APPENDIX 11A

CASH FLOW PROJECTION NUMERICAL EXAMPLE

Exhibit 11A-1 presents a simple example 10-year proforma for the Noname Building, a 30,000-SF office building consisting of three 10,000-SF spaces, each of which rents out separately under a five-year lease.[1] The current and projected market rent for the building is shown in the first row. The market rent in year 1 is estimated to be $10/SF, meaning that leases signed today (at the beginning of year 1) would be expected to have this rent. The market rent is then projected to grow at a constant rate of 1 percent per year. Such a projection might be based, for example, on a judgment that the space market is currently in, and expected to remain in, its long-term equilibrium, with expected inflation of 2 percent per year and market rent real depreciation for the building of 1 percent per year. (Such depreciation would presumably be due to functional obsolescence, even after sufficient capital expenditure for reasonable upkeep of the building.) This results in a net 1 percent per year expected growth rate for the rent the building could charge on new leases.

The next section of the proforma presents the rent roll for the three spaces, totaling the PGI of the building. Space 1 is currently occupied by a tenant that has an existing lease signed two years ago at a higher rent of $10.50/SF. (Perhaps the space market was abnormally tight at that time, or that tenant negotiated a "bad deal" for itself, or received some free rent or other concession up front when they signed the lease.) This lease is set to run three more years and will expire at the end of year 3. Space 2 has just leased out in a new five-year lease at the current market rate of $10/SF. This lease will expire at the end of year 5. Space 3 is currently vacant and not expected to lease up until the beginning of year 2. At that time the market rent is projected to be $10.10/SF, which is the projected rent for space 3 from years 2 through 6.

In the proforma, the PGI is calculated for all three spaces as though each were fully occupied every year. Note that when a lease is projected to expire, the space "rolls over" at the projected market rent prevailing at the beginning of the next lease period. Thus, for example, after space 1's current lease expires at the end of year 3, the rent roll for that space is "marked to market" as of the next year, at the projected year-4 market rent of $10.30/SF. (Actually, this is a rounded estimate. The precise estimate is $10.303, which is why the PGI for 10,000 SF is projected at $103,030 based on the year-4 market rent.)

The next section of the proforma computes the vacancy allowance that must be subtracted from the PGI to arrive at the effective gross income. Space 3 is expected to be vacant for the entire first year, so its entire PGI for year 1 is attributed to vacancy allowance. The assumption for the remainder of the proforma is that when leases expire, there is a 50 percent chance the existing tenant will renew, resulting in no vacancy. However, if the existing tenant does not renew, the expectation is that the space will remain vacant for an entire year.

Recall that the proforma is supposed to forecast the *expected* cash flows, that is, the mean of the subjective *ex ante* probability distribution of the possible cash flows for each year. To compute this mean, we multiply the probability of each scenario by the cash flow resulting from that scenario, and sum over all the scenarios. In this case, we have two

[1]In practice, analysis like this is often facilitated by use of specialized software that makes it easy to convert lease information into cash flow projections. The most widely used such software in the United States in the early 2000s is ARGUS® Software (http://www.argussoftware.com). On the CD accompanying this book we provide a basic ARGUS exercise that can serve as a simple tutorial for this product.

Copyright © 2021 Mbition LLC. All rights reserved. May not be scanned, copied or duplicated, or posted to a publicly accessible website, in whole or in part.

