# *Vacancy Management V: Is Potential Gross Income Overstated?*

***Peter F. Colwell and Carolyn A. Dehring***

A commercial property's *potential gross income* (PGI) is typically said to represent the total rental revenue that would be received if the property were fully occupied – the maximum revenue that would be possible. PGI is used in *pro forma* analyses, in which analysts try to predict losses associated with vacancy (and collection) problems. A value known as *effective gross income* (EGI) measures the dollar amount that remains after an allowance for vacancy is subtracted from PGI.

Unfortunately, PGI is not directly observable. Instead, it is conventionally computed based on a theoretical construct that, apparently, has never been examined very carefully. Analysts typically calculate a property's PGI by multiplying total rentable square feet by the *prevailing market rental* rate. If office space rented for $12.00 per square foot and the building had 100,000 rentable square feet, the computed PGI would be $1,200,000. We would find the associated vacancy loss by subtracting observed EGI from this theoretical PGI figure. EGI is not based on a theoretical construct; rather, it is the total revenue actually received. (In this article we assume that the property is well managed, such that net operating income is maximized.) If the EGI were $960,000 based on 80,000 square feet occupied, then the computed vacancy and collection loss would be $240,000.

**A Flawed Measure**

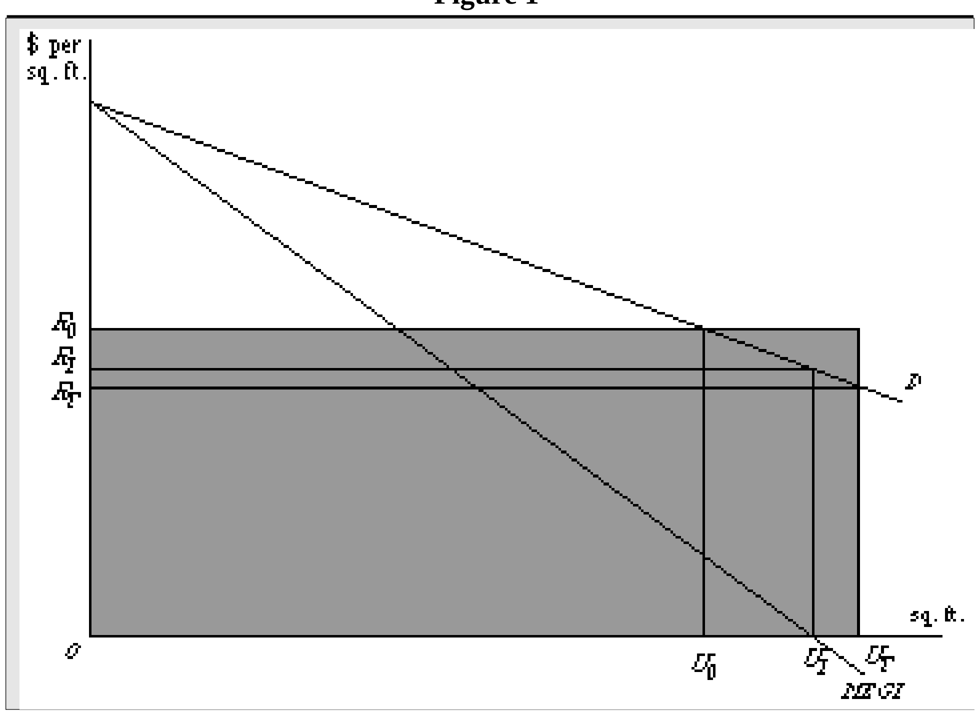
While the standard method of calculating PGI is simple, the result is a measure so flawed that it is not helpful in explaining real estate management. The reason is that standard PGI analysis does not take into account the economic law of demand as it relates to the rental of income producing property. Calculating PGI the conventional way results in overstating both PGI and vacancy loss. Alternative measures would be more defensible.

We can simplify our analysis of PGI calculations by assuming that all leases are signed at the same rental rate. In other words, we assume initially that either the leases in place are short term, or else the building is operating in long run equilibrium. (There is, in fact, an element of this assumption in the conventional calculation; the issue is not critical to this portion of our discussion.) Consider Figure 1, a graphical depiction of an office property's revenues and costs. Each lease calls for the tenant to pay $R_0$ per square foot. But notice that the demand relationship facing the property manager, shown as *D* in the figure, follows the *law of demand*, meaning that the demand curve is downward sloping.

An implication is that the property has some *monopoly* power, an idea that seems rational in the context of a *spatial* monopoly. Every property has a degree of monopoly power because it is located uniquely in space, and thus potential tenants will differ in their desire to occupy the premises. More of the building's total space could be rented out, then, only if a lower rental price per square foot were charged; it would be impossible to attain 100% occupancy at $R_0$ quoted rent. The manager could either rent space at $R_0$ and accept the accompanying vacancy level, or choose a preferred vacancy level and charge the appropriate rent. A rent of $R_0$ intersects the demand curve at occupancy level $U_0$ (less than the full occupancy shown as $U_T$). Continuing with the earlier example's observed $960,000 EGI, if $R_0$ were $12.00, then $U_0$ would have to be 80,000 square feet (80% of $U_T$).

