REQUIEM FOR LARGE-SCALE MODELS IN REAL ESTATE ANALYSIS

by Dominique Achour

Requiems now have established a decennial quasi-tradition in urban economic literature. In 1964 John Reps[1] attacked traditional modes of land use controls and heralded the use of mathematical and computer models. In 1974, Douglas B. Lee[2] voiced general dissatisfaction with such constructs and announced his own requiem for large-scale models. In this article we are simply following up and suggesting a requiem for large-scale computer models in real estate analysis. But the analogy should not be carried too far. We do not suggest formal models in real estate valuation and analysis will disappear, neither do we question the validity of the existing paradigm — the discounted cash-flow equity models. What we simply want to report is a significant change in the form of the design, writing and use of computer models. First we will define, describe and criticize the available large-scale computer models, and then stress the advantages of small-scale general spreadsheet types of computing procedures.

Large Scale Models For Real Estate Investment Analysis

In the last 10 years, a number of computer models have been developed in U.S. and Canadian university departments where real estate is being taught. An even greater number of similar products have been commercialized by private software firms.[3] All these models are variations around the standard discounted cash-flow analysis; thus the term large-scale model, as used here, does not allude to their scope but only to form and programming medium. Large-scale models mostly are used on mainframe computers and are written in traditional languages (Fortran, APL or Basic); thus they require

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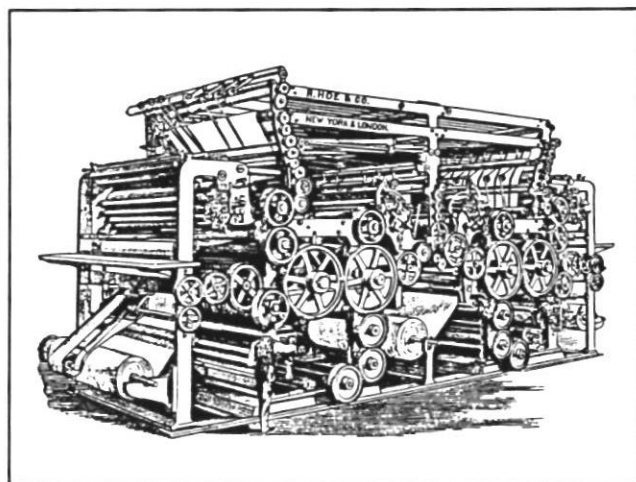
large machines and large programs (up to 10,000 statements). Their power and efficiency comes with their size, but also causes their weaknesses.

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Complexity

Conceptually simple, discounted cash-flow analysis does require extensive programming modeling of various complex subroutines to deal with the aspects of taxation and financing. The very nature of income tax legislation, particularly the necessary relationships between tax regulations, depreciation schedules and financing options, imposes the use of interlocking routines and creates interesting programming problems. In their final forms, adorned by sundry bells and whistles, discounted cash-flow models are arcane enough to discourage scrutiny from users moderately trained in programming.

Immutability

Because of their complexity, large-scale models are not amenable to tinkering. Authors and programmers tend to exhibit a fairly conservative attitude when major, or even

minor, changes are suggested. Because of the tightly knit nature of such models, they tend to be error-prone since minor changes may generate frustrating domino effects. Since, for tax-related reasons, real estate models have a high rate of obsolescence, the relative immutability of large-scale models is a serious handicap.

Inscrutability

Listings of programs usually are not provided to the users because of their size and the author's copyright protection. Even when listings are provided, they still remain rather opaque to most users. This black-box aspect of large-scale models reinforces their immutability; the user is frustrated in his attempts to modify the instrument for his own needs.

Grossness

Despite their relative complexity, large-scale models do rely on simplifying assumptions and somewhat uncomplicated treatments. Typically they deal with yearly cash flows, simplify the timing of tax payments and reimbursements, rely on some taxation clarifications and have a limited range of financing options. Only a few models deal directly with partnership ownership or with complex leasing arrangements. The birth of real estate projects is not usually analyzed. Such simplifications are usually harmless, but since they mostly are implicit, they can mislead the analyst and give him a false sense of accuracy.

Deterministic

Almost no model allows for the definition of probabilistic distribution of the input variables. One-point estimates must be assumed for rental revenues, vacancy rates, mortgage rates, etc., consequently the results are also one-point results. Most users do not feel comfortable with such deterministic results and the forced accuracy required for the input variables. Serious analysts are painfully aware of the uncertainty of their hypothesis and thus the contingent nature of the results. Careless analysts, on the other hand, may be carried away by the apparent accuracy of the forecasts. This carelessness, unfortunately, is reinforced by the quasi-mythical power of persuasion attributed to computer print-outs (50 million bits cannot be wrong!). Again the inscrutability (the black-boxness) of large-scale models does not allow for the required demystification.

Single Asset Analysis

Most existing models are not designed to deal with a portfolio of real estate assets. This is unfortunate not only due to the importance of portfolio composition on the risk-return trade-off but also because tax rules may have different effects depending on the number of assets and their relative performance. One would even like to combine real estate and nonreal assets in a single model. Here again tax rules (for example, on capital and terminal losses) are affected by the composition of the portfolio. The investment separation principle recommended in corporate finance does break down when tax-portfolio effects are considered and single asset models can lead to inappropriate decisions.

