NORTHERN ILLINOIS UNIVERSITY

THE ELLWOOD METHOD: A DETAILED STUDY

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Currently, in 1987, a time when low interest rates have led to a real estate "boom," the need for timely, accurate real estate appraisals has become a necessity. One of the most significant contributions to the technique of real estate analysis and appraisal to be made in the past years is certainly the mathematics of equity capitalization propounded by L. W. Ellwood. Recent focus on Ellwood and mortgage-equity capitalization reflects an increasing awareness that financing is a critical part of real estate investments. Financing represents the leverage to determine the marketability of a given investment, and more important, the liquidity of the equity position. In his formula, L. W. Ellwood emphasizes the changing nature of the equity position of a real estate investment during ownership period. Moreover, it allows an appraiser to analyze the reasonableness of his appraisal under varying conditions. This paper will review and illustrate the Ellwood method as a means of establishing an overall capitalization rate.

According to Alfred Rine and James Raykin, Ellwood's overall capitalization rates "permit ready and instant capitalization of a stabilized income stream over specified years of ownership periods at market-determined mortgage loan terms and prevailing equity yield rates applicable to the subject property" (Valuation, pp. 395). The Ellwood expression for the appropriate overall
capitalization rate is set forth as follows:

\[ R = Y - WC \times \text{dep}(1/Sn) \text{ or} \]

\[ = \text{app}(1/Sn) \]

where
- \( R \) = overall capitalization rate
- \( Y \) = equity yield rate
- \( WC \) = ratio of mortgage to total investment
- \( C \) = mortgage coefficient
- \( \text{dep} \) or \( \text{app} \) = either depreciation or appreciation in
total property value
- \( 1/Sn \) = sinking fund factor

According to William N. Kinnard, “Market orientation is the
essence of the so-called Ellwood analysis...to apply the theory
properly, a practicing appraiser must have a good working
knowledge of the mathematics of finance” (Ellwood Analysis,
pp. 18-24). Kinnard lists the six major areas in which, through
the Ellwood analysis, “Appraisers have a great potential for more
effective application of both the facts of the market place and
the thinking of the prudent, or typical, informed investor, when
attempting to appraise investment properties” (pp. 18-24). He
then describes the six major areas and reminds us that appraisers
are responsible for estimating two particular ingredients of the
capitalization rate, \( R \):

1. The anticipated appreciation or depreciation of the
market value during the projected term of ownership.
2. The prospective yield which will attract equity
investments.

In order to better understand the previous statements made by
Kinnard, it is essential to break down and understand the
individual components of Ellwood’s formula.

In another publication by William Kinnard, he states that
"the Ellwood formulation is simply a logical extension of basic
mortgage-equity analysis with some more realistic and descriptive assumptions about property income flows and the nature of the claims of those income flows" (Income Property, pp. 277). For instance, in mortgage-equity capitalization, the overall rate is the ratio of annual net income to value. From an investor's viewpoint, the overall rate is the fraction of the total investment which must be collected each year to: service the debt, yield the required dividends, and components for depreciation or appreciation. In the Ellwood method of mortgage-equity capitalization, however, the overall rate is conceived as: (1) a basic capitalization rate, and (2) a plus or minus adjustment to compensate for expected depreciation or appreciation. When there is no expected depreciation (or appreciation), the overall rate equals the basic rate. James Gibbons states that Ellwood's teachings are based on the following premises: (1) value is best described as the present worth of future benefits, (2) valuation is a compounding interest discounting process, (3) the nature of real estate investment is money -- debt (mortgage funds) and venture (equity money), and (4) to complete a capitalization rate selection, one must include appropriate recognition of the principle change -- i.e. the sinking fund factor (A Second Look, pp. 333-336).

In attempting to solve for (R), the overall capitalization rate that will capitalize the net income to value, one of the most important factors in the Ellwood formula is (V), the equity yield. Basically, (V) is the combination of two investment factors, the annual equity-dividend which is the
cash flow after mortgage payments, and the cash received at the
time of resale. James Gibbons points out that if total cash
proceeds from the resale are "greater" than the original equity
investment, the combined equity-yield will be higher than the
equity-dividend rate. On the other hand, if the resale
proceeds are "less" than the original equity investment,
the equity-yield will be lower.

Primarily, there are two means of stabilizing the \( Y \)
factor from the market. The first is to obtain all the facts
for a given period, say 15 years, and income, mortgage,
cash flow, etc. Of course, this information would be almost
impossible to obtain for obvious reasons. If the information
were somehow available, there could be a number of factors
that may affect its value for comparative purposes. One
such factor could be an older mortgage at an interest rate
considerably less than the present market rates. Another
factor may be a substantially increased equity position
currently expressed in inflated dollars. Also, constantly
increasing rent levels could distort value. Therefore, past
information could result in a strong equity-yield on paper,
but after inflation is taken into account, the effective
yield could be considerably less.

The second method for estimating the equity-yield is
to ascertain the yields investors are demanding. In other
words, an appraiser would consult investors regarding their
reasoning on current rent levels, mortgages, and estimated
future resale value. This method, however, does pose as a potential danger in light of the fact that a measure of the market is being predicated upon investor's assumptions. Investors do have varied motives for investing.

