the interest rate leads to a reduction in capital demand, given the precondition that $q > (1-\eta-f)/(1-\eta+j)$ [47], which is met by definition for (q).

To quantify the impact of loan approval fees and collateral requirements on capital demand, the fees are reduced to one per cent and the loan coverage declines to 100% of the loan principal[48]. The resulting capital demand displayed in Table 18 shows that the reduction of fees and collateral

[45] Risk premia of 3%, insurance for collateral of 0.75% for mobiles and 0,4% for immobiles, and 1,25% for credit insurance of the bank and a fixed amount of around 50.000 lei for asset valuation and diverse registrations. Source: Bank interview 1997
[46] The default rates are based on estimations and experiences of the interviewed financial institutions with small farm loans and their default rates.
[47] See chapter on Methodology, capital demand under uncertainty, $\delta k/\delta..<0$ only if $q > (1-\eta-f)/(1-\eta+j)$
[48] Fees f of 1% of the loan amount and the loan coverage η of 100% corresponds more closely to the common practice of financial institutions.

requirement leads to an increase in capital demand of almost one third under otherwise similar conditions (q = 0.95).

Table 18 Capital demand under uncertainty and negative real interest rates with relaxed loan requirements

Demand for external capital in million lei							
q = 0.95	*j = 0.62*		***f = 0.01***			***η = 1.0***	
Input of A in ha	*Input of L in man power per year*						
	0.5	*1*	*1.5*	*2*	*2.5*	*3*	*3.5*
1	24.45	27.06	28.70	29.93	30.92	31.76	32.48
5	56.55	62.56	66.37	69.22	71.51	73.43	75.10
10	81.13	89.76	95.23	99.31	102.60	105.36	107.75

Source: Own calculations.

The impact of interest rates on capital demand is shown in Table 19, where the opportunity costs applied for own or external capital are increased and correspond to clearly positive real rates. The derivatives with respect to (i) or (j) are negative and indicate a declining capital demand with increasing interest rates. Under these conditions, not surprisingly the demand for own capital under certain outcomes is higher than the demand for own capital under uncertain outcomes. The increase of interest rates has largely reduced capital demand at different farm size levels.

Table 19 Capital demand under uncertainty and positive real interest rates with tough collateral requirements

Demand for own capital in million lei							
q = 0.95	*i = 1.05*						
Input of A in ha	*Input of L in man power per year*						
	0.5	*1*	*1.5*	*2*	*2.5*	*3*	*3.5*
1	8.42	9.32	9.89	10.31	10.65	10.94	11.19
5	19.48	21.55	22.86	23.84	24.63	25.29	25.87
10	27.95	30.92	32.80	34.21	35.34	36.29	37.12
20	40.10	44.36	47.07	49.08	50.71	52.07	53.26
Demand for external capital in million lei							
q = 0.90	*j = 1.10*		*f = 0.05*			*η = 1.6*	
Input of A in ha	*Input of L in man power per year*						
	0.5	*1*	*1.5*	*2*	*2.5*	*3*	*3.5*
1	6.17	6.83	7.24	7.55	7.80	8.01	8.20
5	14.27	15.79	16.75	17.47	18.04	18.53	18.95
10	20.47	22.65	24.03	25.06	25.89	26.59	27.19
20	29.37	32.50	34.48	35.96	37.15	38.15	39.01
q = 0.95	*j = 1.10*		*f = 0.05*			*η = 1.6*	
Input of A in ha	*Input of L in man power per year*						
	0.5	*1*	*1.5*	*2*	*2.5*	*3*	*3.5*
1	6.59	7.29	7.74	8.07	8.33	8.56	8.75
5	15.24	16.86	17.89	18.65	19.27	19.79	20.24
10	21.87	24.19	25.67	26.77	27.65	28.40	29.04
20	31.37	34.71	36.82	38.40	39.67	40.74	41.67

Source: Own calculation

Note: The opportunity costs of capital are assumed to be real 5% p.a. for own capital and real 10% p.a. for external capital use.

The impact of fees and collateral requirements on capital demand is quantified in Table 20. It shows that the relaxation of fees and collateral requirements leads to a slight increase in external capital demand. However, the impact of collateral and fees on the capital amount demanded is moderate.

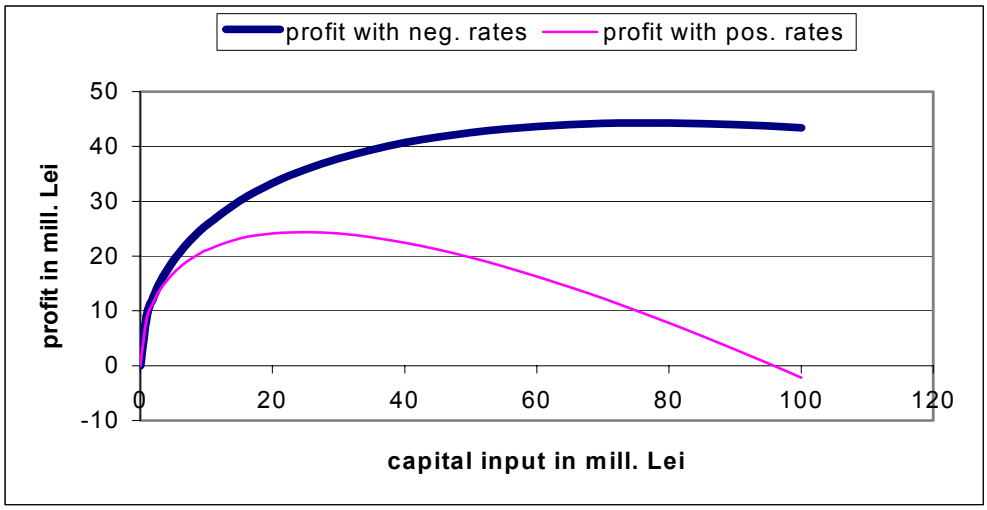
Table 20 Capital demand under uncertainty and positive real interest rates with relaxed collateral requirements

Demand for capital in million lei under uncertainty and collateral requirements							
Demand for external capital in million lei							
q = 0.95		*j = 1.10*	***f = 0.01***		***η = 1.0***		
Input of A in ha	*Input of L in man power per year*						
	0.5	*1*	*1.5*	*2*	*2.5*	*3*	*3.5*
1	7.53	8.34	8.84	9.22	9.53	9.78	10.01
5	17.42	19.28	20.45	21.33	22.03	22.63	23.14
10	25.00	27.66	29.34	30.60	31.61	32.46	33.20
20	35.87	39.68	42.10	43.90	45.35	46.58	47.63

Source: Own calculations

To illustrate the profit situation of an average farm under negative and positive real interest rates two corresponding profit curves are depicted in Figure 11. They take into account the uncertainty conditions and transaction costs[49] for external capital use. The thick line represents the profit situation under negative real loan interest rates, the thin line under positive real loan interest rates. The cost for labor and land are set equal to zero in order to facilitate a comparison with the profit curves under certainty and zero transaction costs in Figure 10. As expected, the profit curve under uncertainty and with transaction costs shifts downwards compared to the profit situation under certainty, but the shape of the profit curve remains rather unchanged.

Figure 11 Profit of an average farm under uncertainty and with transaction costs for external capital



Source: Own calculation

[49] Here, transaction costs are set equal to fees and collateral requirements. The latter are seen as potential transaction costs.

4.4.2 Capital demand in combination with external and own capital

However, in reality an individual farmer's capital expenditure are financed through own and external capital sources. Thus, the capital expenditure (K) becomes $K = K_o + K_f$, as developed in Chapter 3.2. The demand for external capital K_f^D is defined as the difference between the optimal external capital input and the optimal available[50] own capital input under given interest rates and is expressed in equation (51). This definition of the capital demand function leads to a jump in the marginal demand curve with respect to K at the point where the input of capital (K) derives from external sources.

(51) $K_f^D = [(qj + \eta(1-q) + f - b(1-q)) / q\theta]^{\epsilon} - K_o.$

Clearly the demand for external capital depends very much on the availability of own capital and also on the difference between the opportunity cost of own and external capital. According to the survey, the average loan size ranges around nine million lei[51] at constant prices (Annex 7.3). The actual average ratio of external capital (loan) to total capital expenditure for private farms is about 0.25. Therefore, it is assumed that an individual farmer is able to input around one-quarter of his capital expenditures from external capital sources. The final demand levels for external capital under input of own capital, uncertainty, fees and collateral requirements is shown in Table 21 with varying land size and available family labor inputs. The figures indicate the external demand as the difference between the weighed (0.75) optimal own capital input and the optimal external capital input. A so-called negative capital demand arises due to the large difference between the opportunity cost for own and external capital as it was prevailing in Romania. Also, the relative restriction of optimal own capital input to 75%, and the unlimited absolute own capital input of the model permits a negative external capital demand.

Table 21 Demand for external capital under uncertainty and negative real rates with tough collateral requirements and own capital K_o

External capital demand in mn lei							
q = 0.95	*j = 0.62*	*i = 0.53*	*f = 0.05*	*η = 1.6*	*a, b = 1*	*K_o share = 0.75*	
Input of A in ha	*Input of L in man power per year*						
	0.5	*1*	*1.5*	*2*	*2.5*	*3*	*3.5*
1	-9.69	-10.72	-11.37	-11.86	-12.25	-12.58	-12.87
5	-22.40	-24.78	-26.29	-27.42	-28.33	-29.09	-29.75
10	-32.14	-35.56	-37.73	-39.34	-40.64	-41.74	-42.69

Source: Own calculations

However, this calculated potential capital demand does not correspond to reality. The actual use of external capital, for example through subsidized loans from banks or other sources, is higher – positive- than the demand calculated in Table 21. The main reasons for the observed external capital use through loans are that the interest rates for loans to small-scale agricultural enterprises are on average 49 per cent points below (subsidized) the official, registered market loan rate (Annex 7.3), and thus the actual nominal loan interest rates are lower than the official nominal

[50] If the available capital input is lower than the optimal own capital input, then the available capital determines the external capital input, otherwise the optimal own capital input has to be taken into account.

market deposit rates. Consequently, any rationally-acting economic agent tries to obtain as much external capital as possible, to at least invest in a bank deposit account. The capital demand under subsidized interest rates in the model, displayed in Table 22, confirms this behavior of farmers for large amounts of cheap external capital.

Table 22 Demand for external capital under uncertainty, tough collateral requirements and subsidized (negative real) loan interest rates and with own capital K_o

Demand for external capital in million lei							
q = 0.95	***j = 0.42***	*i = 0.53*	*f = 0.05*	*η = 1.6*	*a, b = 1*	*K_o share = 0.75*	
Input of A in ha	*Input of L in man power per year*						
	0.5	*1*	*1.5*	*2*	*2.5*	*3*	*3.5*
1	9.89	10.94	11.60	12.10	12.50	12.84	13.13
5	22.86	25.29	26.83	27.98	28.91	29.69	30.36
10	32.80	36.29	38.50	40.15	41.48	42.59	43.56
20	47.06	52.06	55.24	57.60	59.51	61.11	62.50

Source: Own calculations

Note: The interest rate subsidy was on average 49 percentage points (farm survey 1997) below the official published average loan rate of 55%, end-December 1997, (NBR, 1998). The final subsidized nominal lending rate was 55%-49% = 6%, corresponding to a real lending rate of –58%. Thus, j = 1-0.58 = 0.42.

The impact of positive real interest rates with tough and relaxed fees and collateral requirements is shown in Table 23 and Table 24, respectively. Although the demand for external capital is still rather low, it becomes positive when the margin between the loan and deposit interest rate decreases. Further, the relaxation of fees and collateral contribute to a slight increase in demand. Thus, the loosening of collateral requirements and the reduction of fees increases the capital demand for an average farm[52] to about four million lei, but the size of the loan demanded is small[53] compared to other business loans, which range on average around 11 million lei.[54]

Table 23 External capital demand under positive real rates with tough collateral requirements under uncertainty and own capital K_o

Demand for external capital in million lei							
q = 0.95	*j = 1.1*	*i = 1.05*	*f = 0.05*	*η = 1.6*	*a and b = 1*	*K_o share = 0.75*	
Input of A in ha	*Input of L in man power per year*						
	0.5	1	1.5	2	2.5	3	3.5
1	0.27	0.30	0.32	0.33	0.35	0.35	0.36
5	0.63	0.70	0.74	0.77	0.80	0.82	0.84
10	0.91	1.00	1.06	1.11	1.15	1.18	1.20
20	1.30	1.44	1.53	1.59	1.64	1.69	1.73

Source: Own calculations

[51] Constant prices based on December 1997, farm survey 1997,
[52] Average farm: 6 hectares of agricultural land, 3 family workers.
[53] 4 million lei corresponds to about 440 EUR in Dec. 1997.
[54] Survey of non-agricultural enterprises, 1997/98, in Brasov and Dolj.

Table 24 External capital demand under positive real interest rates and relaxed loan requirements on external capital demand under uncertainty with own capital K_o

Demand for external capital in million							
q = 0.95	*j = 1.1*	*i = 1.05*	***f = 0.01***	***η = 1.0***	*a, b = 1*	*K_o share = 0.75*	
Input of A in ha	*Input of L in man power per year*						
	0.5	*1*	*1.5*	*2*	*2.5*	*3*	*3.5*
1	1.22	1.35	1.43	1.49	1.54	1.58	1.62
5	2.81	3.11	3.30	3.44	3.56	3.65	3.74
10	4.04	4.47	4.74	4.94	5.11	5.24	5.36
20	5.79	6.41	6.80	7.09	7.32	7.52	7.69

Source: Own calculations

4.4.3 Capital demand under risk aversion

The farm household as an entity is composed of an agricultural enterprise and a household. It is therefore assumed that the farm household as a decision-making unit focuses on utility-maximizing rather than on pure profit maximization and that the utility function displays a concave shape. Consequently, the household members display risk aversion as regards the possible gains or losses from business activities. The more concave the utility function, the greater the decline in demand for external capital.

Since the shape of the utility function applied is supposed to be concave, a logarithmic function for utility U = ln(W+П) is used. The special characteristics of logarithmic functions are that they are strictly monotone, increasing for all logarithmic values (W+П) larger than zero and non-existing for all values smaller than zero, negative for all values 0<(W+П)<1, and that all logarithmic functions have one common point, which is zero for (W+П)=1 (Schule 2000). These characteristics affect the capital demand function in that the demand is zero for all values (W+П) ≤ 1. The figures used to calculate the capital demand are high in numerical terms but not in values (1 million lei ~ 110 EUR). In this functional form a change in utility or capital demand is large for very small values of (W+П). The objective is to demonstrate that with a low wealth level and a possible loss of assets the demand for capital is rather low, but increases with increasing wealth, further characteristics of the selected functional form are of secondary relevance. Most important is that the model shows that the risk aversion decreases with increasing wealth. For this reason, the relative increase in wealth compared to capital demand should be considered, and not absolute wealth. The demand function is based on the maximization of the expected utility function depicted by equation (52) for production where the input of own capital is equal to zero (K_o=0).

(52) $U = q\,U(W+h_1) + (1-q)\,U(W-h_0)$ [55]

where $h_1 = [\,Y - (K_f j + K_f f + Ar + Lw)\,] = П_1$ [56]

$h_0 = [\,bK_f - (K_f η + K_f f + Ar + Lw)\,] = П_0$

$b \leq 1$

$Y = cK_f^{\beta} A^{\alpha} L^{\gamma}$

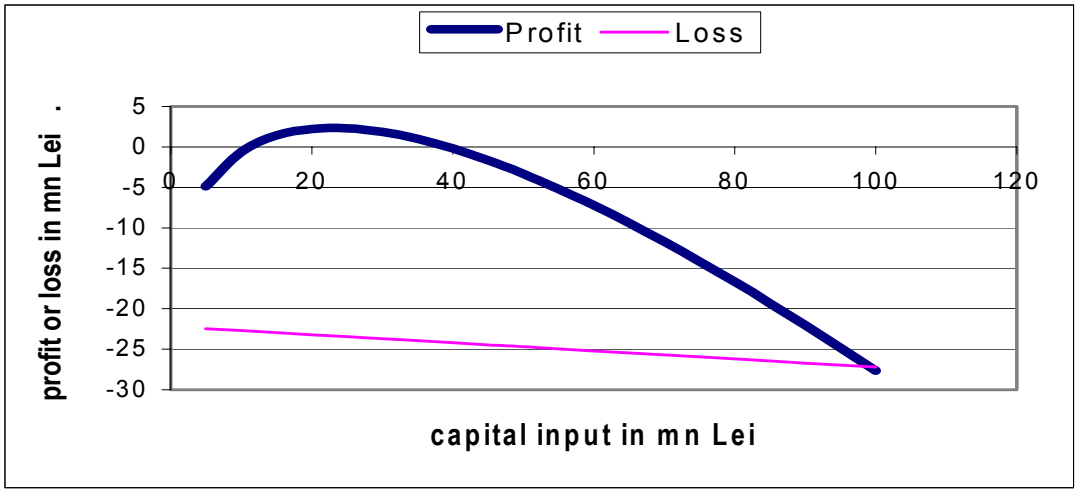
[55] Assuming a concave utility function of the form u = ln(W+hП).