Item	Year 1	2	3	4	5	6	7	8	9	10	11
Market rent/SF:	$10.00	$10.10	$10.20	$10.30	$10.41	$10.51	$10.62	$10.72	$10.83	$10.94	$11.05
Potential revenue:											
Gross rent space 1 (10000SF)	$105,000	$105,000	$105,000	$103,030	$103,030	$103,030	$103,030	$103,030	$108,286	$108,286	$108,286
Gross rent space 2 (10000SF)	$100,000	$100,000	$100,000	$100,000	$100,000	$105,101	$105,101	$105,101	$105,101	$105,101	$110,462
Gross rent space 3 (10000SF)	$100,000	$101,000	$101,000	$101,000	$101,000	$101,000	$106,152	$106,152	$106,152	$106,152	$106,152
Total PGI	$305,000	$306,000	$306,000	$304,030	$304,030	$309,131	$314,283	$314,283	$319,539	$319,539	$324,900
Vacancy allowance:											
Space 1	$0	$0	$0	$51,515	$0	$0	$0	$0	$54,143	$0	$0
Space 2	$0	$0	$0	$0	$0	$52,551	$0	$0	$0	$0	$55,231
Space 3	$100,000	$0	$0	$0	$0	$0	$53,076	$0	$0	$0	$0
Total vacancy allowance	$100,000	$0	$0	$51,515	$0	$52,551	$53,076	$0	$54,143	$0	$55,231
Total EGI	$205,000	$306,000	$306,000	$252,515	$304,030	$256,581	$261,207	$314,283	$265,396	$319,539	$269,669
Other income	$30,000	$30,300	$30,603	$30,909	$31,218	$31,530	$31,846	$32,164	$32,486	$32,811	$33,139
Expense reimbursements											
Space 1	$0	$1,833	$2,003	$0	$1,651	$964	$1,118	$2,870	$0	$1,823	$329
Space 2	$0	$2,944	$3,114	$1,814	$3,465	$0	$153	$1,905	$469	$2,292	$0
Space 3	$0	$0	$170	$0	$260	$0	$0	$1,752	$316	$2,139	$645
Total revenue	$235,000	$341,078	$341,891	$285,238	$340,624	$289,075	$294,324	$352,974	$298,667	$358,602	$303,781
Operating expenses:											
Reimbursable expenses											
Property taxes	$35,000	$35,000	$35,000	$35,000	$35,000	$36,750	$36,750	$36,750	$36,750	$36,750	$36,750
Insurance	$5,000	$5,000	$5,000	$5,000	$5,000	$5,250	$5,250	$5,250	$5,250	$5,250	$5,250
Utilities	$16,667	$25,500	$26,010	$22,109	$27,061	$23,002	$23,462	$28,717	$24,410	$29,877	$25,396
Total reimbursable expenses	$56,667	$65,500	$66,010	$62,109	$67,061	$65,002	$65,462	$70,717	$66,410	$71,877	$67,396
Nonreimbursable expenses:											
Management	$6,150	$9,180	$9,180	$7,575	$9,121	$7,697	$7,836	$9,428	$7,962	$9,586	$8,090
Total operating expenses	$62,817	$74,680	$75,190	$69,684	$76,182	$72,699	$73,298	$80,146	$74,371	$81,463	$75,486
NOI	$172,183	$266,398	$266,701	$215,554	$264,442	$216,376	$221,026	$272,828	$224,295	$277,139	$228,295
Capital expenditures											
TI		$50,000		$50,000		$55,000	$55,000		$55,000		$55,000
Leasing commissions		$15,150		$15,455		$15,765	$15,923		$16,243		$16,569
Common area physical improvements					$100,000						
Property-before-tax Cash flow (operations)	$172,183	$201,248	$266,701	$150,100	$164,442	$145,611	$150,103	$272,828	$153,053	$277,139	
Property-before-tax Cash flow (reversion)										$2,282,951	
IRR @ $2,000,000 price: 10.51%											

EXHIBIT 11A-1 Noname Building: Cash Flow Projection

Copyright © 2021 Mbition LLC. All rights reserved. May not be scanned, copied or duplicated, or posted to a publicly accessible website, in whole or in part.

scenarios: tenant renews or tenant does not renew. Thus, we compute the expected vacancy allowance for a given space during the year following its lease expiration as follows:

$$(1 - \textit{Probability of Renewal}) \times \textit{Market Rent} \times \textit{Expected Length of Vacancy if Nonrenewal}$$

For example, the market rent is projected to be \$10.51/SF in year 6. Space 2's lease expires at the beginning of year 6. So the projected vacancy allowance for year 6 for space 2 is:[2]

$$(1 - 0.5) \times (\$10.51/SF) \times 10{,}000\ SF = \$52{,}551^{3}$$

After adding other income to the EGI, the next section of the proforma computes expense reimbursements. Although the typical leases for this building are gross leases, that is, leases in which the landlord is responsible for paying the operating expenses of the building, there are nevertheless some provisions here for tenants to reimburse some of these expenses to the landlord.

