ASSESSING THE VALUE OF FARMLAND ON THE BASIS OF NATURAL RESOURCE CRITERIA IN NAMIBIA

I: THEORETICAL CONSIDERATIONS

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ABSTRACT

The article briefly describes why land valuation is necessary and then mentions some valuation practices currently in use in the world. The historical application of land valuation systems based on natural criteria, as opposed to market issues, is examined next. The system used by the Agricultural Bank of Namibia (Agribank) is explained and, finally, a case is made for a new approach in land valuation in Namibia.

INTRODUCTION

Land is one of our most precious assets. It represents space, soil, food and water, a basis for nature protection, leisure or urban development. In a free-market economy land stands for property and is a production factor besides labour and capital. It is also an object that can be taxed and is desired by governments, individuals or interest groups.

In economic terms land - or property in general - has value because it gives rise to a stream of future tangible or intangible earnings; those define its exchange value in a functional market. In modern societies the exchange value is usually associated with price, and the exchange is operated through a money transfer. Price is thus a parameter to express the value of an object or property, and in this respect it is the generally accepted mean to compare values in a market.

The material value of a market commodity depends upon the goods, services and/or cash that might emanate from it (Ewert, 1979). In the case of land, this value depends on:
- its *inherent production potential*, which corresponds to the net benefit obtained from its use under the best management conditions, and expressed in terms of (direct) yields or (indirect) rents;

- a *value-added premium,* which is the expression of an anticipated expected higher income due to changes in market conditions, legislation and zoning, speculation or any other factor that might modify the use of the land and the income from it.

In a predominantly rural society the value and price of farmland will mainly be determined by its inherent production potential because under those conditions the land use is relatively stable, with little incentives for change. The impact of the value-added premium increases, however, with the expectation that land use in the future will change, obviously to the benefit of the owner. Hence, Franzsen and Van Schalkwijk (1996) report that in the Gauteng Province in South Africa, for example, the price of agricultural land has in the past two decades risen well above its production value because of the farmers' expectations that much land in this province will sooner or later be bought for non-farm uses, such as dwelling, industry, transport, recreational or other purposes. Hence, the assessment of a land value is both time-bound and linked to a specific land use.

CURRENT VALUATION PROCEDURES

Current land valuation procedures were initially developed for taxation purposes and, therefore, are usually based on economic parameters. This approach includes a number of alternatives (Van Zyl and Vink, 1992; Keith, 1993): the comparative sales method, replacement cost, income capitalization, lease value and a number of derived methods.

The **replacement cost method** works relatively well for buildings, but is hardly applicable to naked land. The **income capitalisation method** (use value) is based on the principle that the net farm income corresponds with an appropriate capitalization rate from a fund that constitutes the agricultural value of the land. Though the approach is seriously criticized because of the number of variables needed and the susceptibility of its discretionary application of the procedures, the Land Bank in South Africa has been using it for many years for purposes of loan advancement, credit extension or donation tax assessments (Theron, 1994; Franzsen and Van Schalkwyk, 1996).

The **lease value method** is based on the assumption that the lease/rent is an indicator of the income generating capacity (land use potential) of agricultural land. Its application has been criticized for a number of reasons, e.g.:

- Except for Europe and the US the lease market is often very thin;
- Many leases are concluded between connected persons (such as family members, family trusts and family companies), which would often not reflect the "true" lease value of the land;
- Lease information is often not very well documented with the result that data may not be readily available or may be unreliable; and
- In many cases the information is supplied by the farmers themselves, thus data manipulation is not excluded.

The most current and widely used approach is the **comparative sales method**, whereby a comparison is made of several units recently sold at arms' length in a functional land market; these sales prices are subsequently used as a reference value, with individual appraisals and/or adjustments. This method seems logical from the viewpoint of both theory and practice and rests on the firm ground that market price is the only value that can be determined objectively. Nonetheless, it has a number of limitations in practical applications, especially in areas where there is no or only a small land market. Valuers may then be forced to adopt alternatives as, for example, sales from a different locality or district, though with proper adjustment. Obviously, where adjustments have to be made, arguments may develop - especially if a valuation is objected and turns into litigation - as to the nature and scope of the adjustment (Ewert, 1979; Fibbens, 1995).