[56] Since the utility function is concave, the profit function h_1П is assumed to be linear in (K) and thus independent of (K) for utility maximization.

As a first step, the potential gains or losses dependent on a certain amount of capital expenditure are calculated according to the equations above. The potential profit and loss is based on an average individual farm with six hectares of cultivable land and three family workers. The negative real interest rates applied conform to the actual situation in Romania. The fees, collateral requirements and remuneration of the other input factors are explained in the notes.

The two curves in Figure 12 represent the two possible outcomes: a loss and a profit, each depicted with a probability of occurrence equaling to one (q=1, (1-q)=1). Along the vertical line the gain or loss is illustrated in relation to the capital expenditure represented by the horizontal line. A decrease in (q) shifts the profit line downwards and a decrease in (1-q) shifts the loss line upwards. An intersection of the loss or profit lines indicates at which probability and capital input level the potential profit compensates the potential loss. In contrast to the actual situation in Romania, the potential loss and profit situation under positive real rates is depicted in Figure 12. The loss line is flatter than under negative rates (see Annex 7.8) and the profit line exposes a global maximum followed by a profit decrease, ending in a loss situation under high capital input due to the positive real interest rates. In this case a decline in the probability of success (q, set equal to one), shifts the profit line downwards, leaving a rather small scope for gains.

Figure 12 Profit or loss situation under positive real rates and relaxed collateral requirements



Source: Own calculations
Note: Collateral coverage of only 100%, η=1, real loan interest rate of 10%, f=0.05, b=1, w=5.4 mn lei, r=1 mn lei, profit = h_1, loss = h_2.

Based on the capital demand function developed in Chapter 3.2, the demand for external capital with $K_o = 0$ is given by the expression:

(53) $K_f^D = (1-q)(W-Ar-Lr+Y) / (j+f) - q(W-Ar-Lw) / (b-\eta-f)$

where $Y = c\,[(qj+f+Ar+Lw-(1-q)(b-\eta))/(q\beta A^{\alpha}L^{\delta})]^{(\beta/(1-\beta))}\, A^{\alpha}L^{\delta}$

The demand for capital under varying wealth levels, collateral requirements and interest rates is llisted in Table 25. The wealth level of 25 and 50 million lei is chosen to demonstrate the impact of wealth level on capital demand. Actual information on the wealth of individual farms was not available. [57] Furthermore, the actual shape of the utility function is unknown, but it is commonly assumed that the utility function is concave. The concavity is represented by a logarithmic functional form in the model. The capital costs referred to in this table include the loan interest rate, fees and the potential collateral loss.

Table 25 Capital demand in relation to capital costs under risk aversion and different wealth levels

Capital demand in million lei				
	W=50 million lei, η=1.9	*W=25 million lei, η=1.9*	*W=50 million lei, η = 3*	*W= 25 million lei, η= 3*
j	Capital K			
0.5	78.53	8.07	63.61	6.57
0.6	70.72	7.26	55.80	5.76
0.7	65.00	6.66	50.08	5.16
0.8	60.62	6.21	45.70	4.70
0.9	57.16	5.85	42.25	4.35
1	54.37	5.56	39.45	4.05
1.1	52.06	5.32	37.14	3.81
1.2	50.11	5.11	35.20	3.61
1.3	48.46	4.94	33.54	3.44
1.4	47.04	4.79	32.12	3.29
1.5	45.79	4.66	30.88	3.16

Source: Own calculation

The probability of default (1-q), the collateral requirements (η), the administration fees (f), the family wage level (w) and the opportunity cost (r) for agricultural land take the values: (1-q)=0.05, η=1.6 or 3, f=0.05, w=5.4 million lei per year and r= 1 million lei.

The data in Table 25 above reveal several features of the farmers' behavior as regards the demand for external capital: (i) the demand for capital declines with a lower asset endowment level (W), and a decrease in wealth of one unit yields an even larger reduction in capital demand. (ii) The demand for capital declines with increasing capital costs. (iii) An increase in the collateral requirements for external capital leads to a significant reduction in capital demand. The derivatives of the capital demand curve with respect to loan requirements, asset endowment and capital costs confirm these findings. Taken together, the relation of initial wealth to possible loss is a very crucial factor influencing external capital demand in the model.

[57] The average capital input of an individual farm is 35 million lei. The evaluation of available farm assets is considered impossible due to lack of information on their values, prices or qualities. The chosen wealth level takes into account the specific characteristics of the logarithmic utility function and aims at demonstrating the effect of different wealth levels on capital demand.

4.5 Supply of capital

The supply of capital offered per loan transaction through financial institutions can be differentiated from the expected profit function. The credit supply in this study is derived from the partial profit function developed in Chapter 3.2. The number of labor hours spent for a loan contract between an individual farmer and a bank depends on the legal status of the borrower. As described in Chapter 2, financial institutions consider a 'farm' as a natural person if there is one member of the farm household in permanent employment who stands for the loan (as borrower). Otherwise the individual farm is considered as a legal entity, and this implies considerable paperwork and thus requires more working time which increases the transaction costs. For this reason the working hours (H) per loan contract correspond to the average working time spent for legal and natural persons depicted in Chapter 2, Table 2-6. The working cost (v) per hour is based on the income of a loan officer plus the additional costs to the employer.[58] The fees (F) due for the opening of an account ranged at around 10-20 thousand lei at the end of December 1997.

Table 26 Profit situation of financial institutions, per loan contract

Partial profit in million lei under negative real interest rates						
Loan size in million lei	*Probability of repayment p*					
	0.5	*0.6*	*0.7*	*0.8*	*0.9*	*1*
1	0.57	0.47	0.38	0.28	0.18	0.08
5	2.89	2.40	1.91	1.42	0.93	0.44
10	5.79	4.81	3.83	2.85	1.87	0.89
Partial profit in million lei under positive real interest rates						
Loan size in million lei	*Probability of repayment p*					
	0.5	*0.6*	*0.7*	*0.8*	*0.9*	*1*
1	-0.01	0.00	0.01	0.02	0.03	0.04
5	-0.01	0.04	0.09	0.14	0.19	0.24
10	-0.01	0.09	0.19	0.29	0.39	0.49

Source: Own calculations

Note: The probability of repayment ranges around 49% in the farm sample (n=181). This is based on the assumption that the principal and the interest are repaid if the net income in relation to capital expenditure is around 0.1 (see Annex 7.1). The values of the applied variables or parameters are for i=0.53 or 0.05, j = 0.62 or 0.1, H = 7, v = 0.02, F = 0.02.

The profit situation under varying loan sizes (K_f^S) and probabilities of repayment (p) is depicted first under interest rates and high collateral requirements as they prevailed in Romania at the end of December 1997, and then under high interest rates (positive real rates) with moderate collateral requirements. The probability of repayment (p) represents the chance of the financial institutions to select an individual farmer whose net income to capital expenditure is sufficiently high to repay the principal and the interest. The frequency distribution of the ratios shown at the beginning of chapter 4 (see also Annex 7.1.) serves as a measure for the probability (p) of selecting a non-defaulting borrower.

[58] The gross wage of a loan officer is about 2.5 million lei as of end December 1997 (Bank interview, 1997). The additional costs to the employer amount to about 32% of the gross wage. Further, about 800 working hours per month are calculated. v = 2.5 * 1.32/800=0.004 million lei per hour.

The comparison between the profit under negative real and positive real rates reveals, first, that under negative real rates the profit increases with increasing default since the return from the resale of collateral, considered in this model without collateral resale costs, is higher than the real loan interest rates. This is because the collateral value (η=1.6) of 160% of the loan amount[59] is a real value while the loan interest rates are nominal rates and partly negative in real terms. Under positive real rates, the profit becomes positive with a probability of default (1-p) slightly lower than 50%. This is due to the omission of the costs associated with collateral resale. Second, the profit of financial institutions originates from the margin between the loan interest rate and the deposit interest rate. In periods of high inflation, this margin is fairly high, while in periods of low inflation this margin decreases and hence the profit declines too.

The capital supply in equation (54) (see chapter 3.2) represents a set of possible loan sizes with a boundary indicating the minimum or maximum loan size a financial institution has to offer to gain a profit of at least zero lei.

$$(54)\quad K_f^S \quad >=< \quad \frac{(Hv - F)}{((p\,(j - \eta) - (i - \eta))} \quad = \quad S \qquad \text{for a profit equal to at least zero}$$

where
- p: probability of receiving the principal-interest payment K_fj, $0 \leq p \leq 1$,
- F: fixed amount of fees (revenue) before the loan installment,
- H: labor hours,
- v: average wage per labor hour of a credit officer,
- η: collateral requirement
- i: real interest rate for deposits/100 + 1
- S: (Hv - F) / m
- m: [p(j-η) + (i-η)]

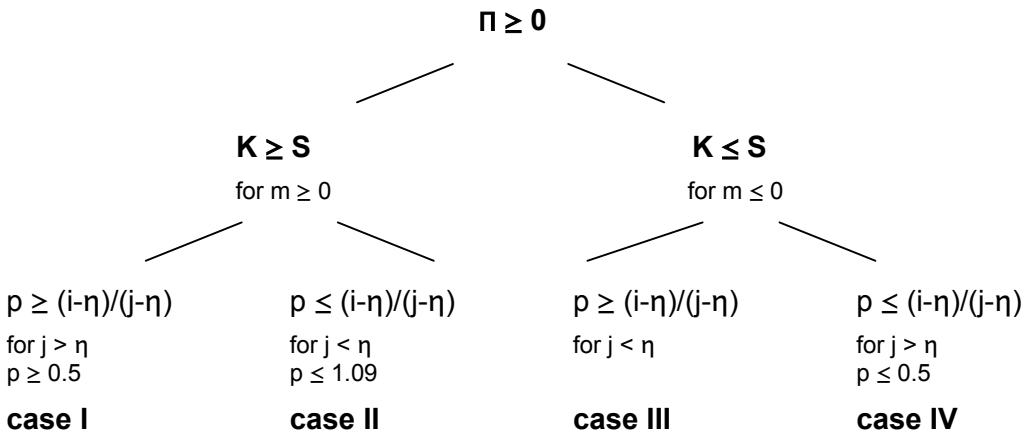
The minimum loan size or capital supply per loan contract depends on the ratio of the interest rates and collateral values. Under negative real rates and tough collateral requirements, the capital revenue for a financial institution is smaller than the return from the collateral requirement (η)[60], this is j<η as indicated by case II and III in Figure 13. Then, according to Figure 13, the probability of repayment should be higher than the interest rate ratio, which is 1.09 for K ≤ S, or lower than the interest ratio for K ≥ S. But, since (p) cannot by definition be greater than one, the probability must be lower than the interest ratio and thus the capital supply is equal to or larger than (S) as indicated by case II of Figure 13. Hence, in case II the capital supply reflects the minimum loan size necessary to cover the expenses. Increasing (p) to one, the minimum loan size per contract increases.

In situations with low inflation, the capital revenues are supposed to be larger than the collateral requirements (case I and IV in Figure 13) and subsequently, the probability of repayment appears to be greater than the ratio of the interest rates, which in case I is 0.5. From this probability point upwards, the capital supply is equal or larger than (S) for π≥0, as pointed out in Figure 13. Hence, the supply set reflects a minimum loan amount. For all values of (p) lower than 0.5 (case IV), the loan size lies below (S) as depicted in Figure 15 and represents a maximum loan size.

[59] 100% for the principal and about 60% for the interest rate of one year.
[60] This underlies the assumption, that the collateral can be seized and sold without further costs.

The following ‘case tree’ summarizes the different situations/cases discussed above:

Figure 13 Case tree

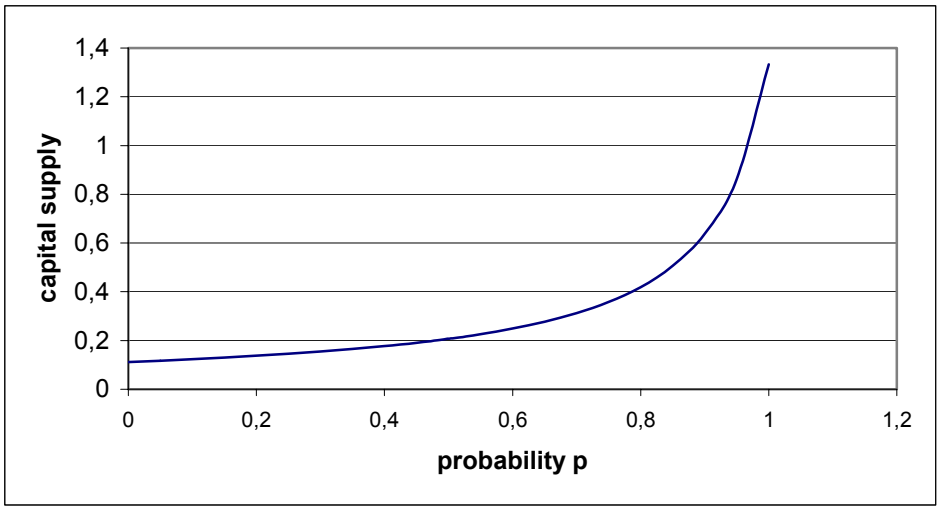


The capital supply in relation to probability (p) is depicted in Figure 14 and Figure 15 for case II and case I and IV from Figure 13 above. The other variables such as i, j, η, F, H and v remain constant. The depicted supply functions represent the outer line of a convex set, along which the profit is equal to zero.

Figure 14 reflects the Romanian conditions, where (j-η) is smaller than (i-η). The greater (p) becomes, the smaller the denominator (m) and thus the steeper the line in Figure 14, representing an increasing minimum loan size for a profit of at least zero. At p(j-η) equaling (i-η), which occurs at p = 1, the capital supply set has reached its limit and no capital supply beyond that line yields any profit.

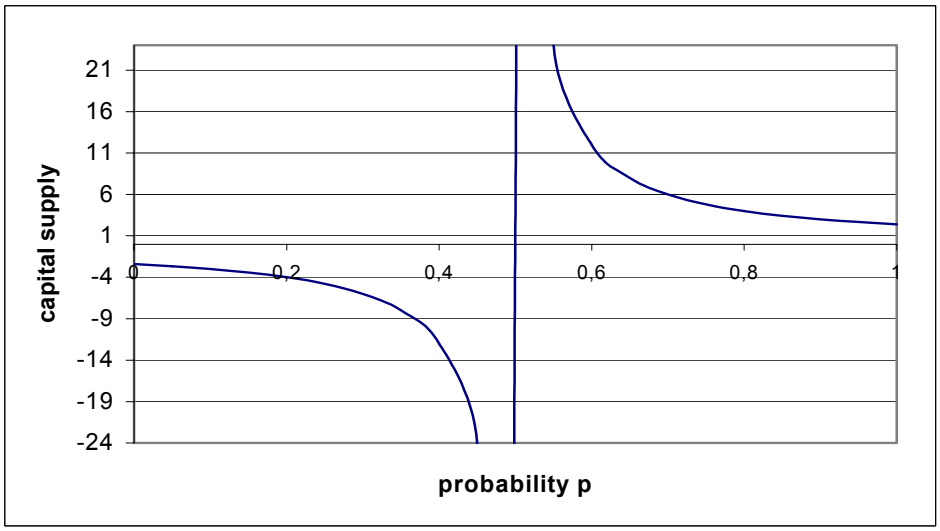
Figure 15 contains two convex sets; the first set (case IV) ranges from p = 0 to p = 0.499999 revealing a capital supply per loan contract smaller than the indicated line, and the second set (case I) ranges from p = 0.500001 to p = 1, showing a possible capital supply larger or equal to the line drawn. Hence, the capital supply is ‘negative’ up to (p) lower than 0.5 (p<0.5) and positive for p > 0.5 under positive real interest rates. Since the line in Figure 15 represents the boundary (for Π = 0) of the capital supply set, any capital supply or loan size within this set leads to a profit larger than or equal to zero.

Figure 14 Capital supply set[61] of a financial institution, under high inflation in relation to p (case II)



Source: Own calculations
Note: The variables j, i and η take the values j=0.62, i = 0.53 and η=1.6; capital supply is indicated in million lei

Figure 15 Capital supply set of a financial institution under low inflation in relation to p (case I and IV)



Source: Own calculations
Note: Capital supply in million lei per loan contract; the variables j, i, and η take the values j=1.1, i = 1.05, η=1

The screening effort is expressed in working hours (H) per loan agreement. To quantify the impact of this effort, the minimum capital supply for (Π = 0) is indicated in Table 27 under different working hours spent per loan contract and under different probabilities (p) of repayment, beginning with p=0.501. The minimum loan size per contract has to increase in line with the increase in working

[61] Here, capital supply refers to a set consisting of a bundle of possible offered loan sizes for a profit larger than or equal to zero

hours (H). However, under positive rates in real terms the minimum required loan sizes decrease in line with the increase in (p), even with a high input of working hours.