In particular, the leases here have expense stops, requiring the tenants to reimburse the landlord for certain operating expenses *in excess of a specified base level per SF*. For example, the current lease in space 1 has a "stop" of \$2/SF. The tenant must reimburse the landlord for his pro rata share of the reimbursable operating expenses in excess of that amount. Look down at the total reimbursable expenses line in the next section. These are projected to be \$56,667 in year 1. As there are 30,000 SF in the building, this works out to reimbursable expenses of \$1.89/SF. This is less than the \$2/SF expense stop for space 1, so that tenant is not projected to pay any expense reimbursement in year 1. On the other hand, in year 2 the reimbursable expenses are projected to be \$65,500, or \$2.1833/SF. Thus, space 1 is projected to reimburse the landlord for \$1,833 in year 2, computed as the \$0.1833/SF projected excess over his stop times his 10,000 SF.[4]

After adding the EGI, the other income, and the expense reimbursements to arrive at the total revenue, the next section in the proforma projects the operating expenses.[5] Four categories of operating expenses are enumerated here: property tax, hazard and liability insurance, utilities, and management (which includes administration, cleaning, routine service and upkeep, etc.). Of these four expense categories, only management is not subject to the expense stop tenant reimbursement provisions. Some of these expense items, such as utilities, are projected to be less in years when there is some expected vacancy (in a probability sense, in keeping with the cash flow projection being a statistical "expectation" of a probability distribution). Some expenses tend to grow with inflation, while others tend to remain relatively fixed, at least over intervals between adjustments. For example, property taxes tend to remain

---

[2]Suppose the renewal probability was estimated to be 75 percent, and the expected vacant period in the event of nonrenewal was four months. Then the projected (expected) vacancy loss for space 2 for year 6 would be:

$$(1 - 0.75)(\$10.51)(10{,}000SF)(412mo.) = 8{,}758$$

It should be noted that in practice conventional wisdom "rules of thumb" are often applied to this calculation, regarding the lease renewal probability and the projected vacancy period downtime in the event of nonrenewal. The industry has not been very "scientific" about this calculation. For example, the most common assumption in the office building market is that leases experience a 75 percent renewal probability. Some empirical evidence suggests this may be a bit high, on average. An empirical analysis of a high-quality office portfolio in the early 2000s found only about 60 percent renewal of leases. (See R. Asser, "*The Determinants of Office Tenant Renewal*," MSRED Thesis, MIT Center for Real Estate, 2004.) This same analysis found evidence that leases of larger spaces are renewed with substantially greater frequency, such that the weighted average lease renewal rate *per square foot of space* was indeed about 75 percent. (That is, the probability of a given lease renewing was about 60 percent, but the probability of a given *square foot* of leased space being renewed was indeed about 75 percent.)

[3]The truly astute student will note that $0.5 \times 105{,}100 = 52{,}550$ (rather than the 52,551 shown here). Minor discrepancies such as this are due to rounding, as the underlying calculations are done in an *Excel* spreadsheet that keeps more accuracy than we can conveniently show in the text.

[4]In some cases, there may be provisions to adjust the expense stop based on the amount of *occupied* space in the building.

[5]Obviously, the computation order requires projection of reimbursable expenses prior to projection of reimbursement revenue.

