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Subsistence Agriculture in Development: Its Role in Processes of Structural Change

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Discussion papers in this series are intended to stimulate discussion among researchers, practitioners and policy makers. This paper has been reviewed externally by Dr. Steffen Abele, IAMO, Halle, and internally by Dr. Gertrud Buchenrieder, Department of Agricultural Development Theory and Policy (490a), University of Hohenheim.

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Abstract

The term "subsistence agriculture" has been and still is used synonymously with such other concepts as traditional, small scale, peasant, low income, resource poor, low-input or low technology farming. Many of these concepts are also used in non-economic disciplines with very different meanings. Thus, it is difficult to give a generally accepted definition of subsistence agriculture – some definitional problems are discussed in the paper.

We find subsistence agriculture both in today's less developed countries and in the early stages of industrialised countries. Generally, farmers' subsistence orientation is seen as causing backwardness and inefficiency, holding down economic growth and economic performance. In this paper we will argue that, although subsistence agriculture may at first sight appear to be an impediment for economic growth, it often is the only way for rural people to survive under extremely difficult conditions, such as inefficient input, output, credit and labour markets, risks and uncertainties. Under such conditions subsistence agriculture should not only be considered as a passive adaptation, it can even play an important role in stabilizing fragile economies. Policies need to take these aspects into account and, instead of neglecting or even fighting subsistence agriculture, they need to address the underlying reasons for the drift into subsistence and open viable ways for farmers to increasingly join the market economy.

1 Introduction

Subsistence agriculture is closely linked to a low level of economic development. We find it both in today's less developed countries and in the early stages of industrialised countries. The term "subsistence agriculture" has been and still is used synonymously with such other concepts as traditional, small scale, peasant, low income, resource poor, low-input or low technology farming. Many of these concepts are also used in non-economic disciplines with

very different meanings. Thus, it is difficult to give a generally accepted definition of subsistence agriculture – the definitional problems will be discussed below.

Whatever the terms used to describe subsistence agriculture, the attributes ascribed to it are predominantly negative, at least in the agricultural economics literature (Rogers 1970, Seavoy 2000). Subsistence-oriented agriculture is said to lack efficiency of resource use for various reasons:

- the priority given to satisfy family needs implies foregoing the benefits of comparative advantage, specialisation and division of labour. It assures only a low standard of living for subsistence farmers and their families;

- formal credit and external inputs are rarely used in subsistence production. Simple technologies, lack of entrepreneurship and absence of specialisation keep land and labour productivity low;

- markets are supplied only if there are surpluses of subsistence production, occurring mainly in good harvest years. Subsistence agriculture, therefore, cannot be relied upon for providing a continuous food supply for the urban population. Also, such production pattern triggers high price instability on food markets;

- subsistence agriculture displays low responsiveness to policies and, therefore, is difficult to control and direct.

In summary, subsistence orientation is usually seen as synonymous with backwardness and inefficiency, holding down economic growth and economic performance.

It is therefore no wonder that governments have tried to change or eliminate subsistence agriculture: Colonial and post-colonial governments in many developing countries have tried to force peasants into the market economy by head taxes and imposed labour and cropping practices and mandatory deliveries. Marxism-Leninism has systematically suppressed peasantry.

In this paper we will argue that, although subsistence agriculture may at first sight appear to be an impediment for economic growth, it often is the only way for rural people to survive under extremely difficult conditions, such as inefficient input, output, credit and labour markets, risks and uncertainties. Under such conditions subsistence agriculture should not only be

considered as a passive adaptation, it can even play an important role in stabilizing fragile economies. Policies need to take these aspects into account and, instead of neglecting or even fighting subsistence agriculture, they need to address the underlying reasons for the drift into subsistence and open viable ways for farmers to increasingly join the market economy.

In the following, we will a) review the changing role of the traditional (subsistence) agriculture in overall development theory and practice over the last decades, b) discuss definitional issues of subsistence agriculture as the concept of subsistence itself is fuzzy and often a major source of misunderstanding and confused analysis, c) discuss within the framework of the main theoretical concepts the many factors which can contribute to the emergence and persistence of subsistence agriculture, and d) draw conclusions for policies and further research. The emphasis will be on developing countries where most of the research on subsistence agriculture has been done. Where we see parallels, we will make references to the situation in transformation countries.

2 Traditional Agriculture in Development Theory

Development economists of the 1950s did not view agriculture as an important contributor to economic growth (Johnston 1970). They knew little about tropical agriculture and there was no substantial body of empirical literature to draw on (Little 1982). Development economists' thinking in the 1950s and 1960s was dominated by the dualistic model of development, which was based on W.A. Lewis' influential article "Economic Development with Unlimited Supplies of Labour" (Lewis 1954). Lewis presented a theoretical model of economic growth with two sectors – a modern, mostly industrial sector and a traditional, mostly agricultural sector, which was largely subsistence farming. Growth and development took place through a transfer of labour from the subsistence sector, where the marginal productivity of labour was low, to the modern sector, where marginal productivity of labour was high and where the reinvestment of profits was driving economic expansion and creating new employment opportunities.

The minor role attributed to agriculture in economic growth was reinforced by Prebish's and Singer's thesis of declining terms of trade for countries exporting largely primary products. Also Hirschman's popular model of unbalanced growth (Hirschman 1958), which favoured the selective support of strategic sectors with strong linkages into other sectors of the economy, did little to draw attention to agriculture; agriculture lacked the direct stimulus to spur investments in other sectors through linkage effects.

Other reasons for the scant attention given to research on agriculture and particularly subsistence farming include:

- Agriculture, and particularly subsistence agriculture, are seen as low productivity sectors that lack the dynamism to act as motor of economic development;
- subsistence farmers' behaviour often appears "mysterious" to economists; they seem to behaving in ways not consistent with the principles of economic theory or even as irrationally, for instance by not reacting to price changes or incentives.
- the science of economics and its analytical tools are mostly based on the existence of markets, which are outside of the range of subsistence;
- research is difficult because statistics about subsistence are not available or unreliable;
- subsistence farming is seen or even derided as traditional and resistant to change and innovation, thus not a preferred target group for development practitioners and policy makers.