Table 27 Minimum capital supply per loan contract under varying (screening efforts) working hours H and probabilities p

Supply of capital under negative real rates in million lei						
	Probability of repayment p					
H in hours	0.5	0.6	0.7	0.8	0.9	1
8	0.02	0.02	0.03	0.04	0.06	0.13
10	0.03	0.04	0.05	0.07	0.11	0.22
12	0.05	0.06	0.07	0.10	0.15	0.31
Supply of capital under positive real rates in million lei						
	Probability of repayment p					
H in hours	0.501	0.6	0.7	0.8	0.9	1
8	120.00	1.20	0.60	0.40	0.30	0.24
10	200.00	2.00	1.00	0.67	0.50	0.40
12	280.00	2.80	1.40	0.93	0.70	0.56

Source: Own calculations

An employee of a financial institution needs in average of seven working hours (H) to check the documents required, to approve the loan application and to monitor repayment. However, he is unable to assess the financial performance of the individual farm, since no detailed information on either the production process or on investment is requested. To reveal the actual financial situation of an individual farm, additional screening efforts are necessary which may be similar to the efforts made in the context of the questionnaire for the farm survey in 1997. With the help of the information obtained from the farm survey, the actual situation of a farm can be depicted and analyzed. Such additional information-gathering reduces the risk and thus increases the probability of loan repayment. On the other hand, however, it also increases working time and thus the transaction costs per loan contract. The distribution of net income to capital expenditure (Annex 7.1) shows a loan default of approximately 50% of all farmers interviewed. An extended screening with an additional 4-5 hours of labor input, which is equivalent to the hours spent on an individual farm survey and the data analysis, would reduce the risk of default. This default rate is assumed to be about 5%.[62] The minimum loan size for a loan agreement decreases significantly to about 0.5 million lei per loan contract with H = 11 and p = 0.95 under positive rates in real terms.

[62] The farm income is uncertain and for the calculation of expected farm income this uncertainty is taken into account with a risk of default of 5% (q=0.5).

4.6 Supply of and demand for capital

A matching of loan supply through financial institutions and loan demand from farmers only occurs if there exists a functioning market with a market clearing price, the market clearing interest rate. This study developed a demand function for loans under profit maximizing behavior in relation to the costs of capital, taking into account the uncertainty of return and the collateral requirements. Further, it showed a bundle of offered loan sizes per borrower – a capital supply set based on the assumption of a profit of at least zero for the lender. To see the coincidence of demand and supply under varying interest rates, the demand function of an average individual farm and the supply set of a financial institution are compared under different loan conditions.

First, the capital demand $K^D = K_f^D$ ($K_o = 0$) of an average individual farm[63] is set against a set of offered loan sizes K_f^S both depending on the interest rates. The loan conditions are classified into four cases (1)-(4):

1. Loan supply and capital demand are based on pure profit maximizing behavior under high inflation, so that interest rates are temporarily negative in real terms and the difference between the lending and deposit rates ranges at around 10 percentage points (NBR, 1998). The collateral requirements or asset values for the lender are the sum of the principal plus the nominal interest rate for one year (160% of the loan amount), that is η_F=1.6 and for the borrower (almost 300% of the loan amount) η_B=2.98 (see Chapter 4.2). The probability of default (1-q) for the lender rises in line with an increased lending rate (Annex 7.1). The average working hours (H) per loan contract are set at H=7
2. As in case (1) except that inflation is low, the interest rates are positive in real terms and the difference between the lending and deposit rates ranges at around 5 percentage points. The collateral requirements or asset values for the lender are η_B=1.0 (100% of the loan amount) and for the borrower η_F=1.9 (see Chapter 4.2).
3. As in case (2) except that the probability of default (1-q) for the lender for all interest rates reaches the level of q=0.95 due to improved screening efforts. The thorough screening requires more working hours (H), which are set to H = 11.
4. As in case (3) except that capital demand is based on utility maximizing behavior.

Second, the capital demand $K^D = K_f - K_o$ ($K_o \neq 0$) from only external sources is set against the same set of offered loan sizes K_f^S. The external capital demand is defined as the difference between optimal capital expenditure and available own capital K_o of an average individual farm. In order to reflect the availability of own capital, the share of K_o is set to three-quarters of the total capital input (Chapter 4.4.2). As before, three cases of loan conditions are identified:

5. As in case (1).
6. As in case (2).

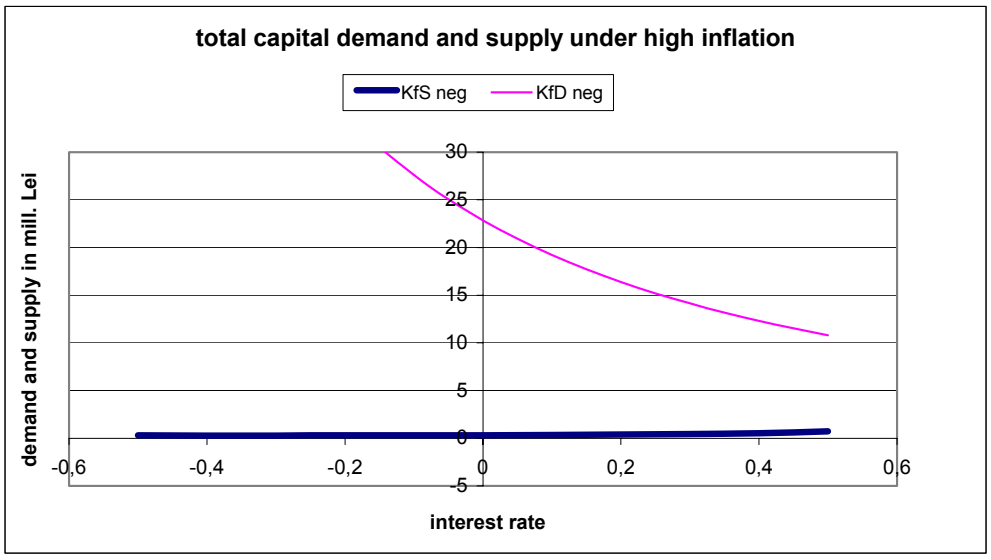
[63] Average farm: A = 6, L = 3, q = 0.95

7. As in case (3).

The demand of an average individual farm and the supply of capital are depicted in Figure 16 to Figure 18. The thick line represents the boundary of the capital supply set where the financial institutions' profit reaches at least zero. The thin line reflects the capital demand function of an average individual farmer. The y-axis represents the loan size under varying negative and positive interest rates depicted along the x-axis.

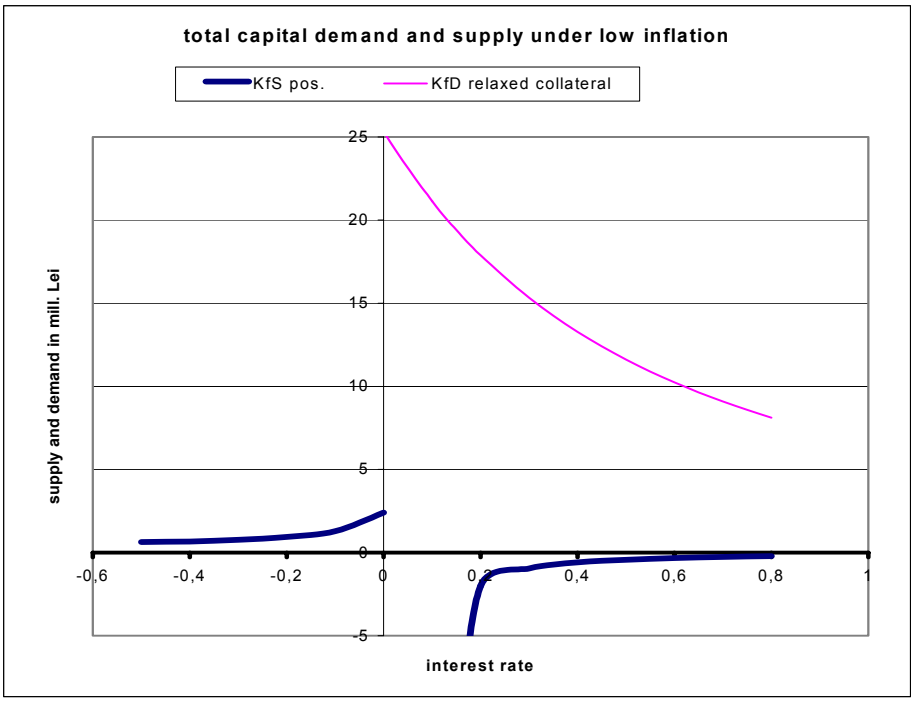
The different variables or parameters take the following values: H=7 or H=11 hours for low or high screening efforts, v=0.02 mn lei, F= 0.02 mn lei, α=0.25, β=0.52, γ=0.07, c=5.91, q=0.95, f=0.05, a,b=1, w=5.4 mn lei, r=1 mn lei, A=6 hectares, L=3 man power, and K_o share= 0.75. The abbreviations in the figures are: 'KfS neg.' or 'KfD neg.' for capital supply set or demand under high inflation, 'KfS pos.' or ' KfD pos.' for capital supply set or demand under low inflation.

Figure 16 Case (1)



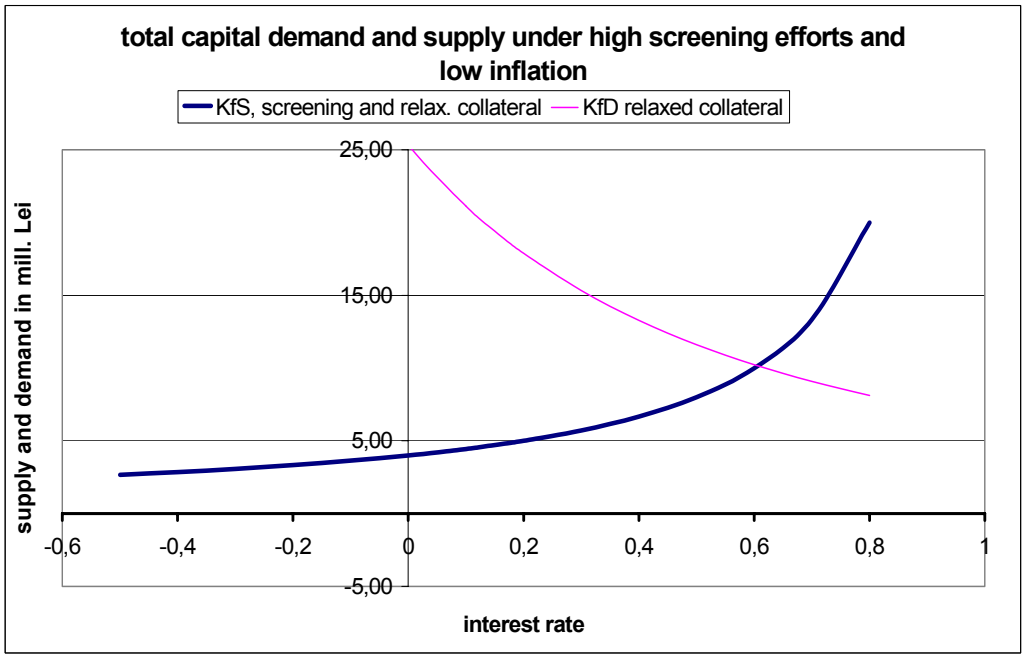
Note: η_B=1.6 (value of the collateral requirement from the perspective of the bank), η_F=2.98 (value of the collateral requirement from the perspective of the farmer), varying p, interest rate as interest rate/100 p.a.

Figure 17 Case (2)



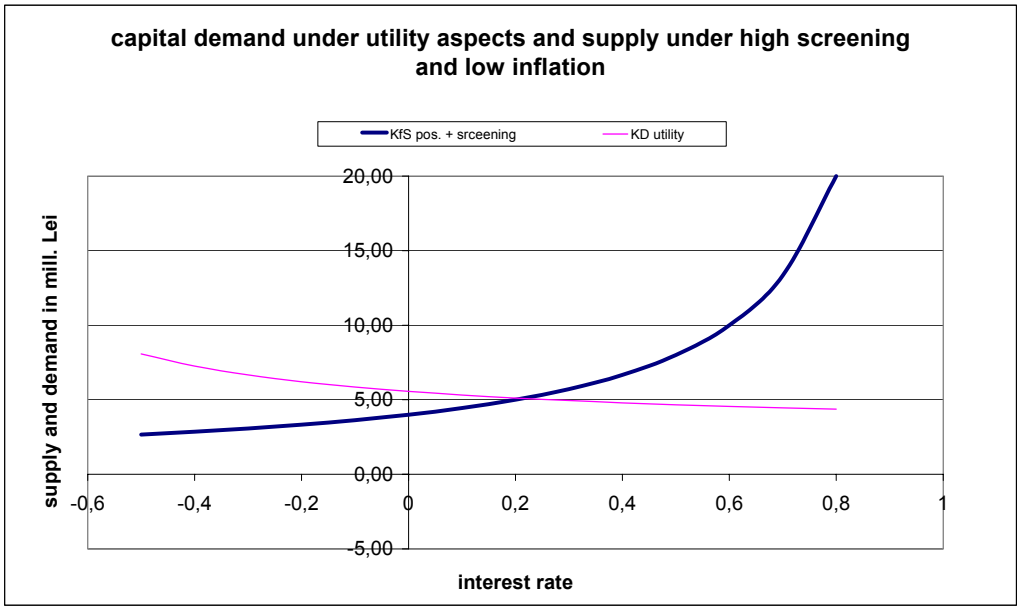
Note: η_B=1.0, η_F=1.92, varying p, interest rate as interest rate/100 p.a.

Figure 18 Case (3)



Note: η_B=1, η_F=1.92, constant p=0.95, interest rate as interest rate/100 p.a.

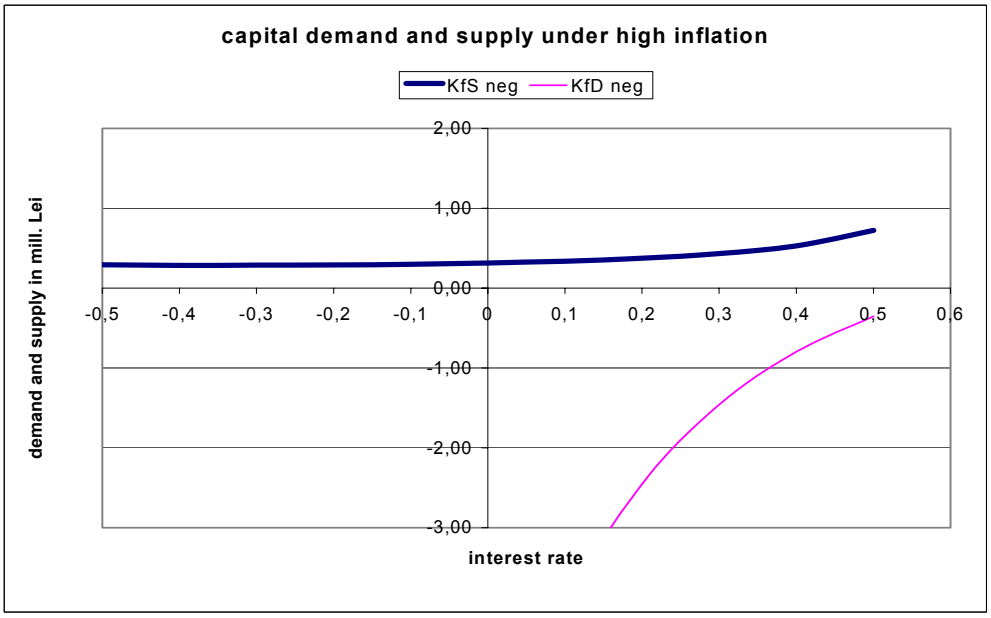
Figure 19 Case (4)



Note: η_B=1, η_F=1.92, constant p=0.95, interest rate as interest rate/100 p.a.

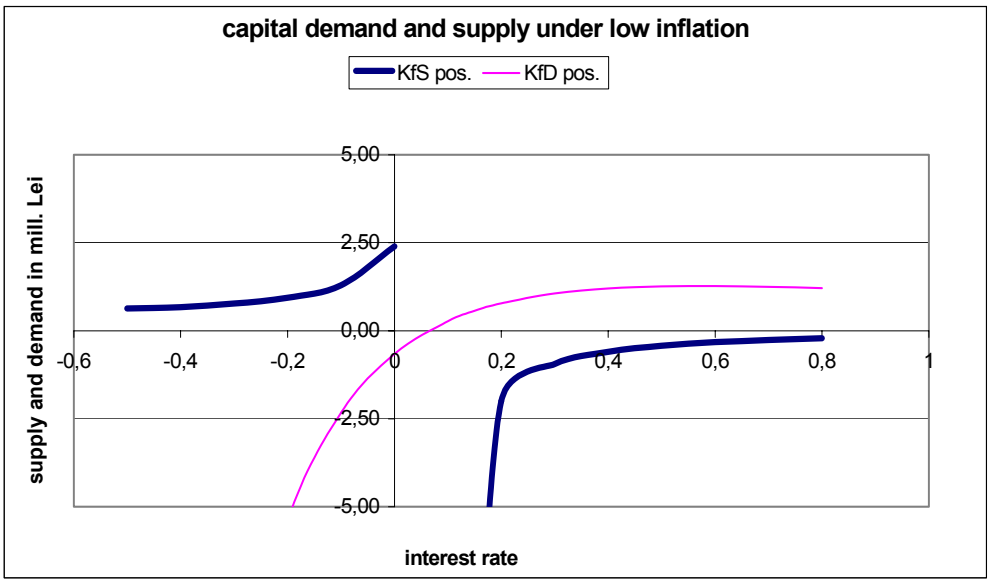
The external capital demand of an average farm, here defined as the difference between needed optimal capital expenditure and available own capital, is depicted in Figure 20 to Figure 22.