The demand curve reflects *average* effective gross income, or EGI/U. Since demand is downward sloping, there is a *marginal* EGI curve, labeled MEGI in Figure 1, that lies below *D* (average EGI). *Total* revenue (here, EGI) is the area lying below MEGI up to the level of occupancy. Optimal management involves charging a rent that maximizes, with some constraints, net operating income (NOI). NOI is maximized at the occupancy level at which MEGI equals marginal operating expenses (not shown in the figure, but described in "Vacancy Management II: An Agency Problem" in the Winter 1990 issue of this publication). At lower occupancy, the marginal (extra) EGI from increasing occupancy by a tiny amount exceeds marginal cost, so it pays to increase occupancy. The opposite is true at higher occupancy levels; extra EGI is less than the extra operating cost associated with more intensive use, so it pays to reduce occupancy. We assert that rental rate $R_0$, accompanied by occupancy rate $U_0$, represents NOI maximization.

**Figure 1**



The area of the large shaded rectangle in Figure 1 represents the conventional calculation of PGI. The height of the rectangle represents rent ($R_0$), and the width represents a 100% level of occupancy ($U_T$); the product of these two magnitudes, the area, is conventionally computed PGI. The area of the smaller rectangle with sides $R_0$ and $U_0$ is EGI. The difference between these two areas (the rectangle with height $R_0$ and width $U_T - U_0$) represents vacancy loss, calculated as conventionally computed PGI minus observed EGI. Of course, because of the downward sloping demand curve, the calculated PGI is not achievable. Another way to state the issue is that there is no potential for achieving this potential gross income.

> *The problem with the conventional PGI measure is that there is no potential for achieving the indicated level of potential gross income.*

**Alternative Measures**

In fact, the analyst using the conventional approach calculates both PGI *and* vacancy loss incorrectly. To attain 100% occupancy, the manager would have to reduce the rent from $R_0$ to $R_T$ (where *D* intersects the maximum achievable occupancy $U_T$), say from \$12.00 to \$9.78. This reduction would generate \$978,000, a possible PGI candidate. An observed EGI of \$960,000 would imply a vacancy loss of \$18,000 rather than \$240,000. In Figure 1, this alternative PGI is the area of the rectangle with sides $R_T$ and $U_T$. As a PGI measure, this alternative is somewhat troubling, in that it would be possible for EGI at our optimum occupancy level $U_0$ to exceed this computed PGI, resulting in a *negative* vacancy loss (*i.e.*, vacancies would actually improve *gross* income).

Another candidate for PGI, one that eliminates the potential for negative vacancy, would be per-unit rent times the occupancy level that would produce the maximum revenue. The revenue maximizing occupancy is found where the MEGI curve intersects the horizontal axis, shown on Figure 1 at $U_1$, with approximately 94,000 square feet occupied. It would be necessary to reduce rent from $R_0$ to $R_1$, say from \$12.00 to \$10.44, to achieve this level of occupancy. Thus PGI would be \$981,360, and the vacancy loss would be \$21,360, still a far cry from \$240,000. In Figure 1, this second alternative PGI appears graphically as the area of the rectangle with sides $R_1$ and $U_1$.

**When Contract & Market Rates Differ**

In the preceding analysis it was assumed that the market rental rate was equal to existing contract rental rates (what tenants pay per square foot of space, as stipulated in their lease contracts). However, because the market for office real estate is volatile in nature, a given contract rental rate may not be representative of current market conditions.

Assume that the market rental rate that maximizes NOI, $R_m$, rises above the average contract rate, $R_a$, as is depicted in Figure 2. (The *average* market rental rate could contain *some* units rented at the current market rate.) Due to an increase in demand (and hence in MEGI), optimal occupancy increases from $U_0$ in Figure 1 to $U_m$. EGI is equal to the area of the darker shaded rectangle, with sides $R_a$ and $U_m$. If vacant units were valued at the market rate, $R_m$, then conventional total vacancy loss (represented by the lighter shaded rectangle in Figure 2) would be calculated as ($U_T - U_m$) multiplied by $R_m$. Our modification of conventional PGI, then, is Figure 2's total shaded region.

As before, however, this PGI would be overstated. Our modified second alternative PGI measure would call for valuing vacant units at the rental rate corresponding to the demand curve's height at $U_2$, the revenue maximizing occupancy level. The striped region in Figure 2 indicates the difference between this second measure and a PGI that involves valuing vacant units at the market rate.

**Conclusion**

The conventional method for computing PGI is flawed, in that it does not reflect economic realities of the real estate market. We have suggested two alternative PGI measures. Each is less operationally simple than the conventional approach, and requires thought regarding the sensitivity of demand to rent changes. Nevertheless, professional real estate managers should be interested in gaining greater insights into this sensitivity. ■

**Figure 2**