REAL ESTATE THEORY AND MODELLING

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Income return: naive or rational expectations?

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

In **Chronicle 26**, we examined why it was more appropriate to use the deflated OAT rather than the nominal OAT when analysing net income return.

Furthermore, we will refer to the difference between the net income return and the deflated risk-free rate as the deflated yield gap; see **Chronicles 26**:

$$(2)\ nir = OATd + ygd \leftrightarrow ygd = nir - OATd$$

with:
- *nir* : net income return
- *OATd* : 10-year OAT deflated: the French risk-free rate adjusted for inflation
- *ygd* : deflated yield gap

Finally, we define the yield gap deflated and adjusted as the deflated yield gap adjusted for the impact of price shocks (**see Chronicle 31**):

$$(3)\ ygda = nir - OATda = ygd - adj$$

with:
- *ygda* : yield gap deflated adjusted
- *OATda* : 10-year OAT deflated adjusted
- *adj* : the adjustment related to price shocks

Naive Expectations vs. Rational Expectations: Definitions

Expectations based exclusively on past data which simply extrapolate the average are generally referred to as naive expectations. Implicitly, this assumes that the past is bound to repeat itself.

This is the framework we have adopted in our recent analyses by assuming that long-term inflation is equal to the past 10-year average of observed inflation, adjusted for price shocks where necessary. Recall that, since **Chronicle 26**, we have used this long-term inflation to approximate the expected average rate of indexation for rents in the coming years: the past is used as an estimator of the future.

$$(4)\ E_t(infN\_LT) = infO\_LT$$

The expected value, at time t, of the naive long-term inflation expectation (*infN_LT*) is equal to the observed long-term inflation rate (*infO_LT*).

Conversely, in economics, rational expectations (regarding long-term inflation: *infRE_LT*) refer to any expectation based on all the information available at time t (I_t). This corresponds to the average of the long-term inflation expectations formed by economic agents ($infE\_LT_a$), who are assumed to be rational and well-informed, considering the information available on that date.

$$(5)\ E_t(infRE\_LT) = E_t(infE\_LT_a|I_t)$$

In practice, the bond market provides an operational measure of these expectations. Indeed, we observe both:

- the yield on 10-year nominal government bonds (OATs),
- and the yield on 10-year inflation-indexed government bonds (OATi), the return on which includes the inflation realised over the period.

Consequently, the spread between the OAT yield and the OATi yield corresponds to investors' estimate of average inflation over the next 10 years. This measure provides a robust approximation of rational inflation expectations.

Naive expectations vs rational expectations: a comparison

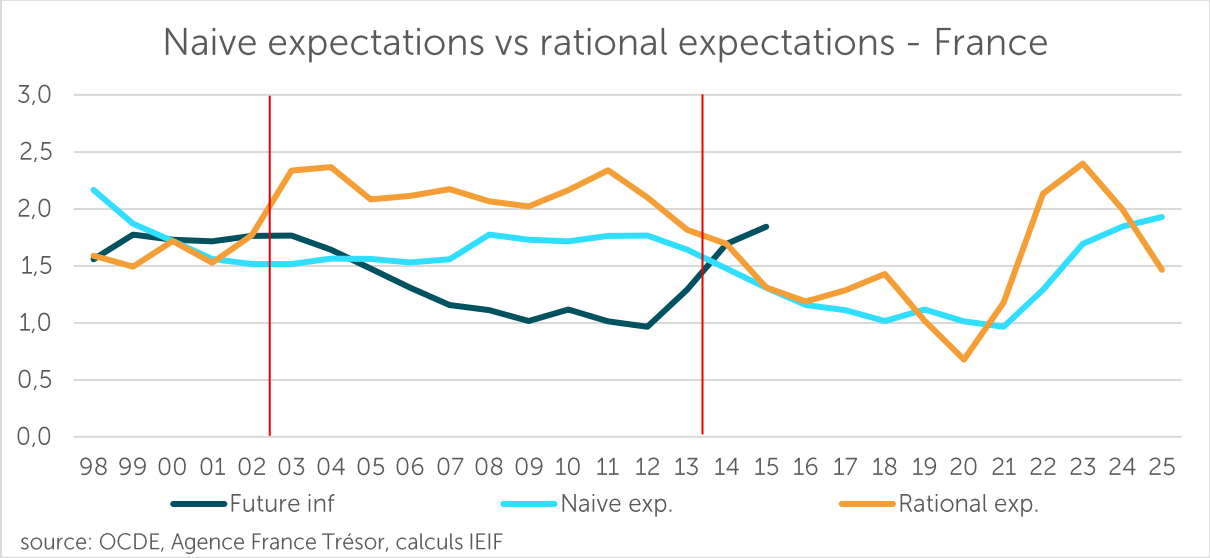
The task now is to assess the relative validity of naive expectations and rational expectations in approximating future inflation—that is, the inflation that will actually occur over the next 10 years.

To this end, we construct a series of average future inflation, observed over 10 years (between t and t+10), which we compare:

- with naive inflation expectations, measured by the average inflation observed over the past 10 years (between t–10 and t);
- rational inflation expectations, i.e. the yield spread between the OAT and the OATi at time t.

Graph 1 shows these three series plotted together. By definition, the 10-year average future inflation series ends in 2015, i.e. ten years before the latest available observation.