Figure 20 Case (5)



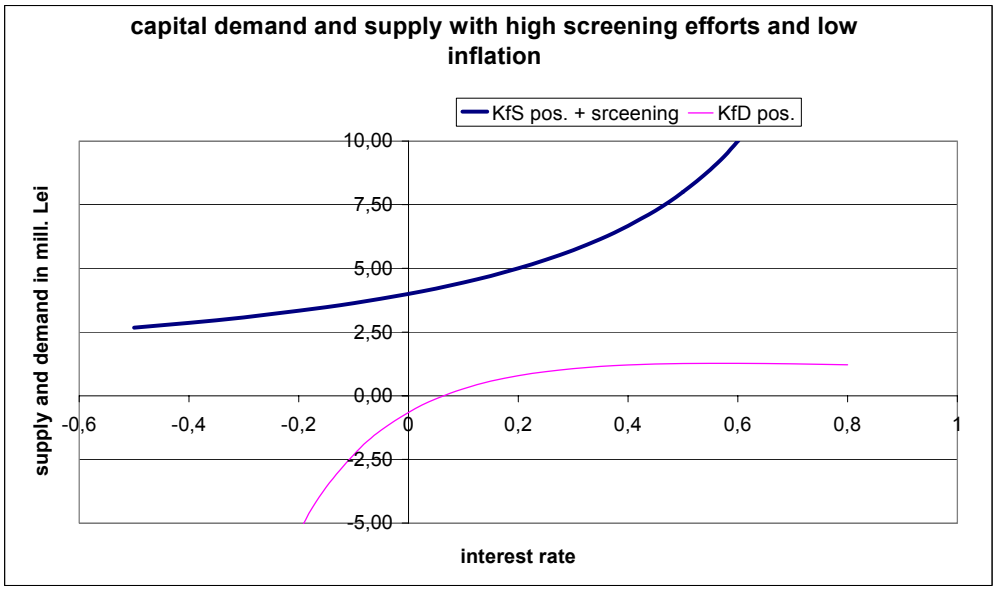
Note: η_B=1.6, η_F=2.98, varying p, interest rate as interest rate/100 p.a.

Figure 21 Case (6)



Note: η_B=1, η_F=1.92, varying p, interest rate as interest rate/100 p.a.

Figure 22 Case (7)



Note: η_B=1, η_F=1.92, constant p=0.95, interest rate as interest rate/100 p.a.

The capital supply line in the figures above represents the boundary of a convex set of possible loan sizes under a zero-profit situation for financial institutions. Any loan size above the line yields profits larger than zero for the lender, except for cases (2) and (6). The capital demand line represents a loan demand function and all loans smaller than or equal to the function are accepted by the borrowers.

In the first three cases the demand function is decreasing with increasing interest rates, cutting the y-axis at around the 25 million lei line. The supply set is rather large in case (1) since the expected

profit of the financial institution relies on the 'sale' of the collateral, ignoring the selling costs. It hardly declines at all with increasing interest rates and decreasing probabilities of repayment and a matching of a wide range of loan sizes under given interest rates seems to be possible for the borrower and the lender. Under the actual conditions in Romania, however, enforcement of the loan contract, and thus the sale of the security, is costly and would shift the loan supply set upwards.

In case (2) no matching between supply and demand occurs, since the supply set opens downwards, meaning that the actual loan offered must be smaller than the line of the supply set. Since at the interest rate between zero and ten the probability (p) of repayment is close to 0.5, the financial institutions are unable to offer a loan of any size. The different shape of the supply set compared to case (1) is due to the lower collateral requirement of η_B=1 instead of η_B=1.6, so that there is no profit but a loss with increasing interest rates and declining probabilities (p) of repayment. Under negative interest rates both demand and supply are rather unbounded.

In case (3), the augmented screening effort leads to higher transaction costs but also to a higher probability (p) of repayment (here p = 0.95) and results in a supply set with unlimited loan sizes above the boundary. The highest payable interest rate where the financial institution only receives a zero profit in this case ranges at around 60%.

In case (4), the demand for capital depends very much on the wealth level. Under a low asset endowment, the demand function is close to the x-axis and rather flat, while under a high asset endowment level the curve shifts upwards and becomes steeper.

Cases (1) to (4) above assume that an individual farmer completely finances his capital expenditure from external funds. But, as soon as he disposes of own or quasi-own[64] capital resources with opportunity costs equal to the deposit interest rate, the demand for external capital declines considerably as illustrated in cases (5) to (7). It is assumed that on average farmers' capital expenditure originates to the greatest extent possible from own sources and that only the last quarter comes from external funds (Annex 7.3). Besides the quarter share of external capital input, no restrictions or limits on own capital are set. But under this limitation there exists no matching between the supply of and the demand for loans because the demand curve shifts downwards, so that the demand becomes negative (Chapter 4.4). External capital is simply too expensive compared to the available amount of own capital or quasi-own capital. However, external capital with interest rates below the opportunity cost for own capital (e.g., subsidized loans) may be demanded. Furthermore, lowering the share of own capital input also results in a higher demand for external capital and leads gradually to a matching of loan demand and supply, which occurs for an external capital input share of around 30% at an interest rate level of around zero per cent. The capital supply for cases (5) – (7) equals those of cases (1) to (4).

The quantitative analysis shows that under the prevailing conditions in Romania the supply of and demand for loans in the private farm sector is limited to a certain loan size. However, the interviews and observation in Romania show that the refusal of financial institutions and individual farmers to

[64]Capital from family members, relatives or close friends

agree to a loan contract is generally not only restricted to a certain amount of capital but also to the contract itself, in some cases regardless of the loan amount. Two other, qualitative approaches to explain the observed behavior are therefore discussed in the next sub-chapters.

4.7 Financial sector and adverse selection

This section discusses the effects of the tough collateral requirements and diverging asset evaluation between the lender and borrower on loan contract agreements.

Banks use loan collateral in order to screen potential clients as a substitute for the lack of customer information and to enforce and foreclose loan contracts in the event of loan default (FAO, 1998; GTZ, 1998). Hence, securities fulfill two main functions. First, due to the uncertainty or risk of loan default, banks need collateral as a kind of 'insurance'. Second, due to asymmetric information with respect to the quality of the business (information) and the efforts put into the planned projects (actions) financed with the loan, collateral is used as incentive for the borrower to give true information and to exert effort to repay the principal and interest. Without secure loan collateral, it is expected that there will be a lower supply of bank credit resulting in reduced access of small farmers and rural clients to finance (Binswanger et al., 1987).

The major factors that affect bankers' and farmers' behavior in farm-lending operations are the expected profitability and the risks related to on-farm investments or to working capital financing (FAO, 1998; GTZ, 1998). Financial institutions consider the farm sector as riskier and having greater asymmetric information than other sectors because of specific farm sector characteristics such as seasonal income, yield and price uncertainty and productivity and management risks. In addition, the lack of experience by banks in credit transactions with the agricultural sector represents another impediment to extend the loan business in this field. The offered market interest rates for loans to agriculture in Romania don't reflect higher risks or the transaction costs associated with lending to this sector. Subsequently, the financial institutions have no incentive to provide loans to the farm sector. To compensate or minimize the risk of lending to agriculture the financial institutions apply other instruments. One common method is the portfolio management. This is based on loan diversification and upper loan limits to certain sectors[65]. Regarding the loan portfolio limit of the farm sector, the banks fill the small available portfolio with subsidized loans and this was confirmed in the bank interviews. High performing farms demanding loans at market conditions are cut off from the loan service by the combination of portfolio restriction and loan subsidy. This mechanism corresponds to pure credit rationing according to Jaffee and Stiglitz (1981). Another implicit method represents the security requirements and assets evaluation. The evaluation and acceptance of assets as collateral by financial institutions offers a number of ways to stop farmers from becoming a borrower. The evaluation and acceptance of assets as collateral as well as its effect on the lending business are analyzed below.

In general, the assets pledged as security are evaluated differently by financial institutions and by their actual owners. These differences have their origin in differing information about the assets,

[65] The agricultural loan portfolio consists to almost 100% of subsidized loans

the alternative potential uses of the asset, the farm objectives and in the precautionary evaluation rules of the banks.

The financial institutions' evaluation procedure of (farm) assets are described first. In Romania the banks hire an expert for asset evaluation. This expert's evaluation gives an average asset value (v) corresponding to the expected value of all similar assets. This expected value is based, if existent, either on market values, construction values or on discounted values of expected returns. According to the principle of precautionary estimation, the expert also, takes into account a 'prudential' margin (ê). This margin reduces the average value (v) to S = v (1-ê)[66]. This value (S) is given to the financial institution. The financial institutions, in turn, accept only between 50-80% of this security value (S) as loan security[67] since it is common practice to incorporate some form of risk margin (x) in the security value (S). For example, a specific tractor minimum average market value, if any, is (v). The external expert's evaluation of the asset with a 'prudential' margin (ê = 0.1[68]) leads to the security value (S), in this example being 90% of the average asset value (v).

(55) $S = v(1-\hat{e}) = v(1-0.1) = 0.9v$

where S: security value or estimated asset value by the expert,
ê: reduction of the average minimum value v as security margin for the external expert,

The bank, however, accepts only 60% (x = 0,6 for machinery) of the evaluated asset value (S) as collateral. Therefore, the value of the tractor and hence the loan security value (B) reaches only v(1- ê) x = S x. Subsequently, the loan security value (B) is 54% of the initial average asset value (v).

(56) $B = Sx = 0.9v * 0.6 = 0.54v$

where: x: share of value accepted as security value (risk margin)

To secure a loan, however, the banks require loan coverage to be at least 160% of the loan value which includes the nominal interest rate of say 60%[69] for one year and the principal (K). Since the collateral should cover these requirements, the condition for K is

(57) $jK = B$ and

$1.6\,K = 0.54v,$ or

(58) $K = B/j$ and

$K = 0.54v/1.6 = 0.34v$

and for v

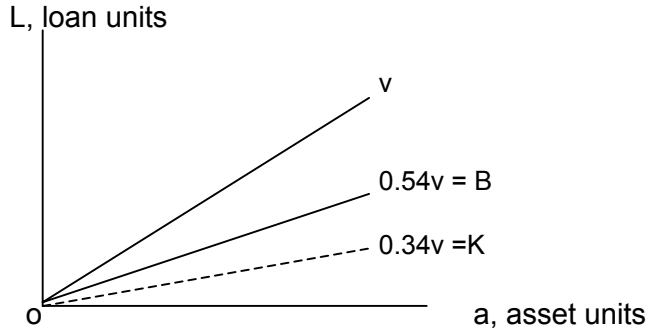
(59) $v = 1.6\,K / 0.54 = 2.96\,K.$

[66] Where ê is a small number e.g. 0.1 representing the evaluation security margin for the external expert
[67] bank interview 1997
[68] arbitrarily large margins are possible
[69] here j = (1+0.6)

where K: loan amount
j: 1+nominal interest rate/100
B: security value, based on the expected asset value (v) minus a prudential margin (ê) and minus a risk margin (x)
v: expected asset value, based on a pool of similar assets

The financial institution accepted collateral-loan ratio is typically just sufficient to cover about one third of the loan amount as collateral. In other words, the borrower has to dispose of about three times the initial asset value (v) for a loan size (K). Using the tractor example , the farmer has to provide collateral this is three times the value of the tractor while only being able to purchase one tractor with the approved and secured loan amount (K). The estimated expected asset value (v) 'reduces' to 0.34v which is 34% of the initial value (v) (Figure 23) The asset pledged as collateral experiences a high depreciation through the financial institutions. This results in a large gap between the initial average asset value v and the finally accepted value of 0.34v. (Figure 23).

Figure 23 Collateral value



Note: B=security value, K= loan amount, v=expected asset value.
The x-axis represents the asset units a, the y-axis the loan units L. The line Ov shows a loan-asset ratio of one to one (L=a=v=K), which says that the average asset value v equals the loan amount K. The evaluated loan security value B, line OB, shows a ratio of one to two (L=2a=0.54v).Finally the loan coverage, line OK, displays a ratio of one loan unit to three asset units (L=3a=0.34v).

The farmer's perception on the asset values, however, differs from that of the financial institution's. The reasons for this divergence are:

1. The farmer has more detailed information about the real quality and thus the real value of the collateral (asymmetric information).
2. Due to the specific use of the asset on the farm in combination with other agricultural equipment, the internal/intrinsic value of the pledged machinery/land is higher than its external value (alternative uses) since secondary markets or land markets are not well developed. This in turn, leads to a higher value assessment of the machinery e.g. tractor by the farmer than by the bank.
3. The farmer evaluates his assets according to its contribution to household utility. Since the utility function is assumed to be a concave function, the lower the asset endowment level of a farm, the larger the loss of one additional unit of utility, for instance, the loss of a tractor if there

is only one tractor on the farm. In this context, the farmer's utility estimation of the tractor is called a subjective value which is generally higher than the asset's market value since the tractor helps to secure the farmer's primary needs such as food and housing security.

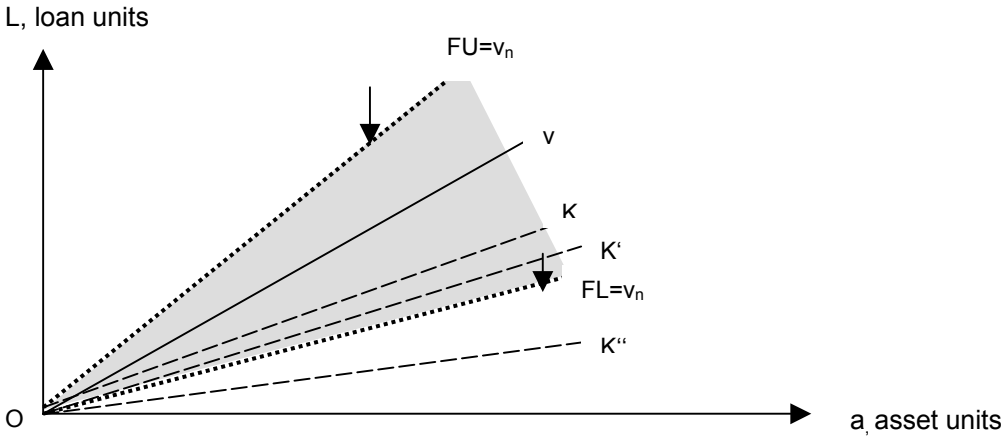
The combination of the above evaluations results in an individual asset value (v_n) for each farmer (n). This value (v_n) ,however, is seldom equal to the estimated expected value (v). The divergence caused by asymmetric information (before contracting) on the quality and utility of assets between borrowers and lenders leads to adverse selection**.** This was first mentioned in Akerlof's lemon markets. Adverse selection arises because farmers have uncertainty about their repayment ability or capability. Since uncertainty in prices and natural disasters prevail in agriculture and extends to agricultural income then, even a 0.1% chance of failure may cause a considerable loss of assets. For the individual borrower this potential loss corresponds to a loss of utility for the pledged assets. However, adverse selection would not exist if farmers were certain about their ability to repay the principal and interests.

In Figure 24, the effects of the divergence in asset evaluation is considered with the uncertainty problem excluded. And in this context the collateral represents the equivalent price for a loan. The vertical line in Figure 24 represents the loan units (L) and the horizontal line is asset units (a). The v-line (= 100% - line) shows that the worth of one asset unit a (a=v) equals to one loan unit L (L=K); and the ratio is 1:1. The line OK represents the asset units required as security for one loan unit by the financial institutions. Using the previous example, the OK line represents the 0.34v value, where one asset unit (a) is worth approximately one third of the loan unit (L), or one loan unit (L) requires three asset units (a). Since the potential borrower's evaluation differs from the bank's evaluation, the line OFU (upper value) and OFL (lower value) indicate the farmers' evaluation range of their assets (v_n), where for example v_n may range between 0.5a and 6a ($0.5a<v_n<6a$). Farmers are only willing to accept the required collateral amount for a loan if their evaluation of the asset (v_n) is lower than or equal to the bank's final asset evaluation 0.34v, that is, only if

(60) $v_n \leq 0.34v$.