OTHER NON-MARKET ORIENTED APPROACHES

Realising that the value of (agricultural) land depends in the first place on its natural production capacity, several attempts have been made to develop a system that focuses mainly on natural land factors and on the impact they have on the production potential and related income generation of the land.

In 1933, Storie (1933, 1964) developed a parametric system to assess the value of land for taxation purposes in **California, USA**. It was based on four simple parameters, viz. soil profile type, texture, slope and a miscellaneous soil quality parameter involving drainage and salinity/alkalinity hazards. It allowed the classification of land into six soil grades corresponding to as many broad land suitability classes and income generation/taxation categories.

Almost in the same period the Ministry of Finance in Germany introduced a numerical Soil Quality Assessment (SQA) as a legal tool for land assessment and taxation (NN, 1934; Schachtschabel *et al.*, 1982). This system, known as the **German Bodenschätzung**, uses a point rating for the three main criteria that affect land use. These are: texture, parent material characteristics (as an expression of the physical soil properties) and weathering stage of the profile (which is an expression of the natural fertility status of the root zone). The final soil rating for arable cropping (*Ackerzahl*) is an expression of the carrying capacity and natural crop growth potential / income generation of the land concerned.

As income and taxation of land can substantially vary with the type of land use (arable cropping, horticulture, grazing, forestry, etc.) a different rating is applied for each of those systems. Hence, the land rating for pastoral use (*Grünlandzahl*) is calculated on the same principles, except that in this case more attention is paid to water/drainage and temperature conditions, and that only 4 textural classes and 3 weathering stages are considered. The *Bodenschätzung* is still in use in some of the *Länder* in Germany. It has also been applied in an adapted form in Hungary, Poland and the former Yugoslavia (Sipos, 1989; Portnov *et al.*, 1997), and has formed the basis for land re-distributions and re-allotment schemes in Belgium and The Netherlands.

The **Bonitet system in Russia** uses a similar numerical approach, but with a main focus on soil fertility-related land qualities; it is crop-specific based on the assumption that specific crops require specific soil qualities (Karmanov, 1980). As a result, each land unit obtains a number of points that, on the basis of economic considerations, are allocated a proper yield value. For the 1990 period, for example, the point allocation for low, medium and high wheat yields was 25-35, 35-45 and 65-75 kg/ha/point respectively (Stolbovoi, 1997).

The **Land Resource Quality Index (LRQI***)* as developed in South Africa (Van Zyl and Vink, 1992; Theron, 1994) holds a number of principles and components included in the former methods. This index can be determined for any land unit in the country, based on the most relevant farm- and non-farm factors that influence production. Information is gathered from farmers by way of agricultural censuses, population censuses and the Weather Bureau (Kleynhans and Lombard, 1994).

VALUATION OF LAND IN NAMIBIA

In Namibia there is no national system of land value assessment in general use, although efforts are currently underway to establish such a system for land tax purposes. Wherever possible, the comparative sales method with proper (subjective) adjustments is applied. Nevertheless, the Agribank (Pers. Comm. Mr Bornmann)} uses a valuation formula in order to facilitate the allocation of loans to commercial farmers. The formula varies as a function of the land use type, and in this respect it differentiates between large (cattle) and small stock (sheep and goats) breeding, irrigated agriculture - including sultanas and cash cropping - and dryland crop cultivation. The final outcome is a so-called *loan-value per ha.*

Although the Bank's objective is not to assess the value of land, the concepts used and the range of ratings are of direct relevance for the quantification of the parameters used in a Namibian context. For *large stock (cattle) breeding* the loan value (n) is defined as:

$$n = a.b.c.d.e.f.g.h.i.j.k.5.l/m$$

where
- a = basic net farming income, fixed at N$ 90.00[1] per ha;
- b = type of grazing, e.g. with values between 1.0 and 0.9 for fields with or without licks;
- c = veld coverage, ranging between 1.1 and 0.9;
- d = cattle/sheep ratio;
- e = camp development and availability of water (ratios between 0.4 and 1.1);
- f = bush encroachment, ranging between 1.0 (for 0-30% encroachment) and 0.4 (for 75-100% encroachment);
- g = occurrence of poisonous plants, ranging between 1.0 (less than 10% of farm area affected) and 0.5 (up to 100% of farm area affected);
- h = disease control area (ratios between 0.9 and 1.0);

[1] This value dates back to 1997 and may have changed by the time of publication.

i	=	distance from market, ranging between 1.0 with a radius of less than 100 km from Windhoek, Okahandja and Otavi, and 0.8 for distances between 400-500 km from those markets;
j	=	topography, with parameters between 0.6 and 1.0;
k	=	extent of farm;
5	=	% capitalisation rate;
l	=	production potential, fixed at 1.0 for 1 LSU (Large Stock Unit) per 8-12 ha in central and east-Namibia, and at 0.9 for 1 LSU for 12-15 ha in north and west Namibia;
m	=	official carrying capacity.

