REAL ESTATE THEORY AND MODELLING

INSTITUT DE L'ÉPARGNE IMMOBILIÈRE & FONCIÈRE

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CHRONICLE N°26

Income return: the use of "deflated OAT" in the 2000s

Let's start by defining "deflated OAT." This is the yield on 10-year French government bonds, our risk-free rate, adjusted for long-term inflation.

$$(1)\ OATd = rfr - inf \leftrightarrow OATd = OAT - inf$$

with:
OATd : 10-year OAT deflated: the French risk-free rate adjusted for inflation
rfr : risk-free return
inf : the average long-term inflation rate
OAT : 10-year OAT: the French risk-free rate

This raises two questions: why use the "deflated OAT" rather than the OAT, and why use the average inflation rate, known as the long-term rate, to adjust the OAT?

Why use deflated OAT?

In order to compare the OAT (risk-free rate) and real estate income return more accurately, it should be noted that the OAT distributes a constant income each year for 10 years, whereas real estate is an indexed asset, meaning that its distributed income changes year on year in line with its indexation rate (assumed to be close to the inflation rate).

In the case of fixed-rate OATs (if the bond is held from issue to maturity), the total return is equal to the nominal rate due to the absence of income changes during the holding period (the coupon remains constant during the period) and the absence of capital gains on resale (at maturity, the resale price is equal to the purchase price).

$$(2)\ OAT = tr(OAT)$$

with:
OAT : the nominal rate of the OAT at issue
tr(OAT) : the annualised total return on 10-year OATs

In the case of real estate, the total return is very different from the initial return for at least two key reasons: real estate income is indexed, and real estate realises capital gains and losses on resale. To simplify the argument, we will not discuss potential capital gains or losses here. We will focus solely on the impact of indexation, which brings us back to the Gordon-Shapiro model studied in our **Chronicles 6 to 9**.

Chronicle 6 tells us that under strong assumptions discussed in **Chronicles 7 to 9**, we find:

$$(3)\ ir = r - g \leftrightarrow ir = tr(re) - inf \leftrightarrow tr(re) = ir + inf$$

with:	*ir*	: initial income return
	r	: the discount rate
	g	: the constant growth rate of income
	tr(re)	: expected total return on real estate = r
	inf	: long-term average inflation = g

Consequently, when I compare income return on property directly with the nominal OAT rate, I am not comparing like with like.

To compare the total return on property with the total return on OATs, I must (at a minimum) add the long-term inflation rate to the income return on property. Similarly, if I subtract long-term inflation from the total return on OATs, I can compare it directly to the income return on property.

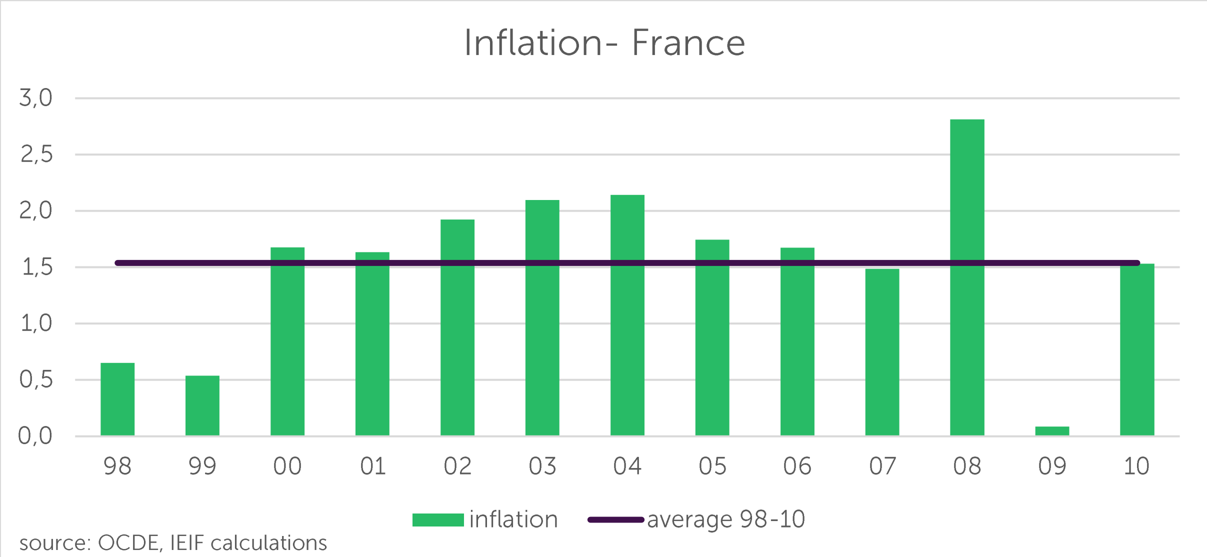
The difference between the income return on property and the deflated OAT yield is therefore much more representative of the risk compensation that actually exists between risk-free bonds and property.

Why use the average inflation rate?