Therefore, the farmer will only pledge those assets whose value lies below or on the line OK (Figure 24). However, these assets are either poor quality or have low intrinsic/internal values due to the poor financial performance of the farm. Being aware of getting only the "worst" assets as security, the lenders/evaluators re-evaluate the expected asset value (v) according to the remaining set of assets, which is the total asset pool minus the assets values (v_n) above the expected value (v), in the graph ranging between OK and OFL. The loan coverage value (K) becomes K' and only those farmers whose individual values (v_n) are lower than the OK' line are potential borrowers. This is because only they are willing to give their assets (v_n) in exchange for a loan of size (K). Again, the financial institution adapts the expected asset value (v) to the remaining set of values. The resulting coverage corresponds to the OK'' –line and once again only those assets with values (v_n) below the OK'' line are given as securities to the banks.

Figure 24 Adverse selection



This process results in an adverse selection process such that the lenders' asset evaluation is eventually lower than the lowest asset evaluation of the borrower. Farmers provide no collateral because banks evaluate the assets too low, and banks accept no collateral because they require more collateral units to cover one loan unit (due to the low evaluation) than farmers are willing to give.

In the next step the problem of adverse selection and outcome uncertainty is considered together. Taking into account the probability of success or failure of repayment. the condition for accepting the collateral requirements becomes dependent on the probability of failure (1-p) as discussed in chapter 3 and is represented by the following equation:

(61) $(1-q)\, v_n \quad \leq \quad 0.34v$.

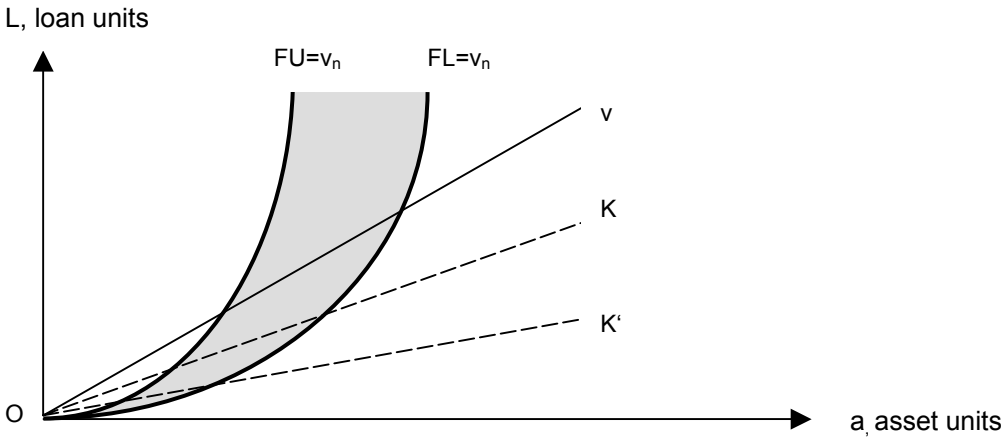
This condition is a monotonic transformation of the OFU and OFL lines, while these lines shift downwards as indicated by the arrows in Figure 24. The smaller the probability of default the greater the shift of the OFU and OFL lines downwards and the more the farm asset values (v_n) are below or on the OK-line. Consequently, high probabilities of default lead to large differences in asset evaluation and to a refusal by farmers to provide assets as collateral.

The final step is to include the utility aspects. Assuming a concave utility function for farm size, defined in terms of farm assets (land, machinery, buildings, livestock), and positive but decreasing marginal utilities, a loss of one asset unit represents a higher loss in utility for a farm with a low asset endowment level than for one with a high asset endowment level. The small scale farming sector displays higher risk aversion than the large scale farm sector, as the utility function is decreasing with increasing asset endowment levels. The concavity of the expected utility function is equivalent to risk aversion (Varian, 1992).

Due to the concavity of the utility function, the OFU and OFL lines are not straight lines but convex curves. This happens because for one additional loan unit the farmers’ are willing to provide a smaller marginal asset unit ($\delta a/\delta L$) than for the first loan unit since from the perspective of a potential borrower the individual value (v_n) of the additional asset is higher than the first asset value

pledged as collateral in case of default. The farmers' first pledged individual value (v_n) corresponds to a lower asset unit a (e.g v_n=a) than an additional asset (e.g. v_n=6a). The convex lines reduce the area between the OK and OFU line particularly for larger loan sizes. By taking into account adverse selection, the downwards move of the OK line results in (i) a demand for small loan sizes and (ii) for larger loan sizes no reconciliation between the borrower's and the lender's asset values. Subsequently, the practiced collateral evaluation process as well as the collateral requirements in Romania lead to the small scale private farm sector being rationed out of the loan services.

Figure 25 Adverse selection and risk aversion



The relatively high risk of failure (price and yield uncertainty) in the small scale private farm sector and the practiced asset evaluation process in combination with the high loan coverage leads to adverse selection and to a refusal by good performing farmers to apply for a loan.

4.8 Agricultural sector and risk aversion

Utility and risk

Through the privatization process many people in rural and urban areas have lost their jobs in the industrial sector or on state farms. They have received a piece of land which they are allowed to cultivate. This small piece of land is temporarily or even permanently their only source of income and thus their only possibility to secure housing and food needs. This results from the fact that the non-agricultural sector in rural areas is rather small and offers very limited possibilities for alternative incomes and the owners of agricultural land receive no unemployment transfers, even if they are former employees of the industrial sector. Thus,, in this stage of the transformation process, the activities of a private farm are closely linked to the farm household's needs since the farm is the only provider of food and income.

In socialist economies, private ownership for individuals was not perceived as an essential need. Secure housing was provided at very low prices, full employment was guaranteed and the state subsidy system kept the price level of most consumer goods low. When the state gave up most of

its assets and abandoned the planned economy, it no longer could provide these securities or facilities (Honkkila, 1996). Private ownership initiated through the privatization process replaces the role of the socialistic state as the provider of secure food and dwellings. Thus, at the beginning of the development of the market economy, the economic behavior of farmers was aimed at securing their source of income and food, as it was the only one available. Consequently, the willingness of farmers to take risks through investments or seasonal loans to enlarge the farm and their potential income is not great. They refuse or hesitate to put at risk their assets (land, machinery) which are essential to maintain a minimum livelihood. However, as a next stage in the transformation process progresses, individual farmers should optimize the available factor inputs and begin with small investments financed externally or through their own capital to increase farm income. These investments, in combination with credit and collateral, require the willingness to take small risks. This is, because to approve a loan application financial institutions require farm assets of approximately 160% of the loan amount for collateral.

Assets are described in the system of national accounts as entities over which ownership rights are enforced by institutional units, individuals or collectives; and from which economic benefit may be derived by holding or using them over a period of time (System of National Accounts, 1993). By applying a simple classification, assets can be divided into land, buildings, productive assets including real capital like machinery and equipment, and financial assets mainly deposits and shares (Honkkila, 1996). The assets referred to in this study are land, buildings and real capital of the farm sector. Since there is a thin market for agricultural land, building or farm equipment, the market value of used farm assets, if any, is uncertain.

If the farmers take the risks and fail they lose the pledged assets resulting in a loss of food and housing security. This loss appears to be significant for the farmer because their asset endowment level is low and the collateral requirements are at least about twice the loan amount. Therefore, the farmer exhibits risk averse behavior, a result of the concave utility function.

Maslow, a psychologist, developed a theory on the human need hierarchy based on the assumption that the fundamental motive for all activities and actions of a human being is the final need of self-realization.To approach and achieve this core need several other needs must be satisfied in order to be able to fully develop and enjoy the principal need. Thus, he divided needs into five level, where the proceeding need has to be fully satisfied before the next level of need matters. According to him, the five levels of the need hierarchy are (1) physiological needs, (2) independency/security needs, (3) social needs, (4) prestige and (5) individual needs like self reliance (Krech, 1992). These need levels can be further divided into sub-levels. With respect to small individual farms in Romania, the need level they strive for corresponds to food and housing security, first on a subsistence level, which can be achieved and secured through a small amount of money earned from small scale farming activities. Then after having secured the subsistence level, the farmers gradually increases the capital expenditure and takes small risks to shift from subsistence farming to market oriented farming. They are willing to take small risks and intensify cultivation, to invest in new techniques, machinery or buildings and to enlarge the farming business and income, and consequently their wealth level. At this stage of development the private farmers'

actions shift from security dominated risk averse behavior to a profit oriented behavior with low risk aversion since the risks taken to increase the wealth become smaller in relation to the available wealth and do not endanger any more their food and housing security. However, many households in agricultural areas produce for the market and for their own consumption. They purchase part of their inputs on the input market and the rest comes from their own resources. Any change in policies will therefore affect not only production but also consumption and the supply of goods. This is because agricultural households combine two units, the household and the firm. To analyze its behavior, an appropriate analytical framework is a recursive model with utility maximization under certain profit maximization (Meier, 1995). However, to understand the model, some special characteristics of Romanian farm households and their utility have to be emphasized.

Concavity of the utility function: The less assets, consumption goods, etc. a person disposes of, the higher it evaluates the marginal utility of each single asset or good. With an increasing availability of assets or goods the additional utility of one more unit good decreases (Nicholson, 1995). This is reflected by the concavity of the utility function. Thus, if a farm household has sufficient food or housing security because they have a large farm, high farm income or non-farm income, the willingness to take risks (investments) increases.

Contingency of the preferences: Any well behaved preference ordering can be represented by a utility function (Varian, 1992). According to Maslow, the highest preference are those actions which support self realization. To achieve this, the individual must have reached a relatively high wealth level. But this high ordered preference is contingent on the satisfaction of the previous needs. If the primary needs are not assured, the highest preferences are first to secure these needs.

Risks: To enlarge the farm business actions involving risks have to be taken by the farmers. The farmers, in general, make many decisions under uncertainty conditions entailing the risk of failure and bankruptcy. Although different types of uncertainty prevail, the individual farmer as a single entity without significant market power is unable to influence prices or other market conditions and makes his decisions based on some estimated probability of the occurrence of unfavorable events. Most situations involving such behavior under risk can be put into a lottery/game framework (Varian, 1992).

Expected utility and risk aversion

This section illustrates the implications of contingent preferences, uncertainty and concavity of the utility function for farmers' behavior. The model includes small scale farm households with a minimum initial endowment (W_s) of assets that assure housing and food needs are met and farm households with higher endowment levels (W_b) that allow some risk taking. Under uncertainty conditions the outcome, h, of an action, i, may lead to a gain (h_{i1}) or loss (h_{i0}) of the asset endowment with a probability of q or (1-q). Not taking the action implies no change in the endowment level. Two features of the farmers' behavior can be illustrated with the model, (a) the risk aversion towards any kind of investment involving loan collateral and (b) the necessity of a high probability of success q to induce any action e.g. seasonal loans for herbicide, quality seeds

input, etc.. Both features result from the concavity of the utility function, the uncertainty of the outcome and the contingent preferences.

Any action involving external capital input represents a kind of risk since the farmer is obliged to repay the loan amount and the interest unless he wants to lose the part of his assets pledged as loan security. Any action i is assumed to have two possible outcomes (h_{ij} , for j=1: gain, or j=0: loss) The expected utility of the action i is demonstrated in this study using the von-Neumann-Morgenstern equation. According to this equation, the utility of different expected endowment levels W_n is defined as the expected utility ($U(W_n)$) of an action under uncertainty. That is:

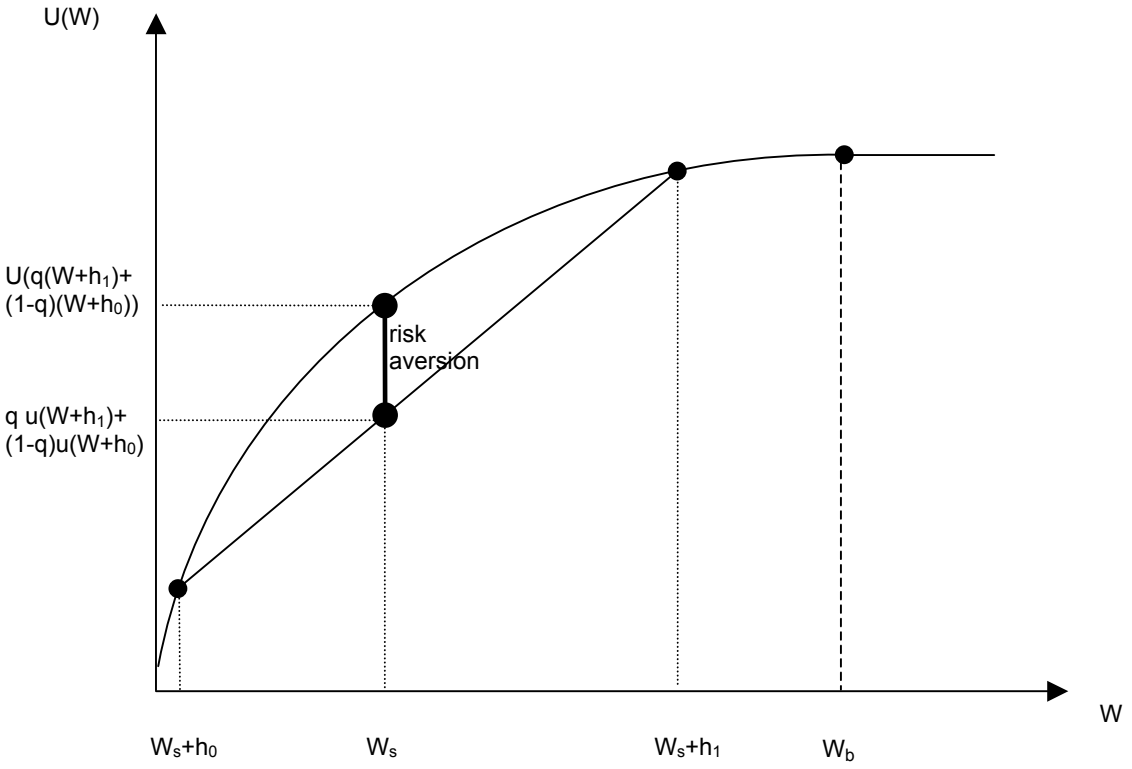
(62) $U(W_n) = q\ u(W_s + h_{i1}) + (1 - q)\ u(W_s + h_{i0})$.

(63) $U(W_n) = q\ u(W_b + h_{i1}) + (1 - q)\ u(W_b + h_{i0})$

U(.):	expected utility,
W_n:	wealth level, {s,b} ∈ n
h_{ij}:	possible outcomes of an action, with a gain ($h_{i1,}$ j = 1) or a loss (h_{i0}, j = 0) of wealth,
q:	probability of outcome h_{i1} occurring, where q: $0 \leq q \leq 1$,
1-q:	probability of outcome h_{i0} occurring
u (.):	utility,
W_s:	minimum initial wealth level to secure primary (physical) needs,
W_b :	wealth level greater than W_s.

Since the utility function is assumed to be a concave function, under uncertainty conditions the expected utility $U(W_n)$ is less than the utility of the expected outcome $q(W_s+ h_{i1}) + (1-q)(W_s+ h_{i0})$ of the action. The greater the curvature of the utility function the more the expected utility and the utility of the expected value differ from each other. This divergence is called risk aversion and is depicted in Figure 26. The more concave and steeper the utility function is around the minimum endowment level W_s , the more risk averse farmers are and the more they refuse any action with a risk of assets loss (Figure 26).

Figure 26 Expected utility



Source: Nicholson, 1995, supplemented

The y-axis represents the utility of wealth and the x-axis the wealth level W. The drawn curve represents the utility of wealth as asset bundles and the straight line indicates the expected utility of the two possible outcomes (resulting wealth levels). As illustrated, the steeper the utility function, the steeper is the cord between (W_s+ h_{i1}) and (W_s+ h_{i0}) and the larger the potential utility losses $u(W_s + h_{i0})$ or gains $u(W_s + h_{i1})$. Clearly, farmers tend to maximize their utility under the initial minimum wealth level of W_s, but are subject to the restriction:

(64) $W_s + (1-q)h_{i0} = W_s$.

This restriction implies that either h_{i0} or 1-q equals zero. As this restriction is not possible under the actual conditions in Romania, the farmer with wealth W_s is not willing to take any action that involves the risk of giving up his minimum wealth level necessary to secure his primary needs. In other words, achieving a gain h_1 means less to farmers than losing h_0.

Taking the derivative of the expected utility function $U(W_n)$ with respect to W_s and re-arranging, shows that maximizing expected utility depends on its slope $\delta u(\cdot)$ and the probability q:

(65) $q / (1 - q) = - \delta u (W_s+h_{i0}) / \delta u(W_s+h_{i1})$.

(66) $q / (1 - q) \equiv \infty$ for infinite steep slope around (W_s+h_{i0}).