Costliness

Good software in traditional languages does not come cheap. A large-scale interactive model conservatively requires a few hundred hours of programming time. Since many models have been developed by university professors and their graduate students, no cost accounting has been performed but we may conjecture that an operational, fool-proof and bug-free documented real estate package would cost at least $20,000 to produce. The retail price of commercialized microcomputer adapted versions of such models range between $400 and $800. Even at these prices, such packages are still quite attractive when one considers the time and alertness required for similar manual computation, but we think cheaper and better alternatives now are available.

Small-Scale Models

Small-scale models[4] are typically homemade ad hoc models written in an advanced spreadsheet (template) format and specifically designed for microcomputers. A spreadsheet program can be described as an accounting matrix entirely defined and manipulated by the user. Columns and rows are created to solve any tabular problem (computation of cash-flows, mortgage payments, depreciation schedules, etc.) and most financial computations (internal rate of returns, net present value, etc.) are performed directly through a very simple command language.

Conceptually the manipulation of such tables is perfectly analogous to the traditional pencil and paper tabular treatment, thus the intuitive understanding of such programs is almost immediate. The remarkable friendliness of such a medium comes from the fact that general complex programming is, so to speak, predigested, and the user needs only to master a very intuitive and visual command language.

The main advantages of such small-scale programs are —

Accessibility

A great (and growing) number of commercial spreadsheet programs are now available and the marketing accent is on their friendliness. This learning process is very short and any user can, within a week or so, create his own complete discounted cash flow real estate model. The requirements are not anymore on programming capability, but mostly on a clear understanding of the financial and fiscal concepts of real estate analysis.

Transparency

Since they are homemade, such programs are perfectly transparent and the user is in total control of the program. He can simplify, complexify, add all the bells and whistles he wishes and create specific routines as required.

Viability

The black-boxeness of such programs being eliminated, so is the false sense of accuracy. The analyst, now the

modeler, has a much better understanding of his hypothesis and results. The model is clearly not more (or less) accurate but at least the soft spots are identified clearly and can be taken into account.

Capability

Advanced spreadsheet programs (such as EPS or IFPS) deal easily with portfolio effects through consolidation routines and are equipped with powerful financial capabilities: direct multi-variable what-if analysis, probabilistic simulation of the input variables, impact analysis and goal seeking procedures. No existing large-scale model offers such options.

Generality

Spreadsheet programs can be used for any type of tabular analysis whether it is real estate analysis, an arcane tax or accounting problem, a cash management problem or an inventory management problem. Because of the very general nature of the master spreadsheet program, any specific adaptation can be produced at a fairly low marginal cost. Master programs retail for $400 to $1,200, but each specific program can be stored on a diskette or hard-disk with no other cost than the time required for writing. A general purpose discounted cash-flow real estate program can be written, debugged, tested and prettied up in a normal work day.

Integrability

Recent packages (example, Symphony) integrate spreadsheet capabilities with graphic production, word processing, data base management and communications. Thus the financial analysis of a project may use previously stored market information, can be directly integrated in a formal report illustrated with graphs and even transmitted directly through a terminal to a client; no existing large-scale model can match such a performance.

Of course, the user who is still reluctant to design his own programs may be tempted to buy existing commercial spreadsheet real estate programs. Such programs are now widely advertised in computer magazines, but since they are packaged such programs also can turn out to be immutable and expensive black-boxes. We believe the major advantage of spreadsheet programs is they can be user designed and tailor-made. This advantage is lost when canned programs (spreadsheet or large-scale models) are purchased.

Conclusion

Large-scale real estate computer programs have been precious and powerful instruments for analysis and pedagogy. Their recent availability has transformed the teaching and practice of real estate valuation and analysis, but their reign has been quite short. They should and are rapidly being replaced by smarter, cheaper and friendlier instruments. Instructors, analysts and professionals now should redirect their attention to the growing panoply of spreadsheet and integrated programs. They also should resist the temptation to purchase canned real estate spreadsheet programs since they will realize that the required amount of homework needed to design their own packages is both gratifying and profitable.

NOTES

1. Reps, J., "Requiem for Zoning", *Planning*, 1964, ASPO.
2. Lee, D. Jr, "Requiem for Large-Scale Models", *American Institute of Planning Journal*, May 1973.
3. For a recent exhaustive compilation: I. Beckhoeffer, ed., *Guide to Real Estate and Mortgage Banking Software*, (2 vol.) Real Estate Solutions Inc. Publishers, Washington, D.C., 1984.
4. We define as spreadsheet type of programs a wide family of programs where computational tables are created and manipulated directly. In fact, we should distinguish the standard simple spreadsheet programs (among the better known: Lotus 1, 2, 3; Multiplan; Visicalc; etc.) and the more powerful and complex template programs also called DSS (Decision Support Systems: such as EPS, NCP CALC, IFPS, 20/20, MICROPLAN, FINAR, etc.). The comparison between simple spreadsheet and DSS calls for a separate article and is not crucial to our discussion. Here we treat DSS programs as small-scale models since, though not really small, they have the advantages of simple spreadsheets since most of them now have been repackaged to run on personal computers.