It was relatively late in the process of development research that greater attention has been given to agriculture and subsistence farming. This was triggered by recognizing that without agricultural growth the lack of food, resulting in increasing amounts of foreign exchange spent on food imports, would tend to choke the development process. Moreover, mounting failures of development programmes, that too often were based on modernization approaches and innovation technologies without taking subsistence farmers' resource constraints, institutional and infra-structural limitations and traditional cultural values adequately into account, played a role.

That the neglect of agriculture in the industrialization models was theoretically inconsistent and would lead inevitably to the strategies' failure, was pointed out early on by agricultural economists. Johnston and Mellor argued already in 1961 that agriculture had an important role to play in a country's development. It could provide - apart from labour - capital and foreign exchange; even more importantly, it would need to supply the food needed for an expanding industrial and urban sector and it would be an important market for the industrial sector's output (Johnston and Mellor 1961).

The subsequent discussion was instrumental for economists' thinking about agriculture in development: it stimulated interest in looking at the interdependencies between agricultural and industrial growth and, related to it, stressed the importance of better understanding agriculture itself and the process of agricultural change (Mellor and Mudahar 1992). Moreover, the discussion had an important impact on the agricultural economics research approach, i.e. it encouraged movement away from a priori theorizing towards empirical research (Eicher and Staatz 1998).

Within this line of thinking it was Theodore W. Schultz' seminal work "Transforming Traditional Agriculture" (1964) that gave small farmer research a major impetus. The influence of Schultz's book for research on subsistence farming can hardly be overstated; it highlighted the importance of understanding small farmers' ecological, economic and institutional environment, which determines and explains his behaviour and decision making as rational and efficient. Schultz's "poor but efficient" hypothesis of small farmer behaviour triggered a major shift in research from macro-strategy thinking into micro-behaviour research.

From the historical perspective, agricultural research has gone through further ups and downs in development thinking. Schultz's (1964) emphasis on the technology constraints that lock farmers into operating at low levels of productivity encouraged major investments in agricultural research and technology development. Many agricultural research centres were involved in developing high yielding crop varieties that laid the foundation for what has become known as the Green Revolution, an innovation package comprising new seeds, fertilizers, water and plant protection. The Green Revolution had a double effect on subsistence farming research and thinking. On the one hand, as a scale neutral and divisible technology it was suited to be introduced also into existing small-scale farming systems. It allowed subsistence farmers to increase market production while maintaining the level of subsistence production necessary to feed their own family. On the other hand, as it required external inputs the institutional and policy environment became important.

On the other hand, the wide-spread lack of farmers' response to innovation packages and the concomitant failure of many agricultural development projects, most notably those in Sub-Saharan Africa, led to a shift in attention to the policy and institutional environment. Policy research made increasingly clear that the earlier emphasis on industrialization models had led to "urban bias" policies that discriminated against agriculture. In many developing countries,

agriculture was taxed heavily, both directly through export taxes and indirectly through pricing and trade protection mechanisms and overvalued exchange rates.

Beginning in the early 1980s the pendulum swung back to placing major emphasis on macro-policy and structural adjustment. Macro-economic stabilization, privatization, trade and exchange rate liberalization and fiscal discipline had a major impact on economic growth. At the same time it became apparent, that these policy changes also implied costs and that the costs in most countries were unevenly distributed and often heavily borne by the poor. Income distribution, poverty and food insecurity moved to centre stage. Research into the social dimension of structural adjustment, the causes of persistent poverty and increasing attention to the degradation of natural resources moved part of the attention back to the micro level. Farmers' ecological base and natural resource endowment, their institutional and socio-cultural environment are emerging as key determinants of their livelihood. At the same time, at the macro level emphasis also has shifted to include, apart from the economic policy area, the importance of the political scene into the discussion. The importance of good governance, a fair and enforceable legal and administrative framework and the role of civil society has been brought to the forefront. In the new concepts, such as the Comprehensive Development Framework of the World Bank, the macro framework as well as the functioning of small farmers' environment at the micro-level are important for improving rural livelihoods. The state at different levels, the private sector and civil society with its numerous social structures all are seen as necessary to fight poverty and move development forward (Dethier 1999, Heidhues 2001).

3 Subsistence a Fuzzy Concept: Definitional Issues

By using the term "subsistence" in the development debate, one ascends slippery grounds. There is no copyright for the term "subsistence" by any discipline. Already early interdisciplinary attempts to discuss subsistence economy found "the most frequent [conceptual difficulty, *addition by authors*] concerned the various notions of 'subsistence' and different levels of analysis or aggregation" (Wharton 1970). It is important to understand these disciplinary differences since agricultural economics is not the only discipline that has a stake in the discussion and formulation of development policies.

But even within the economic disciplines the term subsistence is used with different meanings. We want to highlight three sources of ambiguity: a) subsistence is used as a concept of market-integration but also as a concept for measuring the living standard, b) subsistence orientation can be measured from the point of view of consumption but also of production, and

c) adding to these conceptual ambiguities, any subsistence indicator can move along a gradient from almost 100% to practically zero. Drawing the line between subsistence and market orientation always involves a certain arbitrariness.

It would go beyond the purpose of this presentation to discuss the different definitional concepts. We will limit ourselves to classifying the definition most commonly employed in the agricultural economics' discipline. For a more detailed presentation of the different conceptual definitions within the economics discipline please refer to Annex 1 of the paper.

In agricultural economics the share of production devoted to the family's own consumption is most often used as the criterion of subsistence farming. Thus, a farmer who "predominantly" produces for his or her own family's consumption is labelled a subsistence farmer, if production for the market dominates he is considered a commercial farmer. Where to draw the line is arbitrary – often the 50% line is used (Wharton 1970).

4 Determinants of Subsistence Production

Any policy effort that aims at changing subsistence agriculture needs to understand its determining factors. Experience has shown that "programmes of directed change designed to reach peasants are likely to fail unless based upon understanding of the values, attitudes, and motivations of this audience" (Rogers 1970, p.111).

With development, technological change, urbanization and industrialization, improvements in infrastructure and transport and markets for agricultural products and rural labour emerge. International trade has also encouraged market production, technology development and the increase of productivity. Moreover, government policies have actively supported the switch from subsistence to market production, often by force (colonialist, socialist and many independent developing countries) (v.Urff 1982). But despite the long existence of such markets and efforts, billions of rural people have remained in a (partial) subsistence economy. In former socialist countries it even seems that a re-emergence of a "secondary" subsistence economy is visible, as many country studies during the Halle seminar showed.

