ANSWERS TO STUDY QUESTIONS

Chapter 29

29.1. The three distinguishing features of development project investment as compared to investment in stabilized property are: time-to-build, construction loans, and phased risk regimes. Time-to-build refers to the fact that the investor does not receive the investment asset immediately but only after the time it takes to complete the development project, with correspondingly only a portion of the investment price or cost paid up-front at time zero (when construction is committed and the land opportunity cost is incurred). Use of construction loans is quite ubiquitous even among deep-pocket equity investors, and results in all or most cash outflow expenditures from the equity investors occurring in effect at only two points in time, up-front ("time zero") when the land is committed, and at (or near) the completion of the construction project when the construction loan (which covers all or most of the construction costs) must be paid off. Phased risk regimes refer to the fact that the development project itself is much more risky (due to operational leverage) than the corresponding stabilized property, so that as the project progresses through time it moves from a high- to a low-risk regime suitable for different types of investors or different sources of financial capital (apart from the use of financial leverage, which can magnify the risk in the levered equity investment even in a stabilized property as described in Chapter 13).

29.3. The OCC of construction costs is usually not much greater than the risk-free interest rate because construction costs are usually not highly correlated with economic or financial variables that dominantly determine the non-diversifiable risk in investment portfolios. Construction costs are typically either largely fixed by contract or their variation around their prior expected value is due to unforeseen physical or engineering factors encountered in the construction project. Variation in the cost of construction labor or materials is usually either relatively small over the time horizon of a given construction project, or is fixed by contract, or is not highly correlated with the value of the completed real estate or other financial variables such as stock market values, bond values, and so forth. In effect, in the CAPM terminology of Chapter 22, the "beta" of construction costs tends to be low for any given project.

29.5. The two key points in time for simplifying the analysis of development project investment economics are "time zero," which refers to the time up front when the irreversible commitment to undertake the construction project is made (and the opportunity cost of the land is thereby incurred), and time "T," which refers to the future point in time when the construction project will be completed. Sometimes, for speculative projects, it is useful to sub-divide time T into "T1" and "T2" referring to completion of physical construction and completion of the lease-up phase (to project "stabilization"), respectively, as the lease-up phase does not contain as much risk (not as much operational leverage) as the construction phase.

29.7. The canonical formula (4) conforms to the real option model of land value presented in Chapter 27 (section 27.3) at the point when it is just optimal to exercise the option (develop the land). At that point, the OCC or expected return to the land exactly equals the OCC or expected return to the development project, and the value of the land exactly equals the NPV of the development project exclusive of land cost as exemplified in formula (4).

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29.9. The "Enhanced Cap Rate on Cost" rule of thumb for development project evaluation provides a cap rate at and above which the project appears desirable, where the cap rate is defined on (or applied to) the projected stabilized NOI of the project divided by the total development cost (land plus construction) rather than the projected stabilized value of the project, and the relevant criterion value of that cap rate equals the current typically prevailing market cap rates for such stabilized properties in the property market plus some extra premium to reflect the added risk and need for profit in the development investment compared to stabilized investment. For example, if prevailing cap rates on stabilized property are, say, 9%, then to be considered sufficiently profitable a development project (for the same type of assets) might require an enhanced cap rate on costs of, say, 10%, a 100 bp premium. Implicitly, if not explicitly, this premium can effectively reflect the time-to-build duration and the OCC (required expected total return) on the development project. In principle, it is possible to define the required enhanced cap rate on cost such that it correctly reflects the actual OCC and expected duration of the development investment. If and only if the enhanced cap rate on cost criterion is thusly defined will it be exactly consistent with the NPV investment decision rule. For example, in the FutureSpace illustrative project in the text chapter, the prevailing market stabilized cap rate on an effective annualized basis is 9.38%, the expected project duration is one year, and the OCC of the development project is 20.16%. Together these imply that an enhanced cap rate on cost with a premium of 69 basis points, or 10.07% (equal to 9.38% + 0.69%), will provide the same decision criterion as the fundamental NPV analysis in the text section 29.1, explicated in formula (4). (For the computations, see the Chapter 29 Excel file supplement on the CD that comes with the text.)

29.11. Completion value of $V_T - K_T$ = Projected Dvlpt. Profit = 95,000,000 − 128,000,000 = $33,000,000.

$PV[\text{asset}] = 128/1.085^2 = 128/1.177225 = \$108{,}730{,}277.$

$PV[\text{constr. cost}] = 95/1.05^2 = 95/1.1025 = \$86{,}167{,}800.$

NPV exclu. land = 108730277 − 86167800 = $22,562,477.

Per eqn.(4) Dvlpt. OCC $= (33000000/22562477)^{1/2} - 1 = 20.94\%$.

29.13.

$$V_5 = \$10{,}1000{,}000 = \frac{\$80{,}000}{1.09} + \frac{(1.01)\$800{,}000}{1.09^2} + \frac{(1.01)^2\$800{,}000}{1.09^2} + \cdots$$

$$= \frac{\$800{,}000}{0.09 - 0.01} = \frac{\$800{,}000}{0.08}$$

$$V_3 = \$8{,}201{,}531 = \frac{-\$100{,}000}{1.12} + \frac{\$400{,}000 + \$10{,}100{,}000}{1.12^2}$$

$$L_3 = \$4{,}845{,}938 = \$1{,}500{,}000(1.075)^2 + \$1{,}500{,}000(1.075) + \$1{,}500{,}000$$

$$V_T - K_T = \$8{,}201{,}531 - \$4{,}845{,}938 = \$3{,}355{,}593$$

$$NPV_0 = \$-278{,}106 = \frac{\$3{,}355{,}593}{1.20^3} - \$2{,}220{,}000$$

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