

An Introduction to Revenue Curve Analysis

The basic principal of good design is that form follows function. This principal is as valid for financial structures as it is for scientific or architectural structures. For scientific and architectural structures there are concrete measures for evaluating design performance. Such measures, for example, can be mathematical, physical or aesthetic. However, for financial structures, there are no concrete measures to determine what constitutes good design. I believe this result derives from the pre-eminent role securities analysis has assumed in the development of financial theory.

The purpose of revenue curve analysis is to provide a framework within which the design of financial structures, particularly bond issues, can be evaluated. The best place to start an examination of revenue curve analysis is to consider what is meant by the “design” of a bond issue. The design of a bond issue is comprised of two components. The first component is the debt service shape or the form of the bond issue. The second component relates to the securities used to create that form.

An architect designing a home has to decide upon the appropriate building material to use. For instance, the infrastructure of the home can be built with wood, clay, brick or cement. The decision as to which material to use flows from the vision the architect has for the home. In terms of process, the architect first envisions the desired form, then decides on the materials.

For those issuers that have the requisite flexibility under the legal structure governing their bond issuances, financing design should follow a similar process. The issuer of a bond financing should first make a conscious decision about structural form, then choose the appropriate “building materials” of financial instruments that constitute the infrastructure of the bond issue.

Utility as Criteria

Revenue curve analysis evolves from the idea that revenue utility is the proper criteria for evaluating financial performance. Revenue utility measures the *productivity* of each dollar pledged to a bonding program. A productive dollar is one in which the portion used to pay non-asset costs, such as interest or issuance costs, is minimized.

A Radical Approach

Revenue curve analysis is radical in the *primary* sense of the word meaning “of the root” or fundamental. It addresses in a fundamental way the core realities of certain financing programs. It evolves from the root concept that for any particular issuer, a finite level of revenues exists to fund projects or service debt. This level of revenues, whether known or projected, when plotted over time, forms the revenue curve.

(For purposes of this article, the revenue curves presented are assumed to be net of all operating costs and other budget items. That is, they are revenue levels entirely available for debt service.)

The “of the root” objective for public finance professionals responsible for program and transaction design should be to maximize the utility of the revenue curve, thereby insuring that each dollar received is used in the most productive way possible.

Form and Function as One

As discussed above, the basic precept of good design is that *form follows function*. However, financial dynamics provide unique opportunities to achieve even greater design performance wherein form does not merely follow function but form and function act as one; integral to and supportive of each other.

In order to take advantage of these opportunities, we must first distinguish between form and function in finance. As stated above, form relates to the debt service structure resulting from the issuance of bonds. Function relates to the debt instruments, such as current coupon bonds or capital appreciation bonds, used to create the debt service structure.

The purpose of this article is to demonstrate how revenue curve analysis can be used to achieve a synthesis of form and function in finance so that revenue utility is maximized.

Defining Revenue Utility

Revenue utility measures the capacity of a revenue stream to support debt. At any point in time, the capacity of a revenue stream to support debt is a function of prevailing interest rates.

Table 1 sets forth the debt capacity of a sample revenue stream comprised of \$100.00 available in each of the next twenty years. (Insert Table 1 here.) The table demonstrates that as interest rates increase, the amount of debt that can be supported by the revenue stream decreases. That is, the utility of the revenue stream decreases as interest rates increase.

When performed at a particular point in time, this calculation is typically referred to as the leveraging capacity of the revenue stream. The difference between leveraging capacity and revenue utility is that leveraging capacity is a static measure of productivity potential at a particular point in time whereas revenue utility is a dynamic measure of productivity potential *over time*.

For example, if we fully leveraged the revenue stream set forth in Table 1, the structural form (i.e. debt service) created would be the same regardless of the interest rate environment because the debt structure would still consist of twenty payments of \$100.00. For the same reason, the structural form created would be the same regardless of the type of debt instruments used.

Assume that at the time the debt issuer is prepared to enter the market, the interest rate available for the twenty year period framed by the revenue stream is 5.10%. Assume also, that if the issuer wishes to incorporate a prepayment provision

specifying that it can prepay the debt after three years, the interest rate available would increase to 5.25%.

As indicated in Table 1, the leveraging capacity assuming a 5.10% interest cost is \$1,235.72. At a 5.25% interest cost, the leveraging capacity decreases to \$1,220.22. If leveraging capacity is the only criteria, then the issuer would opt to forego the prepayment provision. However, the prepayment provision creates the potential to extend the utility of the revenue stream by refinancing in a lower interest rate environment.

In comparing the performance of these two alternatives, revenue curve analysis extends performance criteria to encompass the value of the prepayment option. And the analytical framework typically used to determine the more appropriate alternative is opportunity cost analysis.