Copyright © 2021 Mbition LLC. All rights reserved. May not be scanned, copied or duplicated, or posted to a publicly accessible website, in whole or in part.

a roughly constant proportion of property value, but taxes may only be adjusted once every several years (based on new property value assessments).

The NOI is computed as the total revenue minus the total operating expenses. Then, *below* the NOI line, capital expenditures are projected. Three categories are included here: TIs, leasing commissions, and general capital expenditures for common areas or structural improvements. TI expenditures are projected whenever a new lease is expected to be signed. These are initially projected at $5/SF, growing to $5.50/SF later. In reality, TI allowances will vary from market to market and as a function of the state of the space market (whether the market tends to favor tenants or landlords). Leasing commissions in this example are projected at 3 percent of the total PGI amount associated with the lease. A single major common area physical improvement costing $100,000 is projected for year 5, midway through the proforma period. This might be an accumulation of repairs and upgrades that would be necessary by that time. In reality, specific capital items might be budgeted, or a general reserve amount might be taken out every year.

A key point to note is that the cumulative capital expenditures of all types projected for years 1–10 is about 18.5 percent of the cumulative NOI during that period, in our example building. This is a plausible percentage. (Recall that the typical range for this figure is between 10 percent and 20 percent, and over 30 percent for some types of class A properties.) Projections of capital expenditure substantially below 10 percent of NOI in a 10-year proforma should be suspect, unless a reasonable explanation is provided, or a correspondingly reduced resale value is projected for the reversion.

The overall bottom line in our example proforma is labeled "property before tax cash flow—PBTCF," and is broken down between operational and reversion components. The reversion in this case was projected by applying a 10 percent going-out cap rate to the year-11 NOI projection. Note that the operating net cash flow bottom line is somewhat "lumpy" across time. For example, the projected net cash drops from $267,000 in year 3 to $150,000 in year 4. This is typical of years in which the leases will expire covering a large portion of the building's space. Because of releasing capital costs such as TIs and leasing commissions, the net cash bottom line will typically be more affected by lease expirations than the NOI. Thus, realistic net cash flow projections are typically "choppier" than NOI projections, as is the case in the Noname Building.[6]

As indicated at the bottom of Exhibit 11A-1, if the No Name Building could be bought at the beginning of year 1 for $2 million (with end-of-year annual cash flows thereafter), the going-in IRR would be 10.51 percent per year over the 10-year projection. The going-in cap rate would be 8.61 percent, which may seem a bit low until you realize that the year-1 NOI reflects one-third of the space being vacant. A fully occupied NOI, as represented by the year-2 projection, would imply a cap rate of 13.32 percent, which seems high. However, neither of these cap rates reflects the necessary capital expenditures. This demonstrates why cap rates can be tricky to use for judging property value. The IRR applied to the net cash flow (net of capital expenditures) is a more meaningful and reliable measure. As there is only slight overall growth projected for this property, we would expect the $E[r]$ expected total return (**going-in IRR**) to be only slightly higher than a long-run **stabilized cap rate**. Thus, if 10.5 percent is a reasonable expected total return for this property, then our projected going-out cap rate of 10 percent, applied to estimate the reversion value, is reasonable and consistent with a $2 million current valuation.

[6]In extreme cases, this can result in projected years of negative net cash flow for a property that is generally profitable. Obviously, the building owner needs to plan in advance for income volatility, and especially for possible years of negative cash flow, when the property's income will have to be supplemented by external sources. It will often be possible to finance major capital improvement expenditures using borrowed money. Another common approach is to plan for a "sinking fund" in which building cash flow is invested prior to years of negative cash flow in order to cover such projections. Cash flows diverted to a sinking fund still belong to the landlord, however, and so should not be subtracted from the projections used in DCF investment analysis of the value of the asset (i.e., investments in a sinking fund may be presumed to be zero NPV).

Copyright © 2021 Mbition LLC. All rights reserved. May not be scanned, copied or duplicated, or posted to a publicly accessible website, in whole or in part.