Since the slope of the utility function below the minimum wealth level (W_s+h_{i0}) approaches infinity, while the slope around (W_s+h_{i1}) is much flatter, the ratio of (W_s+h_{i0}) to (W_s+h_{i1}) is very large and close to infinity. Therefore, the probability q must be extremely large (q ➜ 1) in order to induce the farmer to take the credit risks. In contrast, at wealth level W_b the slope of the utility function at ((W_b+h_{i0})) and ((W_b+h_{i1})) are flatter but because of the small denominator the probability q of the outcome h_{i1} may also need to be large in order to induce the farmer to take any action even at a wealth level W_b.

Risk aversion and indifference curve

The boundary of the convex acceptance set which represents the set of all probable outcomes (bundles of assets) the farmer would accept at a given wealth level shows the set of outcomes where the farmer is indifferent. The boundary of this set can be given by the indifference curve, $h_1(h_0)$ depicted as implicit function (Varian, 1992). This means that the possible bundles of outcomes $\sum_{i=1}^{n} (q_i h_{i1}+(1-q_i) h_{i0})$ along this line provide the same level of utility to the farmer. It is assumed that the farmers' behavior can be described by the maximization of the expected utility. Using an algebraic expression, the expression $h_1(h_0)$ and must satisfy the identity (Varian, 1992):

(67) $q\, u(W_n+h_{i1}(h_{i0})) + (1-q)\, u(W_n+h_{i0}) \equiv U(W_n)$

where: W_n: any kind of (initial) wealth level, {s,b} ∩ n
W_b : wealth level higher than W_s and W_s',
W_s': wealth level, just above W_s,
h_{i1}: outcome gain of action i
h_{i0}: outcome loss of action i

The slope of the indifference curve can be found by differentiating the expected utility with respect to h_0 and evaluating this derivatives at different wealth levels. The slopes of the implicit function equals the ratio of the probabilities and of the marginal utility. The slope of the indifference curve at a certain wealth gives the probability at which the farmer is just willing to accept the small risk for the action in question (Varian, 1992).

(68) $q\, \delta u_1\, \delta h_1(h_0)/\delta h_0 + (1-q)\, \delta u_0 = 0$

(69) $\delta h_1/\delta h_0 = -(1-q)/q\ \delta u_0/\delta u_1$

where $\delta u_0 = \delta u(W_0)/\delta h_0 = \delta u(W_n+h_0)/\delta h_0 < 0$
$\delta u_1 = \delta u(W_1)/\delta h_1 = \delta u(W_n+h_1)/\delta h_1$

Since the final wealth level under a loss is less than in a profit situation ($W_0>W_1$, where $W_0= W_n+h_0$ and $W_1=W_n+h_1$) and since the utility function is assumed to be strictly concave, the marginal (dis-)utility under a loss h_{i0} situation is larger than the marginal utility under a profit situation h_{i1}, that is $|\delta u(W_0)| > \delta u(W_1)$. Therefore, the ratio of the marginal utilities in equation (69) is larger than one. Changes in the final wealth level leads to the results expressed in equations (70).

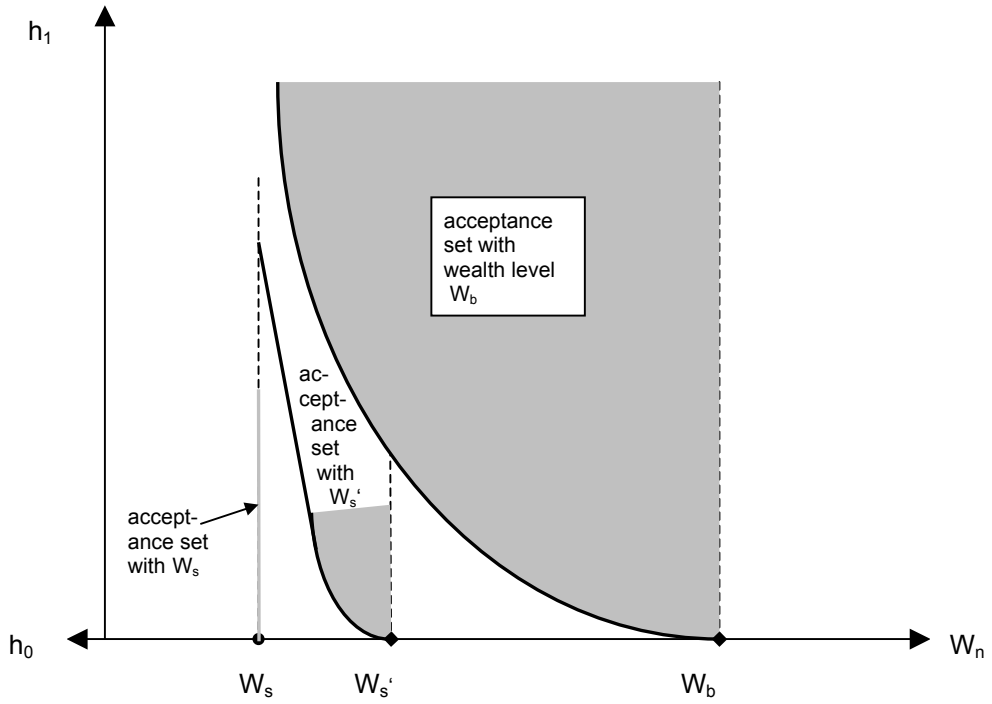
(70) $\left| \lim_{W_0 \mapsto W_1} \frac{\delta u_0}{\delta u_1} = 1 \right|$ and $\left| \lim_{W_0 \mapsto 0} \frac{\delta u_0}{\delta u_1} = \infty \right|$.

For high initial wealth levels with relatively small changes in outcome the ratio approaches one while large changes give a ratio larger than one. Hence, under a given probability ratio the slope of the indifference curve is rather steep for low wealth levels with all outcomes and high wealth levels with large changes in outcome, and flat for high wealth levels with relatively small changes in outcome. Where the probability q approaches one for outcome h_{i1} the probability ratio in equation (69) approximates zero, and infinity for where the probability q equals zero. Then, the slope of the indifference curve is steep for small q and flat for the large probability q (equation (71)).

(71) $\lim_{q \mapsto 1} \frac{(1-q)}{q} = 0$ and $\lim_{q \mapsto 0} \frac{(1-q)}{q} = \infty$ and $\lim_{q \mapsto 1-q} \frac{(1-q)}{q} = 1$

At low endowment levels W_s the individual farmers' primary objective is to secure their basic needs, and the implicit function is likely to be a point at wealth level W_s, and the convex acceptance set just a line (gray line in Figure 27). This indifference curve and the acceptance set at W_s indicates that the only outcomes accepted are an increase of wealth with no loss at all. These results are depicted in Figure 27 where along the x-axis the possible loss h_{i0} increases as it approaches the y-axis and wealth W_n decreases, and along the y-axis the outcome h_{i1} increases with the distance from the x-axis. The loss h_{i0} can be not greater than the initial wealth W_n. The line of the two gray sets of possible asset bundles represents the indifference curves. The lower q and W are, the larger a loss and the steeper the slope of the curve. It becomes clear from Figure 27, that at low wealth levels the range of potential actions is relatively small. However, at a wealth level W_b the indifference curve is flat at the beginning with a slope close to one giving equal probabilities of success or failure. It points out that the farmer is willing to put at stake a share of his wealth (W_b+h_{i0}) equal to an eventual gain in wealth (W_b+h_{i1}). The acceptance set of farmers with wealth W_b (large gray area) is larger than those with W_s' (small gray area) or W_s (gray line). Since the 'slope' of the indifference point around $W_{s'}$ is rather steep, and around the wealth level W_b relatively flat, the probability q for the outcome h_{i1} must be one for the wealth level $W_{s'}$ in order to induce the farmer to take an action.

Figure 27 Acceptance set



The results of this model can be transferred to a Romanian farmer operating on a low endowment level W_s and who has the possibility to increase production through a higher capital expenditure financed by a loan. The outcome of the so called small investment may be a gain h_{i1} in wealth with a probability of success q or a loss h_{i0} with probability 1-q of almost all assets used as collateral in the loan contract. Due to housing and food security needs the utility function and indifference curve are rather steep and/or curved around the asset endowment level W_s. Thus, the farmer is very risk averse and a probability of one for the outcome h_{i1} is necessary to induce the farmer to take any action. Therefore, even a very small probability of failure leads to a refusal of a loan contract which requires at this wealth level almost all farm assets as credit security. Subsequently, under the given liquidity constraints in the private farm sector investments are hardly taken.

In contrast, a farmer with a high endowment level W_b, less curvature on his utility function and indifference curve shows a much higher readiness to take risks to the excess satisfaction of his primary needs at wealth level W_b. Thus, the farmer displays a lower risk aversion and even a probability q smaller than one does not deter some actions. Further, a possible loss of wealth reduces his utility less than a farmer with endowment level W_s. Since the private farm sector in Romania consists mainly of small scale farming the demand for loans with tough loan security requirements is, therefore, close to zero.

However, the question arises of what is the actual extent of the possible loss or gain of wealth that result from the actions. It is clear, that the potential loss depends on the collateral requirements

and diverging assets evaluations of the financial institutions and farmers as well as on the enforcement of the loan contract. The possible benefit of short-term investment (increased capital inputs) depends on the expected profit function of the individual farm.

5 Conclusion

This chapter summarizes the findings and analytical results and formulates policy conclusions. It attempts to apply a holistic view and considers rural financial markets as one part of the financial system. However, the ideas discussed in this work are not designed to give detailed implementation advice on policy. Rather, they are meant to provide a simple conceptual framework for some policy areas, to help to understand the problems in this field of finance and to identify further research areas to focus on.

5.1 Financial sector

Banking business in Romania faces many constraining factors, including macro-economic uncertainties, a weak legal and institutional system, information and dissemination problems, legacies from the past, and structural problems in the financial sector. The extent of the difficult financial and economic conditions in which the financial institutions have to operate is reflected by the recent bankruptcy or liquidation of some large state banks and private banks.

The former structure of the banking sector has not yet completely disappeared in Romania. At the end of 1997, the banking sector is still dominated by a few large state banks. The restructuring or enlargement of banks' know-how, technology and networks that formerly focused on particular sectors or groups of clients and offered only one main product is under way but is making slow progress. Therefore, the banking services offered in 1997 are not suited or accessible to all groups or types of clients in all regions or areas and especially not for small-scale farms in rural areas.

The services offered through financial institutions encompass savings, sight and short-term deposits, as well as a variety of consumption loans, short-term production loans, and a few investment loans. Loan security requirements include two guarantors and at the very least the financed product/object as collateral, but in many cases other assets too. The financial sector's activities as regards the individual farm sector are restricted to subsidized or state-guaranteed loans and to deposit services. The lending business of a financial institution has to deal with information asymmetries, in particular in rural areas. These information asymmetries lead to high risks and consequently to high collateral requirements. On the other hand reducing information asymmetries causes high transaction costs often not covered by the market interest rate along with the small amount of loans often requested. The subsidized lending policy actually in operation, which aims to support development in the agricultural sector, in fact hinders the development of competitive and efficient agricultural lending schemes. Furthermore, the allocation of subsidized capital takes place according to criteria based not on efficiency but on what is politically and socially desired. This leads to an inefficient allocation of capital.

The paperwork and processing time needed to finance working or investment capital for legal entities is high in comparison with that required for consumption loans to natural persons. Furthermore, small-scale enterprises demand small loans, so that the interest received hardly covers the costs incurred by the financial institution. In particular, lending to agriculture is costly.

First, the loan procedure for a farmer, from the initial loan application to the complete repayment of the principal, requires a great deal of paperwork for the financial institutions by comparison to consumption loans for individuals. In addition, the loan size demanded in the small farm business is too low to cover the high transaction costs associated with on-farm lending. Second, lending costs are high due to the risky nature of agricultural business, and this has not yet been incorporated into the interest rates. Consequently, the new private banks' focus is to service first the private clientele or well-known large enterprises.

The share of the capital and insurance market in the volume of capital transactions is still small and at this stage of development has no significance for the development of financial markets.

5.2 Agricultural sector

The agricultural sector comprises private farms, associations and state farms. The private, individual farm sector consists of a large number of small private farms which provide employment and food to their farm household members, many of whom can find no employment in the non-agricultural sector. Not surprisingly, in comparison to the total agricultural sector, labor productivity on individual farms is low. The land rental or lease market is hardly functioning which in turn hinders the allocation of agricultural land. The small land market, together with the collapse in the labor market in Romania, delays or even impedes the restructuring of the private farm sector necessary to enable it to become more productive. Furthermore, capital expenditure, as the third production factor, hovers at a low input level. This is because the banking sector on the one hand fails to provide loans to these farms due to the high risks, and, on the other hand, there are many small-sized and overstaffed private farms which are often not very productive and any kind of capital investment is likely not to be profitable. The income situation of the interviewed farms implies that around half of the farmers interviewed would fail to repay their loans made to finance investments. The farm associations with or without legal status are often downsized successor organizations of former productions cooperatives or new foundations made up of family farms. The subsidized state farms have to cope with obsolescent farm equipment and building and a low capital and equity cover often resulting in a low productivity.

For the agricultural sector, and in particular the individual farm sector to develop, it needs impulses from the non-agricultural sector and support from a well-functioning infrastructure that includes functioning institutions, markets, information and physical infrastructure in rural areas, a good farm management and access to capital through an efficiently functioning rural financial market.

5.3 Rural financial markets

Since the privatization process the agricultural sector in Romania has faced sever problems ranging from a lack of adequate supply of production inputs, marketing, production technologies and know-how to a lack of financing working capital or investments. As regards rural financial markets in Romania, the financial sector is confronted with a twofold task: (i) efficiently providing sufficient financial means for the agricultural sector to develop and (ii) reforming itself, its

structures, organization, technology, know-how, service and products to an efficiently functioning financial market. This chapter summarizes the factors affecting the demand for capital of individual farmers and the supply of capital through financial institutions in rural areas in Romania. First, the demand side dealt with is based on economic and financial data from over 180 farms, followed by an analysis of capital supply provided by financial institutions. In this context, this work also discusses risk aversion and information asymmetries and their influence on loan transactions in rural areas.

5.3.1 The capital demand of individual farmers

The capital demand analysis of individual farmers relies on a production function, obtained from of a multiple regression analysis with the variables capital, land and labor input. The first derivatives of the profit function which is composed of the production function as well as the production costs, delivers factor demand functions which show the demand for capital of individual farmers under different conditions. Further, to take into account the farm household, the demand for capital is calculated by integrating the profit function into an concave utility function of a farm household. For the calculations the following conditions or factors are distinguished: (i) farm output without (certainty conditions) and with price and production risks (uncertainty conditions), (ii) instable and stable economic situation with high inflation (real negative interest rates) and low inflation (real positive interest rates), (iii) total capital expenditure from own sources, external sources or a combination thereof, (iv) farm decisions under utility aspects and (v) different levels of fees and collateral requirements for a loan.

The production function

The regression results give a production function with decreasing returns to scale. The differentiation of the farmer sample into sub-samples according to the farmer's age, specialization and managers' education and the regression of each of the sub-samples shows some small differences of the input coefficients of the production functions. However, the differing values of the input coefficients do not explain the large differences in farm output and hence farm income depend on further factors such as organization and management.

Capital demand

The demand for capital, land and labor under certainy conditions shows that the labor demand is relatively low while the labor supply is high. Moreover, it shows that the demand for land is high. This result emphases the need for farm size restructuring through a functioning and open land market. As anticipated, the demand for capital is large under real negative interest rates and moderate under real positive interest rates.

Assuming an uncertain income situation (uncertainty conditions) and high collateral requirements the demand for capital is significantly less than under certainty outcomes. The high collateral requirements of financial institutions thought to overcome part of the information asymmetry between the lender and borrower, cause a significant reduction of capital demand.

In Romania, under the current conditions, the financing of working capital or investments from external sources, e.g. bank credit, is more expensive (interest rates, fees) than from own sources. Therefore, individual farmers prefer own capital or capital from relatives to bank loans. Based on an average external capital use of the interviewed farmers, the analysis assumes that about 25% of the capital use of a farm comes from an external source, e.g. financial institutions. Consequently, the difference between optimal capital input under profit maximization and available own capital represents the demand for external capital in this analysis. Accordingly, the external capital demand depends on the margin between the deposit and loan interest rates and the availability of own capital. In an environment with high inflation like in Romania, the margin between the deposit and borrowing rate is large and hence the use of own capital is strongly preferred. Not surprisingly, the actual practice in Romania confirms this finding. Farmers predominantly ask for and financial institutions often approve only loans with interest rate subsidies and state guarantees for the private farm sector. In a scenario calculation with relaxed collateral requirements, low fees and a small interest margin between deposits and loans, the demand for external capital increases, although only slightly.

Capital demand under utility aspects

A large part of the individual farms in Romania are rather small farm units with a low asset endowment level. They can be considered as farm households which display a great risk aversion and hence low willingness to finance, for example, working or investment capital through external funds. To adequately illustrate the situation of farm households, the profit function is integrated into a concave utility function from which the capital demand is derived. The model shows that a doubling of the collateral requirements reduces the total capital demand in the model by about one third. Halving the wealth of a farm in the lower range leads to a large decline of capital demand. The results demonstrate that the low asset endowment level of the individual farm sector, combined with the tough collateral requirements and the existing risk of default, enormously reduces capital demand.

