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FORVAL: Computer Software Package for Agricultural and Natural Resources Investment Analysis

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Abstract: The valuation of agricultural and natural resource investments presents challenging analysis problems that often require the use of computer software. Most of these computer packages are complex and costly. FORVAL is a free, user-friendly, menu-driven, agricultural and natural resource investment analysis package. It can accommodate any investment scenario and includes the standard financial criteria (net present value, rate of return, equal annual income, benefit/cost ratio, and land expectation value for forestry investments). FORVAL accommodates various cash flows like single sum, terminating annual and periodic series, and perpetual annual and periodic series. It also has options for payment and price projections.

Introduction

The valuation of agricultural and natural resources investments and projects presents challenging financial analysis problems. Calculations range from specialized problems like bare land value in forestry calculations to the use of standard criteria like net present value and rate of return. Financial calculators are fine for simple analyses, but agricultural and natural resources investments tend to be complex and often require the use of a computer analysis program. Most of these computer packages are not particularly user-friendly, and few are free.

FORVAL (FORest VALuation) is a user-friendly, free, menu-driven agricultural and natural resources investment analysis computer package. It is equally applicable to public and private sector agricultural, natural resource, and forestry uses. Ease-of-use has made it a very popular software package. Originally designed for forestry applications, it is suitable for any discounted cash flow analysis. Users simply respond to questions displayed on the computer screen. The program can be downloaded directly from a site <http://fwrc.msstate.edu/software/forval.htm>, or an on-line version is available for immediate use <http://www.cfr.msstate.edu/forval>. A 14-page user's manual with examples can be directly downloaded

from the first site (Bullard, Straka, & Carpenter, 1999). The user is first prompted to choose on of four options: financial criteria, monthly or annual payments, precommerical timber value, or projected stumpages price.

Financial Criteria

This option is used for standard financial calculations. Any investment can be analyzed if cash flows are known. The financial criteria option requires the user to choose the type of financial calculation to make (Figure 1).

The program presents the following financial criteria that are discussed in Bullard and Straka (1998): **net present value** (the discounted value of all revenues minus the discounted value of all costs), **rate of return** (the interest rate that makes the net present value equal to zero, or the rate of return actually earned by the investment), **equal annual income** (the annual sum of money that is equivalent to a project's net present value), **benefit/cost ratio** (indicates relationship between discounted benefits and costs), **all of the above** (calculates all the criteria mentioned above simultaneously), **land expectation value** (the value of bare land in perpetual forest production, a specialized forestry calculation), and **future value** (the value of a single cash flow at a future date).

Figure 1.
Example of the Interactive Web Page Used for Calculations by FORVAL-Online

FORVAL uses the standard assumption that all cash flows occur at the end of the year. An exception is Year 0, which represents now or today. Sometimes site preparation or planting costs occur immediately, and this equates to Year 0.

Besides basic **single sum** payments or revenues (a single cost or revenue that occurs just once during the life

of an investment), three types of payments series or annuities may be specified by the user: (1) **terminating annual series**, where costs or revenues occur annually for a set period of time (an example is a payment of $10.00 per hectare annual property taxes for 30 years), (2) **perpetual annual series**, where a cost or revenue occurs annual for an infinite period of time (an example is a payment of $10.00 per hectare annual property taxes that is payable forever), and (3) **perpetual periodic series**, where a cost or revenue occurs periodically for an infinite time period (an example is timber harvest revenue occurring every 30 years forever). Bullard, Straka, and Matney (1987) outline the use of these options in more detail.

Land expectation value (LEV) is the value of bare land if put into perpetual forest production. It is a specialized timber valuation calculation and is also called "soil expectation value" or "bare land value." The user inputs all costs and revenues associated with a single rotation of the forest, including establishment costs. This option performs a fundamental calculation used in forest valuation: the value of bare land in permanent forest production. This is actually a standard net present value calculation, but with several critical assumptions (Straka & Bullard, 1996).

Other Options

FORVAL has unlimited uses in a variety of valuation problems. It was originally designed for forestry problems, but quickly became a natural resources valuation tool. Its functions are so general that any agricultural type problem can also be easily solved. Three additional options are particularly valuable.

Monthly or Annual Payments

FORVAL is capable of calculating the amount of a monthly or annual payment necessary to repay an installment loan (capital recovery) or to accumulate a future sum of money (sinking fund). Two simple examples will illustrate these options. First, assume you need to replace $250,000 of farm equipment in 6 years. How much must you deposit annually into an account that pays 6% interest to accumulate the $250,000? The answer is $35,840.65 per year. Or, if type of payment is changed to monthly, we see the monthly payment would be $2,893.22.

Second, the opposite problem would be to borrow $250,000 at a 6% annual interest rate. What is the annual payment? Six annual payments of $50,840.65 would be needed to repay the loan. Or, 72 monthly payments of $4,143.22 would repay the same loan.

Precommercial Timber Value

This option calculates the value of a stand of immature timber using the current age of the trees. The calculation discounts the future stand value using the rate of return earned by the timber rotation as the discount rate. Land opportunity cost is included in the calculation (annual land rent). The valuation method is fully described in Straka (1991). Inputs are costs and revenues for one rotation, beginning and ending land value, and the stand's current age.

Projected Stumpage Value

The projected stumpage price option calculates the future value of any commodity price. The calculation is performed using the present price, the number of years projected, and the compounded annual rate of price increase. The underlying formula is the future value of a single sum. The option requires only three inputs: current price, annual rate of price increase, and number of years. For example, a $1,000 current price projected to increase annually by 5.75% for 15 years would be projected to be $2,313.15.

Conclusion

FORVAL performs all the basic valuation calculations used in forestry and natural resources applications and is equally applicable to agricultural valuation situations. It was originally designed for instructional purposes and purposely stressed ease-of-use. Besides being free, one reason it is so popular is that the authors managed to avoid the temptation to modify and update it periodically. This would have led to a package that was cumbersome and required detailed instructions to operate. Other popular valuation packages were updated to the point that ease-of-use was sacrificed and lost popularity. FORVAL remains a simple model and will stay that way.

The current model sees wide use in many applications. It is a powerful tool, and we think foresters, natural resource professionals, and agriculturists will find it to be very useful in many financial analysis situations.

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