What are thus those strong forces that keep rural people in subsistence, and even induce others outside of agriculture to go "back to the roots"? Subsistence agriculture is ubiquitous and dependent on internal and external factors; they are inevitably multifaceted. In Figure 1 the determinant factors have been grouped into three categories:

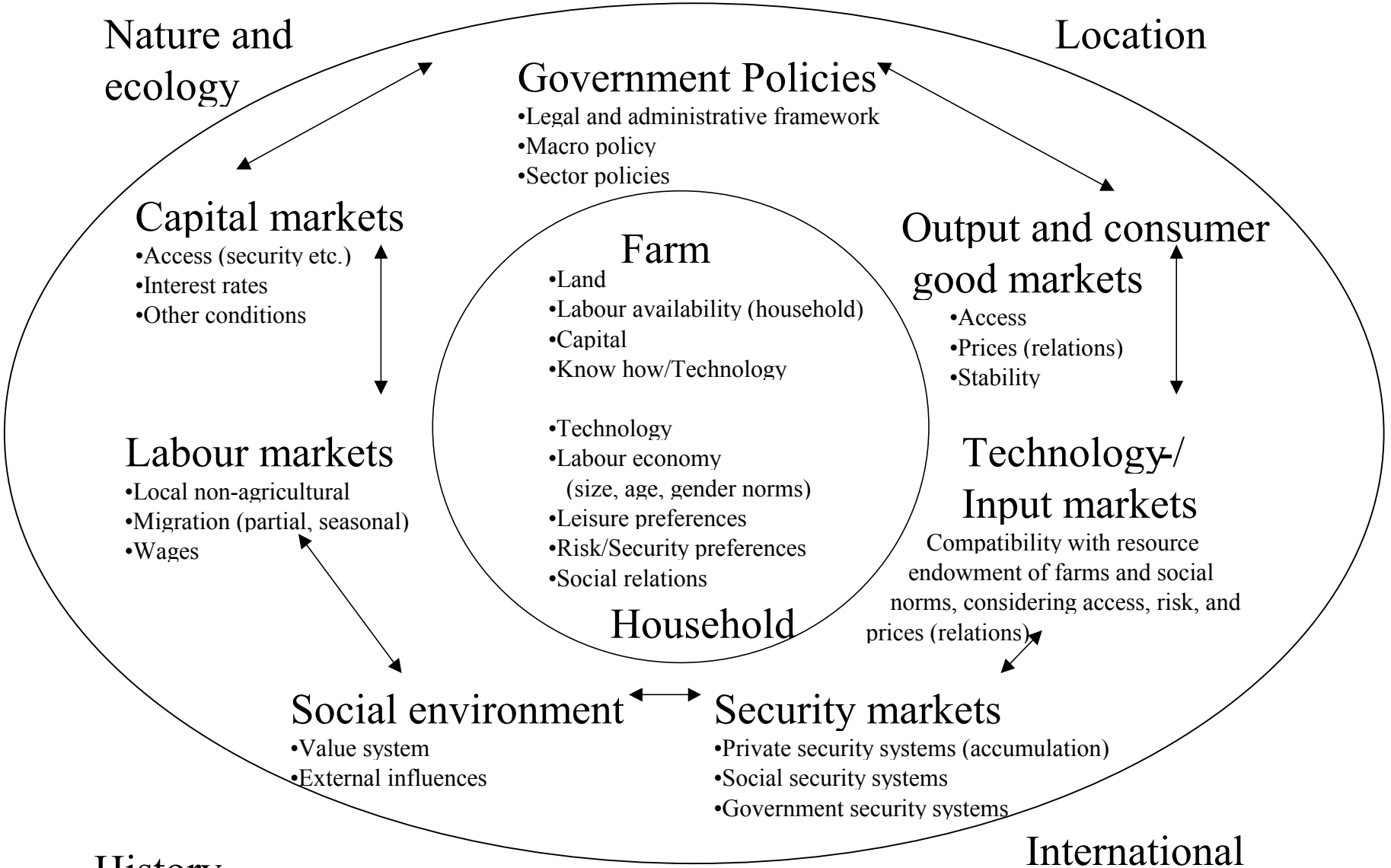
i) Country external factors that are given for each country and region (such as ecology, climate, history, culture and international environment, outer circle)

ii) the farm external and country internal factors, such as government policies, institutions, markets etc. which can be influenced by the country itself but are exogenous for the individual household (intermediate circle); and

iii) the farm/household internal factors, i.e. factor endowment and farm-family specific characteristics (inner circle). Farm/household decisions are influenced by all categories of factors. Many of these factors are interlinked and influence each other.

In the following, we will focus on those factors and theories that capture the most important of these determinants of subsistence production: these are Chayanov's model of peasant production; farm/household models with simultaneous production, consumption and leisure optimization; transaction costs and market failures; and risk and risk aversion models.

Figure 1 Determinants of subsistence versus market orientation



5 Models of Subsistence Production without Risk Considerations

A most prominent place among the theories of subsistence production is the **propensity for leisure** model by Chayanov (in Thorner et al. 1966). His theory is based on quantitative research on Russian peasant agriculture in the 1920s. The fundamental hypothesis is that peasants have a high marginal propensity for leisure even if it means sacrificing additional income, i.e. they prefer to reduce the hardship of manual work. This behaviour can lead to a backward bending supply curve, the occurrence of which is one of the central arguments in the literature for assuming a non-economic behaviour of subsistence farmers (compare Pütz 1991).

An extreme variant of Chayanov's propensity for leisure approach is the hypothesis of a satisfying strategy (Upton 1982), in which households work only to achieve a certain minimum level of consumption; they aim at maximizing leisure. Such behaviour plays a dominant role in the alternative subsistence literature mentioned above; it automatically leads to a backward bending supply curve.