Graph 1



It is useful to distinguish between three periods:

- From 1998 to 2002: **the three series produce results that are similar to one another.** However, the starting point for naive expectations in 1988 suggests that the preceding period was probably more favourable to rational expectations.

- From 2003 to 2013: both naive and rational expectations significantly overestimated future inflation. By their very definition, the retrospective nature of naive expectations meant they were unable to anticipate a continuous and marked decline in inflation. However, over this period, **naive expectations proved to be more accurate than rational expectations.** Indeed, between 2003 and 2012, the implied inflation expectations contained in the yield spread between OATs and OATis were consistently above 2%, whereas actual inflation mostly stood between 1% and 1.5%.

- Since 2014: a direct comparison between expectations and realised inflation is no longer possible. However, the dynamics of expectations remain comparable. The two approaches produce broadly similar results, with the exception of 2022 and 2023, which were marked by an inflationary shock that significantly affected rational expectations.

Finally, whilst the adjustment of naive expectations for episodes of extreme price rises has proved relevant, it might be appropriate to apply a similar treatment to the future inflation series, in order to improve the comparability of the approaches.

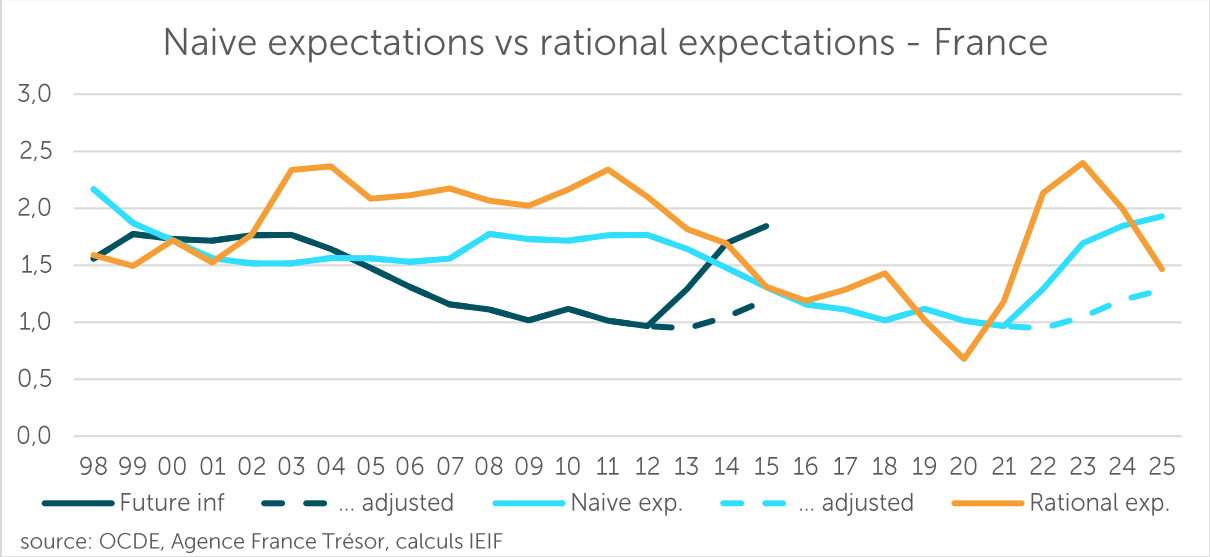
Naive expectations vs rational expectations: incorporating price shocks

Incorporating price shocks (shown as a dotted line in Graph 2) provides at least two additional insights:

- Over the 2014–2015 period: future 10-year inflation, once adjusted for price shocks, is likely to be below 1.5%, contrary to what the unadjusted series suggested, which converged towards 2%. In other words, the underlying inflationary momentum appears weaker than the raw data would suggest.

- At the end of the period (2024–2025): the unadjusted curves crossed. Rational expectations initially overreacted to the inflationary shock before normalising, whilst naive expectations, due to their inertia, incorporated this shock into long-term inflation with a delay. In contrast, the adjusted series tells a very different story: it becomes consistent with that of rational expectations and converges towards a long-term inflation rate of just under 1.5%.

Graph 2



Ultimately, it seems difficult to definitively distinguish between the assumptions of naive expectations and those of rational expectations regarding inflation. Both approaches have their limitations:

- Naive expectations, by their very nature, are unable to anticipate changes in the inflationary regime, whether upward or downward. On the other hand, they offer a degree of stability and have the advantage of being simple and directly observable.

- Conversely, rational expectations are, in theory, capable of incorporating changes in trend. However, it must be noted that between 2003 and 2014, they were affected by a systematic and significant bias (often exceeding 100 basis points), which was more pronounced than that observed for naive expectations. More recently, they have also shown a high sensitivity to price shocks, resulting in high volatility, unlike adjusted naive expectations.

None of these approaches therefore stands out as fully satisfactory. In this context, a joint and systematic analysis of the three measures — naive expectations, adjusted naive expectations and rational expectations — appears to be the most robust strategy.

Taking only these three indicators into account, if one were nevertheless to formulate an estimate of current long-term inflation, the point of convergence between rational expectations and adjusted naive expectations provides a relevant benchmark, namely a level close to 1.5%.

Nevertheless, the macroeconomic environment remains particularly uncertain. As discussed in **Chronicle 31**, it is currently difficult to favour one inflation trajectory with certainty, in a context where structurally deflationary forces—less powerful than in the 2010s—coexist with an increased probability of repeated price-hike shocks.

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.