As we can see in equation (3), inflation is used as a proxy for the assumed constant growth rate of rental income. In France, different real estate products are indexed to various indices (ICC, ILAT, ILC, IRL, etc.) based in particular on inflation. For the sake of simplicity, we therefore used inflation as a proxy.

Next, we had to use the long-term average inflation rate rather than the current inflation rate. Due to its specific characteristics (limited information, high transaction costs, 3/6/9 leases, etc.), property analysis overwhelmingly uses a 6-year or longer time frame. Under these conditions, it is unlikely that over a 6-year or longer horizon, the effective average annual inflation rate will be very far from its long-term average.

Chart 1



Given that inflation at that time generally ranged between 0.5% and 2.5%, with an average of around 1.5%, it was reasonable to assume that the average rent indexation rate was 1.5% (Chart 1).

The Chronicles on net income analysis (**Chronicles 10 to 22**) show how much of a simplifying assumption this is.

Consequences for comparative analysis of property versus risk-free rate?

Since we subtract a constant (1.5%) from the risk-free rate (Chart 2), this is automatically added to the yield gap (Chart 3).

Chart 2

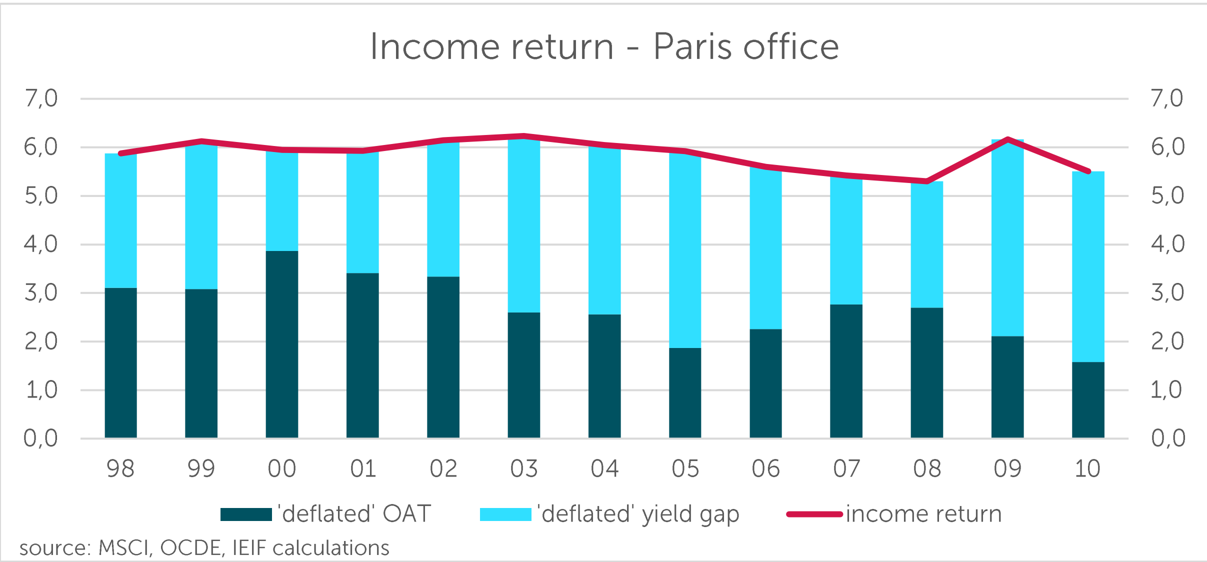
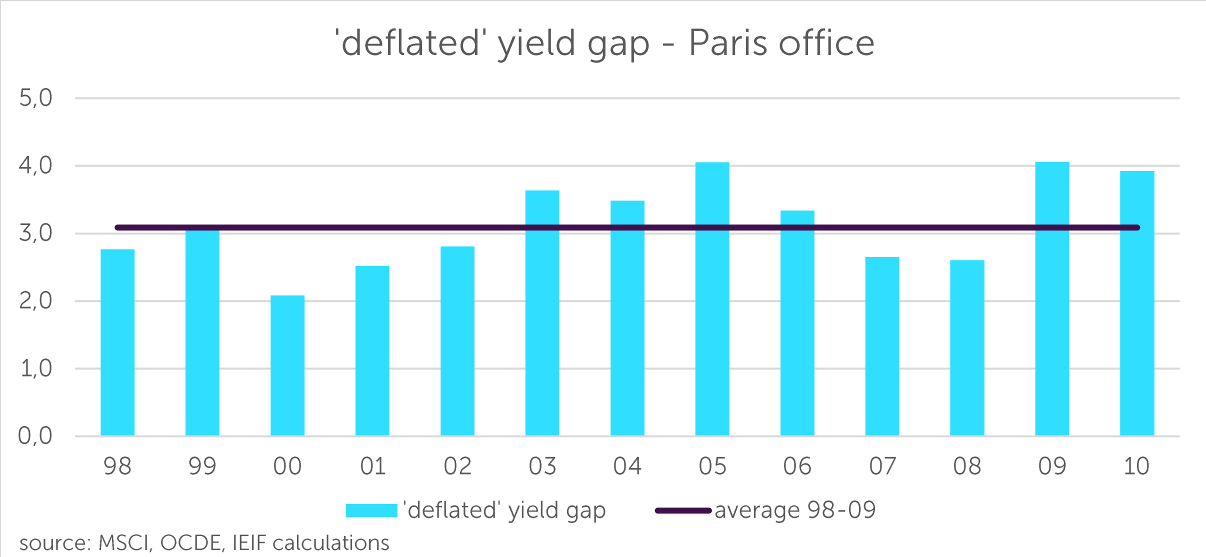