For the purpose of this paper, the method used to calculate the (Y) factor will not be detailed here. It should be noted that investor's expectations do not always materialize and due to management, financing, location, etc., equity-yield projections can prove unreliable even when all the facts are known. But, to help illustrate the importance of, and the sensitivity of, the (Y) factor, the following examples are given:

1.) Assume (Y) = 13%; all other factors are given

\[ R = V - MC + dep(1/Sn) \]
\[ R = .13 - (.75 * .0586) + .10(.0543) \]
\[ R = .13 - .04260 + .00543 \]
\[ R = .0925 \]

Net Income: $185,000 + .0925 = $2,000,000

2.) Assume (Y) = 10%

\[ R = V - MC + dep(1/Sn) \]
\[ R = .10 - (.75 * .0286) + .10(.0628) \]
\[ R = .10 - .02145 + .00628 \]
\[ R = .085 \]

Net Income: $185,000 + .085 = $2,180,000

Thus, as illustrated above, a variance in value of almost 9% will result from the formula due to a difference in (Y) of only 3 percentage points. According to William Torrey, the 9% value difference is near the "maximum" tolerance difference considered reasonable by practicing appraisers (Ellwood Tables, pp. 339-352).
The next factor following \((V)\) in the Ellwood formula is \((M)\) and \((NC)\). \((M)\) is the percentage of mortgage to purchase price or value, such as 70%, or 75% etc. \((C)\) is the mortgage coefficient and is expressed as a separate value calculated as follows:

\[
C = Y + P(1/Sn) - F
\]

where

\(Y\) = anticipated equity yield
\(P\) = percentage of mortgage amortized over the ownership period
\(1/Sn\) = sinking fund factor
\(F\) = annual mortgage payments

In Ellwood’s book, many of these \((C)\) factors have been pre-computed. An example of a \((C)\) computation, however, is given below. Other factors are given.

\[
C = Y + P(1/Sn) - F
\]

\[
C = .13 + (.2164 \times .0543) = .0850
\]

\[
C = .13 + .01175 = .0850
\]

\[
C = .0660
\]

Next in the Ellwood formula is the provision for depreciation, or appreciation, or the entire investment during the period of ownership. Again, there are various methods put forth to estimate the depreciation (appreciation) of property over a certain period of time. Although fluctuations in this factor do not affect the overall rate as do variances in \((V)\), but nonetheless they do affect value. The following example utilizes the previous example where the value was \$2,000,000.00, .0925 overall rate, 13% equity yield, and 10% depreciation. In this example, assume a depreciation rate of 15% instead of 10%.
\[ R = Y \cdot MC + \text{dep}(1/Sn) \]
\[ R = .13 - (.75 \times .0568) + .15(.0543) \]
\[ R = .13 - .0426 + .008145 \]
\[ R = .096 \]

Net Income: \$185,000 + .096 = $1,927,000

The value of $1,927,000 with 15% depreciation, as compared to $2 million with a 10% depreciation rate, shows a marked difference with varied depreciation.

The final factor in the Ellwood formula is the sinking fund factor \((1/Sn)\). Charles Amerson describes a sinking fund as:

A fund in which equal amounts of money are periodically deposited in order to ultimately:
(1) pay a debt, or (2) replace assets. It is usually a fund in which equal annual or monthly deposits are placed - with compound interest thereon - will accumulate to a predetermined amount at the end of a stated period of time (Ellwood, pp. 325-335).

Amerson goes on to describe a sinking fund factor \((1/Sn)\) as "the periodic investment or deposit required to accumulate one dollar in a given number of periods including the accumulation of interest at a given rate" (pp. 325-335). The sinking fund factor is also predicated on \(Y\) and will change when \(Y\) changes.
Now that all factors of the Ellwood formula have been given, it may be beneficial to see how the Ellwood method is utilized in a separate situation. The following example is given in the article by James E. Gibbons entitled "Mortgage-equity Capitalization: Ellwood Method," found on pp. 200.

Application

A supermarket has been leased to a national chain for 10 years at a rental which should produce a net average annual income of $18,200 after liberal allowance for taxes and expenses. Mortgage money is available up to two-thirds of value at 5% with full amortization by level installments in 15 years.

Price this property to yield 7% on a one-third equity allowing for a decline (depreciation) of 25% in value at the end of 10 years.

First we must select the proper overall capitalization rate.

\[ R = Y - MC + dep(1/5n) \]

where

- \( Y = .07 \)
- \( M = .66 \) 2/3%
- \( C = .0134 \) (Ellwood Tables, p. 79)
- \( dep = 25\% \)
- \( 1/5n = .0724 \) (Ellwood Tables, p. 79)

Hence

\[ R = .07 - (.667 \times .0134) + (.25 \times .0724) \]

\[ R = .07 - .008937 + .0181 \]

\[ R = .0792 \]

Now

\[ V = d/R \]

\[ V = 18,200 / .0792 = \$230,000 \]
The above exemplifies the build-up or composition of an overall rate to reflect the conditions found in the real estate market relating to the property being appraised.

The Ellwood method has certainly made an indelible impression on the real estate appraisal industry. It has forced appraisers to consider property under mortgage and equity terms rather than free and clear terms. Although the Ellwood method is a major concept in income valuation, one must not ignore its limitations. As pointed out by William Kinnard Jr., the Ellwood analysis "requires reliable market data on several critical points. If the required information is not available in the market, then the appraiser is injecting his judgement and opinion in using non-market data, and the results are not justifiable Market Value" (Income, pp. 286). He also goes on to say that none appraisers may not grasp a firm understanding of the technique, thereby making it hard to justify, or explain, the process. Yet even though the Ellwood Method is a somewhat difficult equation to understand, its basis is well-founded, and enables a value estimate to take into account the depreciation or appreciation of property, as well as inject a given period of time (commonly 8 - 10 years), and not an undeterminable period of time.

To summarize, in the final sentence in an article by M. B. Hodges, Jr., he quotes another member of the appraisal
profession: "Those who fail to learn Ellwood within the next five years will be dinosaurs in the appraisal profession" (Ellwood, Pro and Con, pp. 289). Even though M. B. Hodges made this statement in 1968, its relevance is equally as important today as it was then.
Works Cited