For *small stock (sheep and goats)* the loan value j is defined as:

$$j = a.b.c.d.e.f.g.5.h/l$$

where

a	=	basic net farm income fixed at N$ 16.00[1] per ha;
b	=	fencing status;
c	=	camp development and available water;
d	=	water quality with parameters ranging between 0.6 and 1.0;
e	=	grazing cover;
f	=	degree of utilization;
g	=	extent of farm;
5	=	% capitalization rate;
h	=	production potential, fixed at 1.0 for 1 SSU per 2-4 ha, 0.9 for 1 SSU per 5-6 ha, and 0.8 for 1 SSU per 7-10 ha;
i	=	official carrying capacity.

Similar types of formulas are used for other land use types involving particular criteria according to relevance and need. These include, for example, the type of soil and irrigation system in the case of sultanas; or the localization inside and outside the maize triangle, yield (in tons/ha) or soil fertility status in the case of dryland cultivation.

NEED FOR A NEW APPROACH

The current economic and market approaches are not satisfactory. Particularly the comparative sales method – which is almost the only one adapted to the valuation of farmland – is difficult , to apply in areas where there is no or only a small land market. In these cases the assessment needs additional local adjustments that are not always free from subjective interpretations and/or lack the transparency to avoid conflicts between stakeholders.

Apart from Europe and the USA the lack of a functional land market is more the rule than the exception. Almost all land under customary tenure in Africa, Asia and South America falls in this category. A similar situation occurs in the countries recently emerging from a former socialist-marxist political system, where private ownership was not allowed, and where present land restitution is seriously delayed because of the lack of accepted norms for value determination and pending conflicts for compensations to former land owners.

There are a number of other reasons why, in the absence of a functional land market, there is an urgent need to define the value of land. First, with the rapid shift, worldwide, towards a market economy, land becomes a crucial production factor and private ownership of land will become a major component in future investment policies. This situation implies that more and more land will be transferred and that a consensus on the exchange value has to be reached. Additionally, land is becoming a hot political issue especially in countries facing high population densities and a growing imbalance in incomes. Land reform and land re-distribution may become a political tool, but require a legal basis for fair and acceptable compensation. Here again, clear and transparent standards are needed. Even so, there will be a need to define the exchange value of land taken out of production for reasons of nature protection or any other form of land zoning. Objective norms for such operations have still to be defined.

These situations require that current valuation methods step away from subjective assessments and that those be replaced by a more quantitative and transparent methodology. This means that, at least for farmland located in rural areas, more attention is paid to the inherent production potential of the land. The related land value may then largely be established through a quantified rating of natural criteria, using by preference data which is either available from the public domain or - if provided by the stakeholders themselves - that can easily be checked and controlled. The use of a model based on numerical values (or indices) for the relevant factors involved adds to the transparency, uniformity and consistency of the approach in a domain where disputes have to be avoided as much as possible.

The following principles and assumptions should be at the base of such a new approach. They are closely in line with the land suitability assessment developed by FAO (1983) and implemented over the past 15 years in many countries, under different conditions.

- The market value of rural land is mainly determined by its production potential, with a relative small proportion allocated to the value-added premium. Hence, the value of rural land is mainly related to the impact of the natural factors that affect this production potential.

- A natural resource-based valuation procedure should, therefore, start by identifying the parameters and their relative impact on that potential, taking into consideration the specific growth and production requirements for each particular land use type (grassland, rain-fed or irrigated sorghum, maize, etc).

- A fair balance should be maintained between the number of parameters selected, as too many of them make the system unworkable while too few might overlook the role of some of them.