5.3.2 Capital supply

The capital supply from banks is based on a linear partial profit function, partial, because it considers only the lending business. The supply represents a set of possible loan sizes with a boundary. Beyond the boundary the financial institution's profit becomes negative.

Overall, the model shows that the loan supply is rather low in a situation with low inflation and high when there is high inflation since the large margin between the lending and deposit rates in Romania leads to a rather high profit for the bank. Furthermore, the collateral represent real values and the collateral resale costs are not completely acknowledged and incorporated in the model. Thus, even under relatively high default rates the supply of loans is still relatively high because of the high collateral value in real terms[70]. According to the model, under stable macroeconomic

[70]But also because the costs of loan contract enforcement and collateral resale are not completely incorporated in the model

conditions (positive interest rates in real terms) the supply of loans increases in line with a decreasing probability of default.

If financial institutions increase their screening efforts which are positively linked to transaction costs they simultaneously reduce the default rate. The required increase of the minimum loan size for a positive profit is partly compensated by the increasing probability of repayment. Hence, loan supply is low under positive real interest rates and high default rates but rises slightly with increasing screening costs and decreasing default rates in the model.

5.3.3 Capital demand and supply

In summary the results of the analysis are: (i) a high demand for capital under high inflation, a relative low demand for capital under low inflation; (ii) with tough collateral requirements a high supply of capital under high inflation, but a low supply under low inflation. The supply increases with a decreasing probability of default; (iii) there is a matching between loan demand and supply if moderate collateral requirements prevail, if the margins between deposit and loan interest rates is not too large and if the availability of own capital[71] or informal loans[72] is limited[73].

The prevalence of credit contracts only in context with state intervention in the Romanian financial rural markets seems to support these findings. Collateral requirements, demanded loan sizes as well as the uncertainties in income and hence in borrowers' repayment capacity represent restrictions for the supply and demand of loans. However, in Romania the supply and demand of capital in rural areas occurs only with subsidized lending. Even under high inflation and tough collateral requirements contrary to the model, there can hardly be observed a credit contract without subsidies in Romania. This gap may be explained partially with the problems of collateral enforcement or resale which are not incorporated in the model as well as with the high volatility or uncertainty of agricultural income. For these reasons, it appears to be an unbearable risk for the individual farmers as well as for the banks to provide or demand loans at market conditions. It seems that not the required loan size but the loan contract is refused. From the point of view of the financial institutions, the principal reasons are legal and financial uncertainties as regards asset and farm performance evaluation, and collateral enforcement and resale. From the perspective of the farmer, the risk aversion of potential borrowers with low asset endowment may inhibit the actual credit demand because of the potential loss of assets pledged as collateral. In this context, the results of the two qualitative analyses may contribute to a better understanding of the actual behavior of the potential borrower and lender.

5.3.4 Information asymmetry and collateral value

Financial institutions value the assets pledged as collateral lower than the potential borrower does. Furthermore, the collateral has to cover 160% of the loan amount. The potential borrower

[71] Own capital also includes capital from family members and relatives
[72] Informal loans refer here to cheap loans or grants from close friends, neighbors or far relatives
[73] Availability of own capital or informal loans is restricted if financial institutions offer attractive deposit facilities and hence attract the otherwise available capital of families, relatives or friends.

compares the value of his pledged assets with the loan size. Under certainty conditions, the size and value of collateral is irrelevant to the decision whether to take or give a loan. But under an uncertain income situation such as prevails in the agricultural sector in Romania, the collateral value represents a possible loss for the borrower or a possible/alternative revenue for the financial institution in case of default. Hence, the farmer as borrower considers the pledged asset as a potential cost of lending and the loan amount should at least be equal to the value he estimates for his assets. It follows then that any asset value which, in the farmer's estimation, is smaller than or equal to the loan size is available as collateral. Thus, only 'bad' assets are pledged as collateral, resulting in an adverse selection of collateral. Since the financial institution is aware of this process, it may re-evaluate the remaining pool of 'bad' farm assets, but again they select the 'bad' ones from this 'bad' asset pool. Finally, this results in the refusal to accept any kind of farm asset as collateral and no loans are offered for the small-scale farm sector.

5.3.5 Risk aversion and farm households

The farmers' economic behavior are driven by their economic situation or wealth of the farm household. The basic needs comprise food and dwelling security that is maintained and secured through farming. In contrast to farmers with large farms, the small-scale farmers' household values more highly individual farm assets (Nicholson, 1995) that contribute significantly to their needs. A potential loss of any kind of farm asset counts much higher than a potential gain. Consequently, the aversion against risk is high for these farmers[74]. Furthermore, the scope of their business actions is rather small since they are not willing to put at stake any part of their wealth. Subsequently, they refuse to engage in risky activities such as financing investments or working capital with loans involving the provision of collateral. Finally, this behavior results in an inflexible farm sector that is slowly developing or restructuring.

5.4 Policy options

The topic of this study discusses the constraints of capital demand and supply in three fields, the financial sector, the agricultural sector and rural financial markets, in which small-scale farmers are considered as the representatives for small-scale enterprises in rural areas. Moreover, the issue of credit demand and supply is embedded in three levels, the macroeconomic, the sectoral and the microeconomic level, but only the micro-level is analyzed in detail in this work.

Overall, the macro-economic level comprises the budget and financial policies, economic and monetary policy and the legal, institutional and infrastructure framework. Stabilization, amelioration, reorganization and efficiency on this level, and consequently confidence of the economic agents in the economic and political situation so that deposits become attractive, is a very necessary pre-condition for the functioning of rural financial markets.

On the sectoral level, it becomes clear that a restructuring of the agricultural sector and of financial institutions has to occur:

[74] In this model it is assumed that the utility function is concave (Varian, 1992, Mas-Colell, 1995).

- In the banking sector, the concentration on particular client groups or sectors and on certain products or services has to be overcome. The services of the banking sector, as well as its business strategies, technologies and know-how should be adapted to the needs or demand of potential clients as well as to the changing situation in Romania. This is already occurring in some small business segments, but not in rural areas. Further, the banking sector should restructure its loan portfolio by depreciating or readjusting the values of weak loans. An information network needs to be established to provide information on the special needs of the rural population and to reduce the risks or information asymmetries and the costs of information for the financial intermediaries.
- The small-scale private farm sector has to develop through a restructuring process and the input of 'new' technologies, and to increase the quality and quantity of output. This can occur through a vibrant land market, the withdrawal of redundant labor forces from this sector, through better supply of input factors and through the availability of external capital for production purposes. Policies such as subsidy schemes which support the persistence of the current agricultural structures should be changed so that they pave the way for the necessary restructuring process. Instead, measures like pre-retirement support, job procurement programs, retraining programs have to be elaborated that support the abandon of small scale farming. Special guarantee programs which take over part of the required loan securities may ease the reluctance of farmers to provide collateral. However, this restructuring can only go hand in hand with the development of the non-agricultural sector in rural areas.

Changes on the microeconomic level comprise activities and decisions of the financial institutions as well as of individual farmers:

- Financial institutions should try to reduce their costs of the administrative procedures, and at the same time increase their screening efforts to select the productive enterprises and hence reduce the risk associated with lending. This may be achieved through the assignment of agricultural credit specialists. Further, they should boost the confidence of potential savers in their institution and try to attract more savings by offering attractive conditions and products and by simplifying their procedures. To increase the activities of rural financial markets, special products and services for rural areas need to be designed and developed. Moreover, the loan coverage ratio could be adjusted since collateral represents a real value, while the interest rates applied are nominal values. Although Holmstrom (1993) suggest collateral lending to overcome information asymmetries, in Romania the lending policy should first concentrate more on screening and less on collateral values because assets usable for collateral are rather limited on small scale farms and the asset (market) value, if any, of agricultural assets is low. When the farm sector has been restructured, the farm sizes increased, farm assets are available and marketable, the lending policy may be to reduce the screening costs and apply collateral lending. To overcome the capital bottleneck, a borrower default insurance, an efficient functioning risk fund for banks or a kind of security market which pools the credit risk and shares the risk equally among investors could be established.

- Through the restructuring of the private farm sector, the income and correspondingly the farms' asset endowment has to increase, so that farmers are willing to take some risks. Farmers need to learn to face risks in a market economy. Therefore, special training programs may reduce the high risk aversion among farmers and enables them to deal with risk. To smooth the relatively high risks in agriculture, a risk fund or efficient risk insurance could be established, such that farmers are willing to accept the risk of loans. Further, farmers should learn appropriate farm management methods, to built up an efficient organization and to adopt the most appropriate production technologies. Farmers of non-profitable farms with little future prospects should be induced to give up farming, i.e. sell or rent out their farm and take jobs in the non-agricultural sector. In general, the farm size has to increase parallel to the development of markets for agricultural assets (land, equipment, machinery, building, stocks), so that the risk aversion of farmers decreases and the size of financial transaction augments.

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7 Annex

7.1 Annex: Distributions

Distribution of capital input		Distribution of land input		Distribution of labor input		Distribution of output		Distribution of return to capital	
K < or =, in million Lei	frequency	A < or =, in ha	frequency	L < or =, in man power	frequency	Y < or =, in million Lei	frequency	X100 < or =	frequency
0	0	0	0	0	0	0	0	-3	0
10	20	1	3	2	18	10	5	-2.5	1
20	44	2	33	3	59	20	18	-2	4
30	33	3	25	4	59	30	22	-1.5	2
40	25	4	20	5	35	40	27	-1	5
50	20	5	20	6	6	50	19	-0.5	24
60	11	6	18	7	3	60	20	0	48
70	11	7	6	8	1	70	12	0.5	57
80	5	8	9	9	0	80	11	1	22
90	5	9	8			90	9	1.5	11
100	1	10	10		181	100	7	2	6
120	3	11	2			110	11	2.5	1
160	3	12	4			120	5	3	0
200	0	13	3			130	4		
		14	0			140	5		181
	181	15	2			150	5		
		16	2			190	1		
		17	5			200	0		
		18	2						
		19	2				181		
		20	3						
		21	1						
		22	2						
		23	0						
		24	0						
		25	1						
		26	0						
			181						

Source: own calculations

7.2 Annex: Sub-samples

Influence of education, specialization and farm foundation on output

	low education	high education	livestock	crop	mixed	old farms	new farms
N	72	109	55	53	73	25	151
R^2	0.67	0.82	0.86	0.52	0.84	0.79	0.77
Residual sum	-31.59	-52.62	-35.72	-7.04	-13.12	-31.40	-59.19
Residual variance	483.40	308.26	363.01	443.37	99.20	390.59	374.35
constant	1.77	1.95	1.92	2.49	1.50	2.24	1.67
K -parameter	0.62	0.40	0.45	0.32	0.64	0.41	0.56
A -parameter	0.11	0.40	0.37	0.27	0.13	0.32	0.24
L -parameter	0.02	0.07	0.14	0.07	-0.05	0.08	0.04
t-value constant	6.64*	10.26*	8.36*	8.19*	7.52*	6.66*	8.09*
t-value K	8.74*	6.86*	7.36*	3.59*	8.38*	3.19*	10.20*
t-value A	1.84*	7.15*	6.38*	3.10*	1.93*	2.38*	5.19*
t-value L	0.18	1.22	2.31*	0.81	-0.53	0.40	0.77
Mean of K expenditure	35.4	35.3	39.3	44.5	25.7	25.9	37.3

Source: Own calculations, 1999

Note: The significance level * is $\alpha = 0.01$ or $\alpha = 0.05$. Low education reflects a school education of up to 9 years. Specialization in livestock or crop production is anticipated if the farm income from one field exceeds the other by more than 10 million lei per year. Old farms are those founded before 1990, new farms in 1990 or later.

Livestock revenues

NAME	N	MEAN	ST. DEV	VARIANCE	MINIMUM	MAXIMUM
K	55	39.334	34.833	1213.4	5.5900	166.23
A	55	5.4816	4.8605	23.624	1.5000	22.000
L	55	3.3682	1.2208	1.4904	1.0000	7.5000

Crop revenues

NAME	N	MEAN	ST. DEV	VARIANCE	MINIMUM	MAXIMUM
K	53	44.529	23.652	559.43	9.7600	151.82
A	53	10.178	5.4975	30.223	1.4500	25.000
L	53	3.2642	1.2074	1.4577	1.2500	6.7500

Mixed revenues

NAME	N	MEAN	ST. DEV	VARIANCE	MINIMUM	MAXIMUM
K	73	25.666	19.927	397.09	2.5000	89.650
A	73	4.1468	3.5241	12.419	1.0000	18.880
L	73	2.8562	0.91848	0.84361	1.0000	4.750

Low education up to 3 (from 1 to 3)

NAME	N	MEAN	ST. DEV	VARIANCE	MINIMUM	MAXIMUM
K	72	35.387	24.802	615.14	4.9100	116.90
A	72	6.4879	5.1148	26.161	1.0000	21.000
L	72	3.2986	1.1656	1.3585	1.0000	6.7500

High education (from 4 to 8)

NAME	N	MEAN	ST. DEV	VARIANCE	MINIMUM	MAXIMUM
K	109	35.314	29.141	849.19	2.5000	166.23
A	109	6.2064	5.3166	28.266	1.0000	25.000
L	109	3.0206	1.0834	1.1738	1.0000	7.5000

Old farms (before 1990)

NAME	N	MEAN	ST. DEV	VARIANCE	MINIMUM	MAXIMUM
K	25	25.941	23.154	536.11	5.5900	91.760
A	25	5.3828	4.9050	24.059	1.5000	20.000
L	25	3.8300	1.1197	1.2537	2.0000	7.5000

New farms

NAME	N	MEAN	ST. DEV	VARIANCE	MINIMUM	MAXIMUM
K	151	37.266	28.123	790.91	2.5000	166.23
A	151	6.5647	5.3239	28.344	1.0000	25.000
L	151	3.0298	1.0843	1.1758	1.0000	6.7500

Extract from results in Shazam: file5e-1, file5d1-3, file5f1-2

7.3 Annex: Loans

Farm ID	Loans in Lei at constant prices Dec. 1997	Nominal interest rates in % p.a.	Official monthly average nom. loan rates in % p.a.	Difference between actual nom. and officially advertised nom. interest rates	Real interest rates p.a. in %**	Capital input in million Lei	Ratio loan size / capital input
BM01	10,409,245	73.3	91.4	-18.1	-37.5	25.4	0.41
BM03	4,000,383	36.7	112.7	-76.0	-50.6	15.2	0.26
BM04	2,179,870	25.0	48.1	-23.1	-53.6	27.7	0.08
BM05	6,392,430	55.0	109.0	-54.0	-43.4	16.1	0.40
BM07	3,749,226	50.0	91.4	-41.4	-45.9	42.7	0.09
BM08	6,248,710	30.0	91.4	-61.4	-53.1	41.9	0.15
BM10	10,227,888	19.0	109.0	-90.0	-56.6	17.4	0.59
BM24	6,392,430	40.0	109.0	-69.0	-48.9	30.0	0.21
BV07	6,792,500	30.0	50.5	-20.5	-51.0	58.4	0.12
BV13	2,901,952	37.5	49.8	-12.3	-47.4	54.1	0.05
BV18	1,438,904	32.5	52.8	-20.3	-48.9	39.1	0.04
BV27	1,045,000	30.3	50.5	-20.2	-50.9	103.8	0.01
DI21	3,835,458	48.9	109.0	-60.1	-45.7	25.2	0.15
DM01	6,964,685	65.0	49.8	15.2	-36.9	11.6	0.60
DM02	16,001,531	75.0	112.7	-37.7	-36.8	82.8	0.19
DM07	6,248,710	60.0	91.4	-31.4	-42.3	22.7	0.28
DM09	10,227,888	65.0	109.0	-44.0	-39.8	35.9	0.28
DM11	6,392,430	60.0	109.0	-49.0	-41.6	21.1	0.30
DM22	18,746,129	68.9	91.4	-22.5	-39.1	25.9	0.72
DM24	2,556,972	0.0	109.0	-109.0	-63.5	14.6	0.18
DM25	11,990,865	70.0	52.8	17.2	-34.4	29.1	0.41
DS01	10,667,687	60.0	112.7	-52.7	-42.2	68.1	0.16
DS06	12,784,860	31.0	109.0	-78.0	-52.2	39.6	0.32
DS11	666,730	45.0	112.7	-67.7	-47.6	10.9	0.06
DS14	666,730	52.5	112.7	-60.2	-44.9	11.1	0.06
DS15	3,333,652	30.0	112.7	-82.7	-53.0	11.5	0.29
DS24	3,196,215	40.0	109.0	-69.0	-48.9	20.3	0.16
T023	3,723,164	0.0	69.0	-69.0	-61.5	59.9	0.06
T050	12,497,420	0.0	91.4	-91.4	-64.0	51.2	0.24
T053	66,673,046	40.0	112.7	-72.7	-49.4	104.4	0.64
T063	21,002,009		112.7			153.8	0.14
Number	31			30	30		31
Min	666730			-109.0	-64.0		0.01
Max	66673046			17.2	-34.4		0.72
Mean	9030797			-49.0	-47.7		0.25
Stand. Dev.	11915638			30.8	7.7		0.19
** calculated according to Fisher's equation							