Chayanov's theory has been found useful in explaining farmers' behaviour in some areas, particularly in Africa (Durrenberger 1984). However, it assumes the absence of a labour market (Ellis 1988). Whether Chayanov's model is relevant for the emergence of subsistence production in transition countries is doubtful, given that in many former socialist countries the importance of peasant culture and tradition has declined since several decades and labour markets do exist.[1]

A further development of the Chayanov model of peasant behaviour is the **farm/household model of the new home economics.** It integrates consumption choices into a household's time allocation decision. It maximizes the utility of three types of goods: self- and market-produced goods, home-produced goods for household consumption, such as fuel search, water carrying, cooking, house repair, child raising etc. (the so called Z-goods), and real leisure. A backward bending supply curve for agricultural products is possible if there is no labour market (Singh et al. 1986).

[1] In terms of the linkages shown in Figure 1: Chayanov's model focuses on history ↔ social environment, output markets, (absence of) labour markets ↔ household preferences and labour economy.

In most model specifications the household interacts with a labour market, i.e. it can buy or sell labour at the prevailing wage rate. The existence of a wage rate gives an externally determined value to time and leads to separability of production and consumption.

For transition economies, the existence of a labour market with effective wage payments may be a crucial factor that contributes to (partial) subsistence production. Labour markets often are imperfect: there is wide-spread open or hidden unemployment, salaries are not paid, they are often low and not protected against inflation and purchasing power erosion. Wages may fall below the subsistence level and force those who have the opportunity (access to land and basic inputs) into subsistence production.[2]

Rural farm/household interactions with markets are generally subject to high **transaction costs**, particularly under conditions of underdeveloped market infrastructure such as typically found in developing countries. They originate in imperfect information, transportation, negotiation, monitoring and supervision, motivation, coordination, management, etc. A comprehensive approach to analyse the impact of transaction costs on self-sufficiency is presented by de Janvry and Sadoulet (1994, p.141). "The result [of transaction costs, *addition by authors*] is that there exists a price band that creates a gap between the effective price received for items sold and the effective price for items purchased. ... There exists a range of products and factors for which equilibrium between supply and demand occurs within the price band. In this case, the shadow price is higher than the sale price and lower than the purchase price, with the result that neither sale nor purchase are desired, and there is self-sufficiency in this commodity or factor." Seen in this way, a commodity is not by its nature a tradable or non-tradable one, and a farm is not defined as subsistence- or market-oriented by the psychological structure of the household, but by internal and externally determined prices and transaction costs specific for each decision unit.

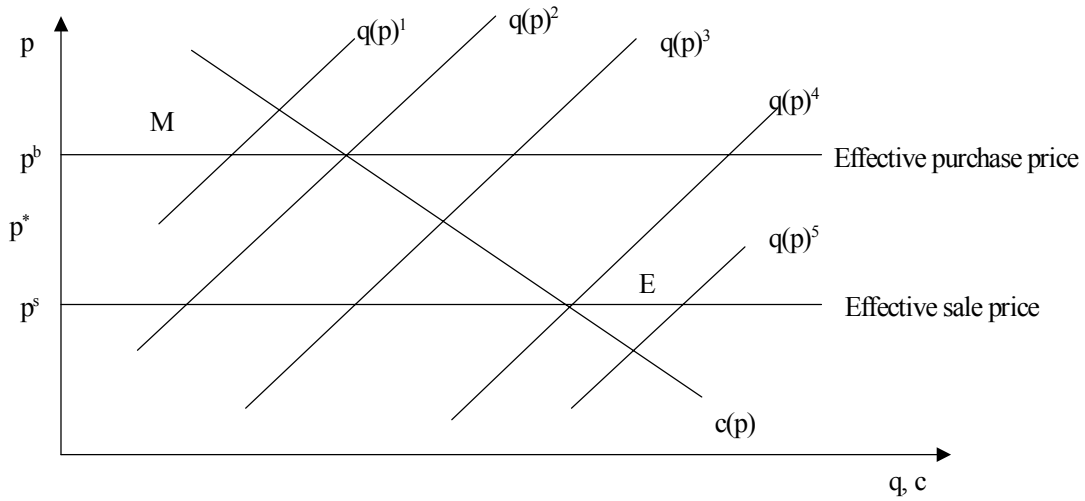
De Janvry and Sadoulet (1994) identify five basic cases that illustrate when farmers will participate in the market and under what conditions they will behave as subsistence producers (see Figure 2): farmers are net sellers if the supply conditions allow production at costs below the lower price band ($q(p)^5$ in Figure 2); they are net buyers if the internal costs are above the

[2] These models capture the linkages: labour and product markets ↔ household preferences and labour economy, in Figure 1.

higher price band ($q(p)^1$); for those situations in between farmers will neither buy nor sell, they are self-sufficient ($q(p)^2$ through $q(p)^4$).

This concept allows to analyse how a certain policy measure by changing transaction costs affects supply response. It can, for instance, explain why many subsistence households do not reduce their production of self-consumed commodities and increase purchases when the market price falls (the effective purchase price does not drop under the internal production cost price) or why market production is not increased by upward price shifts (the effective sale price does not surmount the internal shadow price), and why aggregated supply response is much lower than that of individual farm/households (only a part of farms comes out of the price band).

Figure 2 Supply response under price bands for units with different supply functions



E= Exports (market surplus), M=imports (purchases), P*=implicit price

Source: according to DeJanvry and Sadoulet (1994)

The de Janvry/Sadoulet model of subsistence production is more adapted to the real world of small farmers and rural populations than those classical approaches to agricultural development which disregard institutional issues and imperfect markets. The following four cases, which are often named as underlying reasons for persistent subsistence agriculture, can be interpreted as special cases of this general model.

(a) An important reason for the dominance of subsistence production often is the **lack of market access for outputs and inputs**. In Figure 2, this would mean that the price P* is extremely low. This may be due to extremely high transaction costs and trade risks that

are prohibitive for delivering inputs to remote areas, or for agricultural supply from such areas to find market outlets. Today, in a highly integrated international market for agricultural products and subsidisation of exports by many industrialized countries, such a situation has become a serious market threat for the landlocked areas of African countries. It could also be a relevant scenario for transition countries if it is cheaper to supply the urban centres from the international market rather than from own rural areas. These trends may get reinforced if rural infrastructure continues to degrade.