- The relative impact of each factor and its interactions have to be assessed and reflected on a rating scale. The range of factor ratings should depend on both the nature of the parameter and the ease by which it can be reclaimed. Hence, soil texture for example should have a wide range – for instance between 0.2 and 1.0 – as a poor texture rated 0.2 is difficult to reclaim, and thus will always affect the overall rating. Soil pH, on the other hand, should never receive a rating as low as 0.2 as, even in the worst case, this parameter can easily be reclaimed and thus never excludes the effective use of the land.

- Optimal, intermediate and marginal growth and production conditions (corresponding to degrees of constraints from an optimal situation) should be defined for each factor, and expressed in a numerical value or rating. In this respect, 4 suitability levels can be used:
    - optimal conditions refer to a situation where almost no limitations occur and where yield expectations are in the range of 90-100%;
    - near to optimal or moderately suitable conditions hold only slight constraints; yields are expected in the order of 60-90% from the optimal;
    - marginally suitable conditions reflect moderate limitations; corresponding yields are in the order of 40-60% from the optimal; profitability is nevertheless guaranteed;
    - conditions are considered unsuitable when the land holds severe limitations, resulting in yields below 40% from the optimum and/or without profit.

In a companion article an attempt is made to define the most relevant factors and to quantify their impact on the market value of land, with application to Namibia.

REFERENCES

EWERT, W.A. 1979. The Saskatchewan Rural Land Assessment Manual. 2: Value and valuation theory in assessment. Min. Municipal Affairs, Regina, Saskatchewan, Canada, 90p.

FAO. 1983. Guidelines: Land Revaluation for Rain-fed Agriculture. FAO Soils Bulletin 52, FAO, Rome, 237p.

FIBBENS, M. 1995. Australian rating and taxing: Mass appraisal practice. J. Property and Tax Assessment and Administration, 1(3):61-77.

FRANZSEN, R. and H.D. VAN SCHALKWYK.1996. A rural land tax for South Africa. J. Property and Tax Assessment and Administration, 2(2):5-23.

KARMANOV, I.I. 1980. Soil fertility in the USSR: Natural regularities and quantitative assessment. Kolos Publ., Moscow.

KEITH, S. 1993. Property tax in anglophone Africa: A practical manual. World Bank Techn. Paper 209, Washington, D.C., 1993, 136p.

KLEYNHANS, T.E. and J.P. LOMBARD. 1994. 'n Evaluering van waardasiemetodes vir die Moontlike Implementering daarvan by 'n Landbougrondbelasting in Suid Afrika. Agreken, 33(2):74-83.

NN. 1934. Bodenschätzung: Technische Anweisungen. Min. Finanzen Deutsche Demokrat. Republ., VEB Deutsche Zentralverlag, Berlin.

PORTNOV, B., W. DEDDIS, W. MCCLUSKEY and E. KUCHARSKA-STASIAL. 1997. Addressing the distinct problems of urban land appraisal in a transitory economy. J. Property and Tax Assessment and Administration.

SCHACHTSCHABEL, P., H.P. BLUME, K.H. HARTGE and U. SCHWERTMAN. 1982. Lehrbuch der Bodenkunde, Enke Verlag, Stuttgart.

SIPOS, A. 1989. New land valuation system for an economy without a land market. In: B. Greenshields and M. Bellamy, eds: Government intervention in agriculture: Causes and effects, Dartmouth Publ. Cy Ltd., Aldershot, Hants, UK.

STOLBOVOI, B. 1997. Soil Bonitet system of Russia: Introduction and implementation into the agro-ecological zoning methodology. IIASA Interim Report IR 97-80, October 1997, Laxenburg, Austria.

STORIE, R.E. 1933. An index for rating the agricultural value of soils. Bull. Calif. Agric. Exp. Sta, 556.

STORIE, R.E. 1964. Soil and land classification for irrigation development. Trans. 8th Intern. Congr. Soil Sci., 5:873-882.

THÉRON, L. 1994. A legal theoretical investigation into an agricultural land tax for South Africa. LLD Thesis, Rand Afrikaans University.

VAN ZYL, J. and N. VINK. 1992. An agricultural economic view on land taxation. pp. 32-59. In: R.C.D. Franzsen and C.H. Heyns, eds: A land tax for the new South Africa? Centre for Human Rights, University of Pretoria.