Chart 3

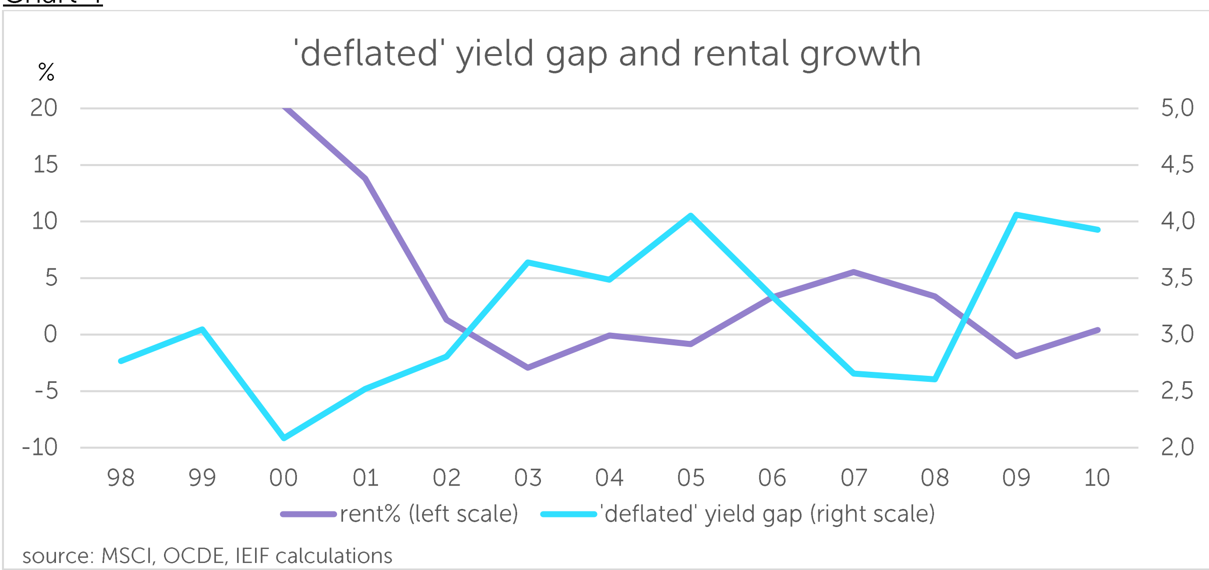


This gives us a much more accurate picture of the difference in total returns between bonds (unindexed) and property (indexed). Indexation is taken into account here in the analysis of the relative returns of these two investments. One crucial element is still missing, namely the capital return resulting from the impact of growth rates in net income return and net operating income. (**Chronicle 9**).

Thus, in this specific context, the average 'deflated' yield gap is 300 basis points, compared with only 150 basis points for the "simple" yield gap. This 'deflated' yield gap is much more representative of the level of compensation for real estate risk.

However, it does not change the economic analysis of the yield gap (Chart 4), which should be compared with the same analysis carried out using the 'simple' yield gap (**Chronicle 25**).

Chart 4



It also does not significantly alter the results of econometric modelling, apart from the level of the constant. Compare with the results of modelling the 'simple' yield gap (**Chronicle 25**).

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For those interested, the econometric illustration of this simple little model gives the following results:

Let us consider the equation:

$$(4)\ ygd = a1\,.rent\% + cst$$

with: *ygd* : 'deflated' yield gap
a1 : the coefficient estimated by Ordinary Least Squares (OLS)
rent% : the rental growth
cst : constant assumed to be equal to the average yield gap

Variables	Coefficient	t-Statistic	Prob.
rent%	-0.076	-4.12	0.0033
cst	2.904	19.20	0.0000

Adjusted R^2: 0.64 Durbin-Watson: 1.88

The adjusted R^2 of 0.64 indicates that the model "explains" 64% of the dynamics of the yield gap.
The Durbin-Watson (DW) statistic of 1.88 suggests that the results are credible (probable absence of autocorrelation of the residuals, with the DW being greater than 1.7 and less than 2.3).
The t-statistic and the associated probability indicate whether the variable in question has a real impact, i.e., whether the associated coefficient is significantly different from zero.
This is the case here: the coefficient a1, associated with rent, whose value is -0.076, has a probability of being zero (and therefore of having no impact on the yield gap) of 0.33%, which is a completely negligible probability.
This is also the case for the constant (cst), whose coefficient is 2.904 with a probability of being zero of 0%.

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Ultimately, using the 'deflated' OAT provides a better understanding of the actual level of risk compensation than simply using the OAT.

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.