(b) Subsistence production may be the result of **inaccessible consumption goods**. If there is no access to consumer good markets, the incentive to produce marketable surpluses is low (Azam and Besley 1991). Several studies show that in Africa's early colonial times, farmers had no incentive to produce as they had no access to consumption goods considered useful. The colonial powers introduced (head) taxes with the objective of creating a need for farmers to earn monetary income (Elwert and Fett 1982). Many examples of historic lack of supply response, which are used as a "proof" for non-economic behaviour of subsistence farmers, date back from such experiences. In today's world many consumer goods are easily accessible even in remote areas. The explanatory power of this model in today's world is thus rather limited.[3]

(c) **Inadequate access to technology inputs and rural finance markets** may constitute a constraint for farmers to produce for the market. The lack of appropriate technology has been identified as a serious problem for large parts of rainfed agriculture in developing countries, particularly in marginal areas where green-revolution technology packages are not working (Dommen 1988, Bromley and Chavas 1989).[4]

(d) Closely linked with the existence of technologies is the access to necessary inputs and credit. In developing countries input and credit markets are often inaccessible for small farmers and/or distorted by policy intervention (Bosc and Freud 1996, Delgado 1995). Credit access is often limited by lack of physical collateral (land), high transaction costs (particularly information) and distorted credit markets. With no access to suitable

[3] The corresponding linkages in Figure 1 are location (policy) ↔ input markets, output markets ↔ consumer good markets ↔ household utility.

[4] The corresponding linkages in Figure 1are history, policies ↔ technology/input market ↔ farm capital and technology.

technologies, inputs and rural finance, farmers remain at a low level of productivity and have high production costs; in Figure 2, supply curves would be far to the left and few farms would be producing for the market.[5]

(e) Subsistence production may be the result of taxation. Farmers focus on subsistence if **prices for agricultural products particularly exports are depressed** by heavy taxations. Typically in colonial and post-colonial Africa producer prices for important export crops have been taxed to the extent that variable costs and labour were no longer covered. Under those incentive structures farmers often return to subsistence production (Heidhues and Weinschenck 1986, Maxwell and Fernando 1989).

6 Risk and Risk Coping Strategies

The previous models of explaining subsistence behaviour were basically without explicitly analysing the role of risk and anti-risk behaviour. The de Janvry/Sadoulet model allows to introduce risk partially by introducing price risk as a shift of the price bands. But the issue of risk goes beyond price risks. Strategies to cope with risks infiltrate the whole life of rural poor; risk is a constituent element of subsistence economies. Risk behaviour of farm/household has been widely researched (see Annex 2). A common and consistent result has been that poor farmers have been found to be extremely risk averse (Binswanger 1980, Antle 1987). This can be generalized for most human behaviour in situations where the consequences of risk are serious or life threatening.

A brief discussion of the models of risk behaviour (see Annex 3) shows that subsistence agriculture can be interpreted as a protection of households against extreme and unpredictable risks. Under the typical conditions of the rural poor in developing countries, the implications at stake for an unfavourable event (income loss, lack of food provision, lack of basic social security - in effect risk of hunger and starvation) are so far reaching that they justify extremely risk averse behaviour. Subsistence agriculture may be inefficient in terms of return to labour, investment or other factor inputs, but it assures survival and a basic standard of living under, maybe low probability, but in their consequence disastrous conditions.

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[5] The corresponding linkages in Figure 1 are history, policies ↔ capital market, input markets ↔ farm capital and technology.

Resource poor farmers in developing countries have been observed to choose from a wide variety of risk coping strategies involving both agricultural and non-agricultural activities. While in transition countries we observe rural people to move into subsistence agriculture, in developing countries they often come from that sector. It may be hypothesized that both will search for an optimum of income and security that follows similar objectives.

What are then the options of subsistence households to cope with the various risks they are exposed to given their ecological, infra-structural and institutional environment? Farmers options may be categorized in five groups (see Figure 3). Strategies and activities subsumed under the five headings are in many ways interlinked and even dependent on each other; they may reinforce or counteract each other.

Figure 3 Food security and survival at risk – Options to secure farm/household food security

Increasing/ Diversifying own production	Wealth accumulation	Gaining access to markets	Seeking off-farm employment	Security systems
- expand area - increase productivity (flexible labour input and/or technological change) - diversification of farm activities and cropping pattern	- storage - saving - asset building (livestock etc.)	- credit (insurance) - input / output - knowledge	- in agriculture - non-agricultural activities	- intergenerational insurance, child education - - institutional capital (insurance systems) - social capital

i. The first group of coping strategies is directed at <u>improving farm production activities</u> under unstable climatic conditions, often aiming at assuming a food production close to the subsistence level even in unfavourable years. A whole range of highly sophisticated actions can be observed, often testifying to farmers' intimate knowledge of their soils and their characteristics, such as fertility, moisture holding capacity and erodability. Farmers may try to increase production, either through expanding cultivated land, increased labour input or through introducing productivity enhancing local technologies or management changes. They may plant early or late depending on observed rainfall

and weather patterns, they vary crops within and between fields, they adjust their cropping pattern and leave fields fallow, they vary the seeding rate and mulching/manuring pattern, etc. It is this fine tuned and sophisticated resource management that leads Theodore Schultz (1964) to conclude, that outsiders could, at the given level of technology, little add to an efficient resource allocation. These "poor but efficient" farmers could only be moved to higher levels of production by exogenous technological change, i.e. by research, innovation development and extension actions to get them accepted by farmers.

ii. Farm households regularly save and build assets for various reasons (Rutherford 2000). A key motive is "to provide for emergencies" (Jung 1987). Also storage of food is an often observed risk coping strategy, although climatic and storing technology may limit its applicability. Other asset building strategies include accumulating livestock as a multipurpose asset, serving as productive investment, income diversification, risk insurance, and source of energy. Planting trees may serve similar functions. Jewellery and clothes are frequently found as forms of saving in the absence of secure ways of storing money.

iii. Establishing and strengthening links to markets can be an important strategy to deal with risks. Access to knowledge, credit, inputs and output markets is a key for introducing new technologies and raising production. Credit markets, apart from their vital role in enabling the acquisition of investments and modern inputs, often play a special role in dealing with stress situations. Access to credit can be an important and efficient instrument to help bridge short-term, temporary food stress situations. Without credit access households may be forced to sell their equipment, animals or other means of production to survive. With access to credit households can avoid losing their productive assets, and recovery after stress situations is faster (Zeller et al. 1997).

iv. A particular form of asset building as a risk coping strategy is the formation of human and institutional capital. Children are sent to school, particularly to secondary or tertiary education, to be able later on to assist their families in overcoming stress situations. This can also be considered as a diversification strategy out of agriculture. Solidarity networks are probably the most important insurance institutions for subsistence households. Particularly in rural areas, many types of ceremonies, invitations and reciprocal exchanges of gifts serve the purpose of building mutual solidarity networks.

