

## CHRONICLE N°14

### Net operating income: the impact of vacancy rate

For this fourth Chronicle on net operating income, and for the following ones on this theme, we are making the simplifying assumption (which will be lifted at a later date) that we are working on the case of a single-tenant building leased in part (between 0 and 100% of the building) at the initial date  $t_0$ .

Unless otherwise specified, all calculations will be made per square metre ( $m^2$ ). To obtain the total amount, simply multiply by the surface area concerned.

The aim of this series of Chronicles is to define a simple but complete formulation of net operating income and its rate of change.

Our starting point is the general formula presented in Chronicle 10.

$$(1) \text{ noi} = (\text{nrv} \cdot (1 + \text{ri}\%) \cdot (1 - \text{sm}\%) - \text{mc}) \cdot (1 - \text{vac}\%)$$

with:

- $\text{noi}$  : net operating income
- $\text{nrv}$  : net rental value
- $\text{ri}\%$  : rent indexation
- $\text{sm}\%$  : support measures (% of net rental value)
- $\text{mc}$  : management costs
- $\text{vac}\%$  : vacancy rate

**Let's look at time.** The property is let at the beginning of year 0 and the owner receives annual income adjusted for the various impacts (vacancy, management costs, etc.) over the following years. We consider that the support measures only concern the first year.

During the first year, the owner receives an income based on the net rental value less support measures impact and management costs, adjusted for the vacancy rate:

$$(2) \text{ noi}_{0,1} = (\text{nrv}_{0,1} \cdot (1 - \text{sm}\%_{0,1}) - \text{mc}_{0,1}) \cdot (1 - \text{vac}\%_{0,1})$$

In the second year, the support measures no longer have any effect, and the owner then receives an income based on the net rental value increased by rent indexation and reduced by management costs, adjusted for the vacancy rate:

$$(3) \text{ noi}_{1,2} = (\text{nrv}_{1,2} \cdot (1 + \text{ri}\%_{1,2}) - \text{mc}_{1,2}) \cdot (1 - \text{vac}\%_{1,2})$$

In the third year, the support measures no longer have any effect, and the landlord receives an income based on the net rental value increased by rent indexation and reduced by management costs, adjusted for the vacancy rate:

$$(4) \text{ noi}_{2,3} = (\text{nrv}_{2,3} \cdot (1 + \text{ri}\%_{2,3}) - \text{mc}_{2,3}) \cdot (1 - \text{vac}\%_{2,3})$$

### Taking vacancy rate into account

In order to study the impact of vacancy rate, the following simplifying assumptions are made:

- **no support measures ( $\text{sm}\% = 0$ )**
- **no rent indexation ( $\text{ri}\% = 0$ )**
- **no management costs ( $\text{mc}\% = 0$ )**

Thus, the net rental income (*noi*) over the firm term of the lease in equations (2) to (4) can be written as:

$$(5) \text{ noi}_{0,1} = \text{nrv}_{0,1} \cdot (1 - \text{vac}\%_{0,1}) = \text{nrv}_{0,1} \cdot \text{occ}\%_{0,1}$$

$$(6) \text{ noi}_{1,2} = \text{nrv}_{1,2} \cdot (1 - \text{vac}\%_{1,2}) = \text{nrv}_{0,1} \cdot (1 - \text{vac}\%_{1,2}) = \text{nrv}_{0,1} \cdot \text{occ}\%_{1,2}$$

$$(7) \text{ noi}_{2,3} = \text{nrv}_{2,3} \cdot (1 - \text{vac}\%_{2,3}) = \text{nrv}_{0,1} \cdot (1 - \text{vac}\%_{2,3}) = \text{nrv}_{0,1} \cdot \text{occ}\%_{2,3}$$

with:  $\text{occ}\%$  : occupancy rate :  $\text{occ}\% = (1 - \text{vac}\%)$

And so the growth rate of net rental income (*noi%*) is written:

$$(8) (1 + \text{noi}\%_{1,2}) = \frac{\text{noi}_{1,2}}{\text{noi}_{0,1}} = \frac{\text{nrv}_{0,1} \cdot (1 - \text{vac}\%_{1,2})}{\text{nrv}_{0,1} \cdot (1 - \text{vac}\%_{0,1})} = \frac{(1 - \text{vac}\%_{1,2})}{(1 - \text{vac}\%_{0,1})} = \frac{\text{occ}\%_{1,2}}{\text{occ}\%_{0,1}}$$

$$(9) (1 + \text{noi}\%_{2,3}) = \frac{\text{noi}_{2,3}}{\text{noi}_{1,2}} = \frac{\text{nrv}_{0,1} \cdot (1 - \text{vac}\%_{2,3})}{\text{nrv}_{0,1} \cdot (1 - \text{vac}\%_{1,2})} = \frac{(1 - \text{vac}\%_{2,3})}{(1 - \text{vac}\%_{1,2})} = \frac{\text{occ}\%_{2,3}}{\text{occ}\%_{1,2}}$$

In the general case we find:

$$(10) \leftrightarrow \text{noi}\%_{t,t+1} = \frac{(1 - \text{vac}\%_{t,t+1})}{(1 - \text{vac}\%_{t-1,t})} - 1 = \frac{\text{occ}\%_{t,t+1}}{\text{occ}\%_{t-1,t}} - 1$$

**Under simplifying assumptions, net income is equal to rent less the impact of the vacancy rate (occupancy rate) and the growth rate of net income is directly linked to the growth rate of the occupancy rate.**

This is perfectly normal, given the simplifying assumption that there are no support measures, no rent variations and no management costs.

The next Chronicle will look at the simultaneous impact of the different elements (indexation, support measures, management costs and vacancy) on the growth rate of net operating income.

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These chronicles are linked to my activity at the IEIF, a Paris based think tank on real estate where I conduct research into the modelling of major property variables. For those less familiar with property analysis, these chronicles can be a source of information and a knowledge base. For experts in the field, their purpose is to launch discussions and exchanges on the various subjects I cover. Some of the chronicles will be based on known and familiar elements, while others will deal with research elements and present some of the results of my work.