Source: own calculations 1999

7.4 Annex: Regressions

	Cobb-Douglas	OLS	Lin-Log	Quadratic	Polynomial	Exponential	Compound	Mitscherl.-B.	Trans-Log
R^2	0.75	0.74	0.71	0.76	0.77	0.65	0.65	0.012	0.85
log-like-function	-800.23	-804.86	-815.38	-796.62	-794.46	-833.43	-833.43	-926.33	-794.63
Residual sum	-79.07	-3.30E-13	-9.30E-06	1.30E-12	4.10E-12	-218.83	-218.83	-1.00E+02	-3.66E-06
Residual variance	405.24	432.11	479.07	405.03	402.43	584.82	584.82	1632.4	7.50E-02
Absolute Errors sum	2525.4	2622.1	2896.8	2460.7	2416.7	3323.7	3323.7	5809.7	38.53
constant	5.91	3.76	-63.51	3.29	2.88	26.99	26.99	-0.96	0.59
parameter for K	0.52	8.83	31.38	1.32	2.06	0.007	1.01	6.32	1.04
parameter for A	0.25	2.83	14.06	3.63	-0.66	0.038	1.04	-0.296	0.47
parameter for L	0.07	3.18	-0.21	-2.11	-1.34	0.076	1.08	-0.958	-0.09
parameter for K^2				-0.0039	-0.016				-0.04
parameter for A^2				-0.055	0.36				0.13
parameter for L^2				0.55	0.15				0.13
parameter for K^3 or KA					4.90E-05				-0.13
parameter for A^3 or KL					-0.011				0.08
parameter for L^3 or AL					0.051				-0.22
yield plateau m								60.86	
t-value constant	6.21	0.75	-7.08	0.32	0.14	10.84	10.85	-0.96	1.53
t-value K	11.22	10.66	9.07	6.64	4.57	9.71	1294.5	64.85	3.69
t-value A	5.8	6.95	4.25	2.96	-0.24	8.04	210.61	-0.29	1.83
t-value L	1.56	2.3	-0.05	-0.38	-0.074	3.77	49.84	-0.96	-0.32
t-value K^2				-2.94	-2.26				-0.88
t-value A^2				-1.07	1.31				2.16
t-value L^2				0.72	0.03				1.23
t-value K^3 or KA					1.66				-1.32
t-value A^3 or KL					-1.41				0.68
t-value L^3 or AL					0.12				-1.67
t-value m								20.27	

Cobb-Douglas: $Y = c\ K^{b} * \ldots$

OLS: $Y = c + bK + \ldots$

Lin-Log: $Y = c + b \ln K + \ldots$

Quadratic: $Y = c + bK + bbK^2 + aA + aaA^2 + \ldots$

Polynomial: $Y = c + bK + bbK^2 + bbbK^3 + \ldots$

Exponetial: $Y = c * e^{(bK)} * e^{(aA)} * \ldots$

Compound: $Y = c * b^{K} * \ldots$

Mitscherlich-Baule: $Y = m * (1 - e^{(-c - bK - aA - lL)})$

Trans-Log: $\log Y = c + b(\log K) + bb(\log K)^2 + ba(\log K \log A) + bl(\log K \log L) + \ldots$

Source: own calculations, 1999

7.5 Annex: Multicollinearity

Correlation of Variables				
Variables	Y	K	A	L
Y	1			
K	0.81	1		
A	0.75	0.68	1	
L	0.12	0.05	0.01	1

Revised Version of Frisch's Confluence Analysis							
Variables	K	A	L	K A	K L	A L	K A L
R^2	0.703	0.590	0.008	0.749	0.704	0.590	0.752
log likely.-function	-816.9	-845.7	-925.6	-801.2	-816.5	-845.7	-800.2
residual sum	-130.70	-53.15	3.15	-92.78	-124.15	-54.02	-79.07
residual variance	487.39	670.05	1,619.50	409.77	485.26	669.89	405.24
sum of absolut errors	2,779.3	3,340.1	5,723.0	2,552.6	2,757.9	3,334.0	2,525.4
c	1.704	3.065	3.919	1.892	1.629	3.047	5.909
b	0.693			0.515	0.699		0.523
a		0.608		0.247		0.608	0.25
g			0.173		0.049	0.016	0.073
t-values c	12.188	32.609	23.011	13.878	9.869	23.763	6.213
t-values b	20.147			11.438	19.548		11.226
t-values a		15.227		5.926		15.182	5.804
t-values g			1.188		0.889	0.211	1.559

Source: own calculation, n = 181

7.6 Annex: Heteroscedasticity

File:f5h2.sha

```
******* DIAGNOSIS-TEST FOR HOMOSCEDASTICITY ****************

file screen f5h2.out
read (DIFfile5.dif) Y K A L D F E  X100  X200 / dif

***** VARIABLE K **************
sample 1 181
ols Y K / hatdiag=s2
ols Y K / hetcov

nl 1 / ncoef = 2 rstat  resid=e1  sigma=s1 weight=s2
eq Y = exp(b0)*K**(b1)
coef  b0 1.5  b1 0.6
genr e11 = abs(e1)
sort K e11 Y e1 A L /desc
genr u1 = e1**2
print s1

plot e11 K
plot e1  / histo groups=12 range nowide nopretty

genr K1= log(K)
genr K2= K**2
genr ee11=log(e11)
ols e11 K
ols e11 K1
ols e11 K2
ols ee11 K1

genr YY=Y/K1
genr KK=K/K1
nl 1 / ncoef = 2 rstat
eq YY = exp(b0)*KK**(b1)
coef  b0 1.5  b1 0.6

end
stop
```

File f5ha.out

```
 FINAL STATISTICS :


 |_plot e11 K

 REQUIRED MEMORY IS PAR=   19 CURRENT PAR=  500
 FOR MAXIMUM EFFICIENCY USE AT LEAST PAR=    22
       181 OBSERVATIONS
                  *=E11
                  M=MULTIPLE POINT
    80.000        |
    75.789        |       *    *  *
    71.579        |
    67.368        |              **
    63.158        |
    58.947        |
    54.737        |
    50.526        |
    46.316        |      **   *
    42.105        |      *  *   *               *
    37.895        |      *   * **   *
    33.684        |    * M *  *M  * *    *
    29.474        |     * *           *
    25.263        |    *M **
    21.053        |    * **M*
    16.842        |  *   M  MM     **   *
    12.632        | MM*MM*MMM *
    8.4211        | MMMMM**M * *  M *
    4.2105        |MMMMMM*** ***                  *
 -0.17764E-14     |*MMM*MMM M*M           *
                   ____________________________________________

              0.000    50.000   100.000   150.000   200.000

                                K
```

```
|_plot e1  / histo groups=12 range nowide nopretty


GROUP COUNTS
GROUP       1       2       3       4       5       6       7       8
GROUP       9      10      11      12
COUNT     10.      7.     26.     59.     41.     14.      5.      8.
COUNT      4.      2.      0.      5.
HISTOGRAM - E1
  PCT.    N
 0.403   73  I
 0.387   70  I
 0.370   67  I
 0.354   64  I
 0.337   61  I
 0.320   58  I               XXXXX
 0.304   55  I               XXXXX
 0.287   52  I               XXXXX
 0.271   49  I               XXXXX
 0.254   46  I               XXXXX
 0.238   43  I               XXXXX
 0.221   40  I               XXXXXXXXXX
 0.204   37  I               XXXXXXXXXX
 0.188   34  I               XXXXXXXXXX
 0.171   31  I               XXXXXXXXXX
 0.155   28  I               XXXXXXXXXX
 0.138   25  I          XXXXXXXXXXXXXXX
 0.122   22  I          XXXXXXXXXXXXXXX
 0.105   19  I          XXXXXXXXXXXXXXX
 0.088   16  I          XXXXXXXXXXXXXXX
 0.072   13  I          XXXXXXXXXXXXXXXXXXX
 0.055   10  IXXXXX     XXXXXXXXXXXXXXXXXXX
 0.039    7  IXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX     XXXXX
 0.022    4  IXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX          XXXXX
 0.006    1  IXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX     XXXXX
             I---------I---------I---------I---------I---------I---------I
           -45.0    -24.3     -3.57      17.2      37.9     58.6     79.3
```

File: file5h.sha

```
******* TEST FOR HOMOSCEDASTICITY ***************

file screen file5h.out
read (DIFfile5.dif) Y K A L D F E  X100  X200 / dif

***** VARIABLE K **************
sample 1 181
nl 1 / ncoef = 2 rstat  resid=e1
eq Y = exp(b0)*K**(b1)
coef  b0 1.5  b1 0.6

*Spearman - rank - correlation-test (coefficient)
genr e11 = abs(e1)
sort e11 K Y e1 A L /desc
stat K e1 /  prankcor


****** VARIABLE A *************
sample 1 181
nl 1 / ncoef = 2 rstat  resid=e2
```

```
eq Y = exp(b0)*A**(b2)
coef  b0 3.5  b2 0.7

*Spearman-rank-correlation-test
genr e22 = abs(e2)
sort e22 A Y e2 K L / desc
stat A e2 /  prankcor


***** VARIABLE L *****
sample 1 181
nl 1 / ncoef = 2 rstat  resid=e3
eq Y = exp(b0)*L**(b3)
coef  b0 2   b3 0.2

*Spearman-rank-correlation-test
genr e33 = abs(e3)
sort e33 L Y e3 A K / desc
stat L e3 /  prankcor

stop
```

File: file5h.out

```
|_****** VARIABLE K *************
|_*Spearman - rank - correlation-test (coefficient)
 |_genr e11 = abs(e1)
 |_sort e11 K Y e1 A L /desc
 DATA HAS BEEN SORTED BY VARIABLE E11
 |_stat K e1 /  prankcor
 NAME         N   MEAN        ST. DEV      VARIANCE     MINIMUM      MAXIMUM
 K          181   35.343       27.425       752.15       2.5000      166.23
 E1         181 -0.72212       22.126       489.57      -45.001      79.301

 SPEARMAN RANK CORRELATION MATRIX -       181 OBSERVATIONS
 K          1.0000
 E1        0.65208E-01   1.0000
              K            E1


 |_****** VARIABLE A *************
   |_*Spearman-rank-correlation-test
 |_genr e22 = abs(e2)
 |_sort e22 A Y e2 K L / desc
 DATA HAS BEEN SORTED BY VARIABLE E22
 |_stat A e2 /  prankcor
 NAME         N   MEAN        ST. DEV      VARIANCE     MINIMUM      MAXIMUM
 A          181   6.3184       5.2247       27.298       1.0000      25.000
 E2         181 -0.29366       25.955       673.68      -65.469      108.30

 SPEARMAN RANK CORRELATION MATRIX -       181 OBSERVATIONS
 A          1.0000
 E2        0.44814E-01   1.0000
              A            E2

 |_****** VARIABLE L *************
|_*Spearman-rank-correlation-test
 |_genr e33 = abs(e3)
 |_sort e33 L Y e3 A K / desc
 DATA HAS BEEN SORTED BY VARIABLE E33
 |_stat L e3 /  prankcor
```

```
 NAME         N   MEAN         ST. DEV      VARIANCE     MINIMUM      MAXIMUM
 L          181    3.1312        1.1219        1.2587       1.0000       7.5000
 E3         181  0.17427E-01    40.354        1628.4       -51.791       135.62

 SPEARMAN RANK CORRELATION MATRIX -       181 OBSERVATIONS
 L           1.0000
 E3         0.11643E-01   1.0000
              L            E3
|_stop
```

7.7 Annex: Farm profit

Farm profit with negative real interest rates

Profit as a function of the interest rate, in million lei							
i = 0.53 (average monthly real interest rate for deposits)							
Input of A in ha	Input of L in man power per year						
	0.5	1	1.5	2	2.5	3	3.5
1	17.21	19.04	20.20	21.06	21.76	22.35	22.86
5	39.80	44.03	46.71	48.71	50.33	51.68	52.86
10	57.10	63.18	67.03	69.90	72.21	74.15	75.84
20	81.93	90.65	96.17	100.29	103.61	106.40	108.82
j = 0.62 (average monthly real interest rate for loans)							
Input of A in ha	Input of L in man power per year						
	0.5	1	1.5	2	2.5	3	3.5
1	14.52	16.06	17.04	17.77	18.36	18.86	19.28
5	33.58	37.15	39.41	41.10	42.46	43.61	44.60
10	48.18	53.30	56.55	58.97	60.92	62.57	63.99
20	69.13	76.48	81.14	84.62	87.42	89.77	91.81

Source: Own calculations

Note: The capital opportunity costs correspond to the real average deposit interest rate of – 47% p.a., i = 1 - 0.47, and to the real average loan interest rate of – 38% p.a., i = 1 – 0.38, the opportunity costs for labor and land use are considered as zero, r=0, w=0.

Farm profit with positive real interest rates

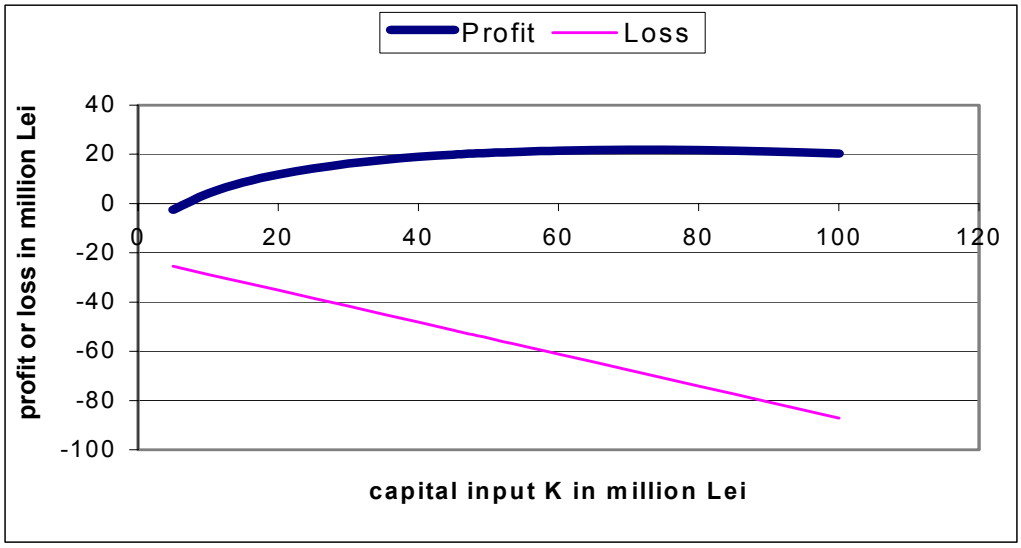
Profit as a function of the interest rate, in million lei							
i = 1.05 (supposed monthly real interest rate for deposits)							
Input of A in ha	Input of L in man power per year						
	0.5	1	1.5	2	2.5	3	3.5
1	8.20	9.08	9.63	10.04	10.37	10.65	10.90
5	18.97	20.99	22.27	23.23	23.99	24.64	25.20
10	27.22	30.12	31.96	33.33	34.43	35.36	36.16
20	39.06	43.22	45.85	47.82	49.40	50.73	51.88
j = 1.10 (supposed monthly real interest rate for loans)							
Input of A in ha	Input of L in man power per year						
	0.5	1	1.5	2	2.5	3	3.5
1	7.80	8.63	9.16	9.55	9.86	10.13	10.36
5	18.04	19.96	21.18	22.08	22.81	23.43	23.96
10	25.89	28.64	30.38	31.69	32.74	33.62	34.38
20	37.14	41.09	43.60	45.47	46.97	48.24	49.33

Source: Own calculations

Note: The capital opportunity costs correspond to a supposed real deposit interest rate of + 5% p.a., i = 1 + 0.05, and to the supposed real loan interest rate of + 10% p.a., i = 1 + 0.10, the opportunity costs for labor and land use are considered as zero, r=0, w=0.

7.8 Annex: Loss and profit situation

Profit and loss situations under negative real interest rates



Source: Own calculations,
Note: Collateral coverage of 160% η=1.6, real loan interest rate of –38%, f=0.05, b=1, w=5.4 mn lei, r=1 mn lei, profit = h_1, loss = h_2

Erklärung

Hiermit erkläre ich , dass ich die vorliegende Arbeit selbständig angefertigt habe. Die aus fremden Quellen direkt oder indirekt übernommenen Gedanken sind als solche kenntlich gemacht.

Die Arbeit wurde bisher keiner anderen Prüfungsbehörde vorgelegt und auch noch nicht veröffentlicht.

Ich bin mir bewusst, dass eine falsche Erklärung rechtliche Folgen haben wird.

Stuttgart, den 16.07.2002

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