Other expressions of social security institutions are working groups, savings and credit groups, insurance groups, renting livestock and land at reduced costs, gifts, visits and adoption of children.

Building solidarity networks entails high opportunity cost in form of time necessary to form and maintain them. Groh (1986) argues that most apparent labour inefficiencies found in traditional societies can probably be explained by the time-intensive efforts required for maintaining solidarity networks.

Social networking is an effective insurance against individual risk, such as farm-related production short-falls, sickness or death of family members, fire and theft. Against collective and covariant risks, such as widespread droughts and floods, war, massive market collapse etc., it is less effective. Their effectiveness increases, however, with sectoral and spatial diversification of the network (Fafchamps 1992, Platteau 1991).

When advocating external support of informal solidarity networks, it is often neglected that the free riders' syndrome or the "abuse" of solidarity (people may work less and rely on help, and they may hide, dissimulate or misrepresent their situation of need or affordability) is a serious intrinsic problem of all such networks. The most important response of networks is to contingent security, to insure only for a survival or subsistence level. Another efficiency problem of solidarity networks is that the "accumulation of wealth constitutes both a curse and a blessing for the mutual insurance system" (Fafchamps 1992, p. 160) since wealth constitutes a personalized insurance and permits the better off, who are in principle the most valuable elements for the system, to escape it. The evolution of landlord-client relations enables to include poor and wealthy in the same network, but at the cost of an increase in inequality.

In summary, under conditions of scarcity and high risk, social networks are a key for survival of poor households. But they tend to reduce the level of production, despite many mechanisms to reduce the incentive problem, such as insuring only a minimum subsistence level, heavily penalizing misuse, stigmatizing escape from solidarity duties, networking along family and neighbourhood linkages in order to reduce monitoring costs, and landlord-client types of relations.

v. Diversification of household activities may extend beyond the farm production domain and include off-farm employment in agriculture or non-agricultural activities, often

linked to temporary or long-term migration. This is favoured by the fact that farm/household and social security networks are inefficient at dealing with covariant risks at the local level (Barrett et al. 2001).

7 Conclusions

Subsistence is an imprecise concept. In this paper we use the concept of subsistence production to vaguely imply a farm/household production dominated by agriculture and producing predominantly for its own consumption needs. However, in different contexts subsistence is used with different meanings and has become a term burdened with prejudices and misinterpretations. Is it a consistent use of the term subsistence if we hear that 90 % of the potato market, in Russia for example, is supplied by "subsistence farmers"? Or that the informal urban sector can be called subsistence-oriented, although these households have to purchase all their food from the market? Perhaps we should avoid the term in favour of more neutral concepts such as "small-scale" farming. If the term "subsistence" is used, it needs to be clearly defined and placed in its material and behavioural dimensions to avoid confusion and elicit prejudices.

The existence of a subsistence sector may have different origins. In early stages of economic development it is caused by the absence of markets, low technology level and division of labour. It conforms to and is part of traditional behaviour. Where subsistence agriculture coexists side by side with commercial agriculture it can be explained as a response to unequal distribution of assets, at least partially high transaction costs and risky environments. The distortions of markets for inputs, outputs, consumer goods, labour, capital and security should be explicitly taken into consideration when analysing subsistence production.

Subsistence agriculture may constitute a low-level but secure survival strategy. In consequence, subsistence agriculture is not only an indicator of poor market performance and high transaction costs, it also fulfils important functions which must not be neglected. Despite its low efficiency it may be a most rational answer to an adverse environment. Strategies to improve the efficiency of subsistence oriented agriculture should be based upon the understanding of the factors underlying farmers' decisions. A special "non-economic" mentality often associated with subsistence production may be misplaced or should be empirically underscored – we would argue with Ruttan (1988) that one should try to understand economic phenomena before making judgements about them.

Some of the elements of this necessary analysis are:

- Farm and household in subsistence oriented agriculture have to be seen as an interdependent and simultaneous allocation unit of production and consumption.

- High transaction costs for input, output and particularly food commodity markets can explain subsistence behaviour.

- Risks in agricultural production and off-farm employment, in consumer good, credit and security markets as well as uncertainty stemming from past and future policy interventions need to be taken into account explicitly.

- We have not discussed the issue of intra-household aspects of subsistence agriculture, but in many cases they are of prime importance - particularly the gender orientation of labour allocation and intra-household decision making must be considered for research, technology development and policy options (Ellis 1988, Quisumbing 1993, Udry et al. 1995).

A policy orientation against subsistence farmers' interests will fail. Even relatively effective coercive instruments and institutions in colonial times were seldom successful, and in poor countries with a weak government and in democratic societies with a strong rural population they will even be less likely to succeed.

In contrast, if subsistence producers are considered as rational, technological and institutional options should be designed to cater to their objectives. According to our discussion, these should aim at:

- reducing transaction costs (infrastructure, market institutions, legal framework security, information, standards, etc.);

- improving stability in and access to farm input and output markets, particularly of those relevant for survival, but also in the off-farm sector (employment and wages) and the macro economy;

- supporting reliable rural finance and social security development and

- developing technologies which are adapted to the objectives, needs and constraints of subsistence farmers.

Since improvements of key economic variables are difficult to discern in a highly variable environment, and since decisions about issues of survival will be governed by strong risk aversion, it must be accepted that responses of subsistence farmers will be sluggish. New institutions must gain confidence over a longer period before they have proven their sustainability and efficiency. It is probable that many subsistence farmers will rely on subsistence production at least in the medium term before they (re)turn to more market reliance.

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Annex 1

The three main sources of ambiguity about subsistence will be further discussed here: a) subsistence is used as a concept of market-integration but also as a concept for measuring the living standard, b) subsistence orientation can be measured from the point of view of consumption but also of production, and c) any subsistence indicator can move along a gradient from almost 100% to practically zero.

a) Subsistence can have both a meaning of material consumption in the context of the definition of standard of material well-being but is also used in the meaning of a certain way of production (subsistence production) which subsumes certain typical behaviours.

In classical economic texts (Smith, Ricardo, Malthus), subsistence is basically understood as a material consumption basket that is necessary for (working) people to make a living and to reproduce themselves. This subsistence level is, however, higher than the sheer existence minimum (Sharif 1986), it is a "basic need" consumption basket which can only be defined with respect to a certain society and time. If, in addition, immaterial needs are included such as freedom, social security or cultural identity, it is a hardly operational concept.

The alternative approach to subsistence is the way of earning the subsistence needs, the subsistence production. Particularly in non-economic contexts (anthropology, sociology, psychology, history, politics), production, exchange and consumption are not simply seen as economic acts subject to optimal allocation of resources but embedded in social norms of behaviour. Thus, the economic decision includes non-material issues such as reproduction, social considerations, leisure preference or religious believes. Modern feminism has added the intra-household perspective of women producing mainly reproductive services (e.g. Bennholdt-Thomsen 1981). Women's role and "value" in society depends on the appreciation of these essential subsistence goods which is subject to social considerations. These behavioural components are often seen as inherent to subsistence production as different from market production where produced goods are exchanged in an anonymous market.

Although modern economics sometimes tries to include these issues in divers utility functions (leisure, household Z-goods, risk premiums, etc.), there are certain limits, particularly in defining a common measure of utility in the absence of (uniform) prices for most if not all of these goods and services in the absence of anonymous markets for them. Also the notion of power and exploitation is rather uncommon in classical economics.

The divergence of concepts can be very large, occasionally to such an extent that communication about the subject becomes impossible. Whereas in economies one would assume that subsistence economy is always based on subsistence agriculture due to the fact that for low-income households food alone makes up for much more than 50 % of total consumption value, in non-economic disciplines subsistence production may be seen to consist entirely of non-food products which are marketed. What counts for the classification in these views is that the income level is low and that the objective of production is not profit maximization but consumption satisfaction (see for instance Mies 1995). If agricultural economics and the other disciplines want to effectively communicate in the political debate, they have to take the different definitions into consideration.

Whatever the case in non-economic disciplines, also many development and agricultural economists understand subsistence economy as a model of behaviour in contrast to classical economics mentioned above. There is a frequent connotation that the decisions of the subsistence economic subjects follow a special logic which is different from the classical income maximizing "homo oeconomicus" (see Schneider 1974). For example, the list of attributes compiled by Rogers (1970) cites: 1. Mutual distrust in interpersonal relation, 2. Lack of innovativeness, 3. Fatalism, 4. Low aspirational levels, 5. A lack of deferred gratification, 6. Limited time perspective, 7. Familism, 8. Dependency upon government authorities, 9. Localiteness, 10. A lack of empathy. A few specialized textbooks discuss some of these economic logics ascribed to subsistence farmers (Upton 1987, Ellis 1988).

Given the strong social values in which economic decisions are embedded in subsistence economies, research is often not so much focusing on individual decision makers as does classical economy but on larger social units (households with complex productive and reproductive functions, families, groups, clans or villages). Scott (1976) talks about "moral economies" for the mix of economic calculus and social embeddedness which is included in any transaction.

b) In the frame of agricultural economics one could think that a more precise definition is easy to find. We exclude purely behavioural definitions and look at the hard economic facts – the distribution of (agricultural) production between market and farm/household consumption. If a certain minimum share is exceeded, we talk about subsistence orientation. But even for such a seemingly simple concept the definitional problems do not end. This stems from the fact that subsistence intrinsically links production and consumption issues. But there is a fun-

damental difference between the subsistence orientation of household consumption and that of production.

According to whether the share of self-produced goods in the household's total consumption is taken as the measure of subsistence, or the share of production which is sold, subsistence can describe completely different situations. A small example may illustrate this (see Table 1). A relatively large mechanised Asian monoculture rice farmer (A) who can cover 50 % of his family's food consumption with only 10 % of his production is in a clearly different position from a manually operating African farm family (B) which needs two thirds of its diversified production to cover more or less 50 % of its consumption needs, and from an East European part-time (C) farmer who satisfies 50 % of his family's consumption needs by 100 % of his Datscha food production but who (or his wife) disposes of a basic salary for the satisfaction of non-food consumption.

Table 1 Degree of subsistence dependence according to whether measured by production, consumption or income for three example farm/households

	Aa	Ab	B	C
Value of subsistence production/consumption	10.000	10.000	10.000	10.000
Value of sales	90.000	90.000	5.000	0
Value of total production	**100.000**	**100.000**	**15.000**	**10.000**
Value of inputs and hired labour	40.000	80.000	0	0
Cash farm income	**50.000**	**10.000**	**5.000**	**0**
Off-farm income	0	0	10.000	10.000
Total income	**60.000**	**20.000**	**25.000**	**20.000**
Subsistence consumption as % of total production value	10%	10%	67%	100%
Subsistence consumption as % of total income=consumption	17%	50%	40%	50%

Farmer A is subsistence oriented as far as food consumption is concerned, but not if measured by the share of production sale. Whether he is a subsistence farmer with respect to income will depend on the use and costs of external inputs – in case Aa he has a relatively low input/output relation and would be classified as market oriented, whereas in case Ab his high input costs would reduce his total consumable income to such a degree that his self-produced consumption would qualify him as a subsistence farmer. In cases B and C, classification as subsistence farmer essentially depends on the amount of off-farm income.

All three farmers will have rather different reactions toward market signals, internal and external input use, credit utilisation or innovation adoption. It has been argued that probably the share of external input in total input use is a better indicator for subsistence decision making

than output indicators because it better grasps the dependency on external markets, risk of failure and indebtedness and other key issues (Miracle 1968).

c) The third major source of misunderstanding in the discussion about subsistence economies is already introduced above – subsistence is not equal to autarky. Since the first beginnings of trade in the stone-age there exists an almost universal continuum between own produced versus market exchanged consumption. Almost no peasant farmer today does not rely at least partially on trade, be it by barter, monetized barter or real open market exchange. In consequence, subsistence agriculture is not a categorical classification but one of dimension and pattern of exchange.

Another issue of importance is the variability of subsistence degree. Particularly in rainfed agriculture yields fluctuate strongly, in the order of several hundred percent, and in developing countries with little market integration also prices vary widely both within a year and across years. Price changes may be related to national production but often are determined by reasons outside the national agricultural sector (sector, trade and macro policies, foreign countries' production and trade policies, etc.). Thus, the degree of subsistence for any indicator chosen will strongly vary over the years.

Finally, the mode of market production is an important analytical issue. Miracle (1968) argues that there is an evident difference in the decision making situation between a farmer who sells a production surplus in 4 out of 10 years averaging 20 % in the long run, and one who plans to and actually sells 20 % each year. The first one would be badly advised to use a production credit as long as it is not assured that even during the worst years he can produce at least the extra-crop to repay his debt, whereas for the second the question of external input is less problematic.

Consequently, one could suppose that there is a continuum of decision logic between subsistence and market oriented. This is, indeed, sometimes argued for (Lipton 1968, Scott 1976) when describing the decisions for food versus cash crops or other market production[6]. This mix of rationales makes empirical analysis very difficult since many actions can be inter-

[6] Similarly, women's reproductive and social role for a household's survival within modern economy can be interpreted as a partial continuation of subsistence economy. This assumes that household-produced Z-goods (child care, food and food preparation time, etc., see main text) are at least partially substitutable for market goods (Mesmer 1986).

preted from the point of view of both "worlds". As will be argued in Annexes 2 and 3, it can be assumed that subsistence behaviour is determined not by average year's outcomes but by extremely bad years.

In summary of the unclearness of the concept, one could conclude as Miracle (1968) does, that the term "subsistence" should be abolished. Doppler (1992) for instance labels only farmers with less than 10 % market production "subsistence farmers", whereas between 20 % and 90 % he uses the term "transitory". Of course, this just displaces the classification problem into this transitory class of farm/households for which diversity is at least as big as if using the 50 % subsistence level, but it has the benefit to avoid the co-notions implied by the term "subsistence". Only location-specific definition and transparent development of multiple indicator indices can help to make useful classification and analysis of farm/household systems with strong subsistence components.

Annex 2

Exposé on Risk in Development

An essential feature of low developed countries is the extreme insecurity and risk exposure particularly of the rural population. Risk not only concerns production and price but also most other factors of decision making – unreliable farm and non-farm, input and consumer commodity markets, off-farm employment and wages, contracts and institutions themselves. We think that risk and risk aversion are probably the most determinant factors for explaining subsistence production in transition countries.

In their model (see Figure 2 in main body of text), de Janvry and Sadoulet (1994) take into account the effects of production and price risks as changing the effective sale and purchase prices. When assuming risk aversion, which is typical for human beings with high stakes at risk, they come to the following conclusions (p.157): "Uncertainty in both production and price compound in inducing a decline in production for all categories [of farm/households], except for the net buyers with large purchases. A higher correlation between price and quantity, which occurs in segmented markets, corrects this adverse effect in inducing higher production. The mechanisms by which this occurs are, however, markedly different for different types of producers."

Thus, already for a restricted set of risk sources and assumptions it can be shown that risk reduces market production and fosters subsistence orientation. We want to make clear here that the dimensions of risk for low income people in developing countries are extremely and severe:

- The often assumed negative correlation between production and prices (e.g. Lele 1982), implying a relatively reduced income variability compared to both pure price and production variability, may be true for aggregated production and segmented markets, but for an individual farm/household, production is certainly much less correlated with prices because it depends on many household-internal factors (idiosyncratic risk). Hence, correlation between individual production and aggregate price level tends to be much lower than for aggregated production.

- Relying on off-farm employment and related wage payments is a source of considerable risk for households. Delayed wage payments and lay-offs are observed in both transition and developing countries. Infrastructure deficiencies may impede job execution and cause further wage layoffs. Beyond a certain limit, households will consider dependency on wages as a survival risk.

- Input, output, service and credit markets often fail.

- Insurance systems are unreliable or absent.

- Policy and its impact on the above mentioned factors is unpredictable and a major source of uncertainty. The institutional environment often is inadequate and fragile (markets and their institutions, property rights, cooperative law, financial institutions, etc.) and the macroeconomic environment is unstable (inflation, exchange regime and rate, government budgets, tax regimes, etc.). The civil society is not yet strong enough to prevent policy from making erratic changes which can completely turn upside down individual long-term plans.

It is generally accepted that **risk and risk aversion reduce the efficiency of production** through the attempts to reduce the negative effects of risky outcomes. Examples are high crop diversification, reduced levels of investment, inputs, and innovations, lower credit demand (for an overview of the numerous issues of coping with risk in agriculture, see Hardaker et al. 1997).

Annex 3

Exposé: Modelling Risk Behaviour

Two basically different models of risk aversion are competing: variability reduction and disaster avoidance.

Variability reduction is the theoretically more elaborate and more widespread concept of risk averse behaviour analysis, with the expected utility theory of Neumann and Morgenstern (1943) as its centre piece. It is based on several assumptions, the most crucial of which in our context is that for every distribution of a risky outcome an individual is supposed to have a secure level with the same utility. We would argue that for a situation where survival of the household is at stake and where subsistence production offers an effective protection this axiom does not hold. In this case, a risk-neutral decision maker would not win on average if survival is endangered on negative deviations of production below the minimum existence level. Such decision makers would probably have a higher average income, but would not survive in the long run. Even if it is not sheer survival that is at risk but "only" hunger periods or the sale of (productive or other) assets, farmers may subjectively judge such outcome to be unacceptable. Indeed, risk aversion elicitation games and tests repeatedly show that risk aversion increases with the level of risk involved, and that particularly for extreme probabilities and outcomes people do not classify decisions according to utility theory (Binswanger 1980, Tversky and Kahnemann 1982, Brüntrup 1997).

The most uncompromising **disaster avoidance** behaviour is the "Maximum" decision strategy. It arranges production in a way that assures the maximum possible outcome in the most adverse of possible situations. This is a very conservative decision rule with a substantial loss of efficiency over time. However, there are other more flexible formulations of disaster prevention risk strategies such as lexicographic ranking with subsistence production first, minimum regret, Hurwicz and Laplace rules, focus loss or penalization of negative deviation (Upton 1987, Hazell and Norton 1986).