



IFC-National Bank of Belgium Workshop on "*Data needs and Statistics compilation for macroprudential analysis*"

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## Evaluating risks in the French office market with new sources of data on commercial property prices<sup>1</sup>

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<sup>1</sup> This paper was prepared for the meeting. The views expressed are those of the author and do not necessarily reflect the views of the BIS, the IFC or the central banks and other institutions represented at the meeting.

# Evaluating risks in the French office market with new sources of data on commercial property prices

Edwige Burdeau<sup>1</sup>

## Abstract

As the link between real estate and credit cycles has been emphasized in the literature, following property prices appears crucial for financial stability monitoring. Nevertheless, property markets are heterogeneous, notably in terms of property uses. While the residential market is frequently analyzed, the commercial property market is rarely studied empirically due to the lack of data. However, in France, commercial property prices, especially office prices, raised concerns over the last few years; the commercial property market appeared bullish while other macroeconomic indicators were less buoyant. In this context, we take advantage of a new source of historical data on commercial property prices with a breakdown by country and business sector. These indicators are computed for the ECB by the private data provider *Investment Property Databank* and made available to euro area national central banks. As historical series on office market statistics are not always available, a database on office market indicators gathering information from publications of private entities was also built. From these market data enriched with macroeconomic indicators, the dynamic relationships between office property prices and its determining factors are modeled and a measure of overvaluation of office prices is derived. According to this measure, office prices were overvalued in 2008-2009 and from 2011 to 2016. Finally, the estimated measure of price overvaluation is used to compute a recession indicator for France which is shown to have predictive power.

Keywords: office prices, office market determinants, cointegrated vector autoregressive model, Granger representation, measure of price overvaluation, crisis indicator

JEL classification: R33, E32, E37

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## Introduction

It is generally accepted that banking crises can be in many cases associated with an underlying real estate bubble. In this context, monitoring real estate crises reveal insights into causes of banking crises. Indeed, commercial real estate market is highly pro-cyclical. During an upswing period, commercial real estate lenders ease their lending standards such as loan-to-value ratio, increasing CRE lending. A higher demand for CRE properties pushes property prices upward. In this context, constructions of new buildings of commercial properties become profitable. Nevertheless, due to lags in constructions of several years, supply is inelastic and prices are not driven down. During a downturn period, the demand in physical space decreases, a larger share of commercial real estate buildings remains vacant and some commercial real estate investors no longer pay back their debt. A significant part of CRE loans turns out to be non-performing; property prices fall, triggering or worsening a banking crisis. In the past, several real estate crises, both in the residential and commercial segments of the real estate sector, triggered banking crises, notably in United Kingdom, France and Sweden during the 1990s and more recently, in Ireland, in 2007.

From these empirical facts, it is necessary, before setting macro prudential instruments, to identify a set of key indicators on both financial and physical views of the commercial real estate market calculated and monitored on a regular basis. As highlighted by the European Systemic Risk Board (ESRB), this objective is far from being achieved. Firstly, there is no common definition of the scope delineated by commercial real estate markets, especially whether commercial real estate properties encompass all income-producing properties<sup>2</sup>. Secondly, indicators actually available are scarce, generally published by private entities, and covering only on a limited scope of the market. Besides, the methodology underlying the calculation of indicators is not always made available. In October 2016, the ESRB<sup>3</sup> published a recommendation on closing real estate data gaps enumerating avenues of progress in terms of definitions and data collection on real estate markets. In particular, the ESRB highlighted a strong need to build a consistent data framework to gather information on both financial and physical real estate markets. In this document, an exhaustive list of indicators of the physical market and the financial system, such as credit exposures, lending standards, investment features, is given as well as the level of granularity needed to ensure a broad coverage of the market.

Considering this ongoing work at the European level, this article introduces the set of indicators already identified for monitoring French commercial property markets, especially on the physical segment of the market. In our case, few indicators are published by public institutions; in this context, private entities especially real estate agencies remain the main source of information. Since 2013, data from the major real estate agencies in France, BNP Paribas Real Estate, CBRE, Jones Lang LaSalle, have been retrieved to build time series on the physical market. Nevertheless, as emphasized by the ESRB, in some cases, data from private entities cover only a part of commercial property markets, such as the office sector in the

<sup>2</sup> ESRB Report on commercial real estate and financial stability in the EU – December 2015

<sup>3</sup> Recommendation of the European Systemic Risk Board of 31 October 2016 on closing real estate data gaps (ESRB/2016/14)

Paris region. Besides, we take advantage of a partnership between the European Central Bank (ECB) and the data provider Investment Property Databank (IPD) to get time series of French commercial property price indexes breakdown by sectors, such as the office sector. From this data collection exercise, evolutions of office prices can be analysed considering its key market determinants. As evolutions of commercial property prices convey early information on potential overheating of the financial sector; identifying potential overvaluation of commercial property prices appears crucial. In this context, a measure of the overvaluation is estimated by relying on an econometric approach. According to this measure, office prices were overvalued in 2008-2009 and from 2011 to 2016. The value added of this indicator is assessed by evaluating its predictive power of recession periods identified by the OECD.

## Recent evolutions on French commercial property markets

### A stocktaking exercise to identify potential sources of data on commercial property market

French institutions devoted substantial efforts to produce housing market indicators. As an example, French quarterly residential property price index is recognized for its high-quality, timeliness and historical depth. Nevertheless, these efforts do not yet cover commercial property markets. Indeed, these markets are highly heterogeneous, gathering diverse types of properties, from offices, high street retail, shopping centres, retail parks to specific properties such as industrial spaces and hotels. Besides, these properties are sparsely exchanged, these markets are generally considered illiquid. At this stage, French authorities only publish monthly building permits and construction starts breakdown by sector.

In this context, we dedicated our time to identify appropriate indicators published by private entities to store historical data on commercial property markets. In France, every quarter, several commercial real estate agencies such as BNP Paribas RE, CBRE, or Jones Lang LaSalle, publish a set of commercial property market indicators on both end-user and investment markets. Besides, for the Paris region, an economic interest group, Immostat, was formed in 2001 by the main real estate agencies, to share their data to cover a larger part of the commercial property markets to build robust market indicators. In practice, commercial properties are both physical spaces consumed by companies and investment products bought by entities to generate profits. As disequilibrium can occur in either market, gathering information on both markets is crucial. From the end-user side, measures on both volume and price are made available on a quarterly basis. Office take-up and vacancy rates are generally used as the volume measure of the demand on the end-user market, while average rents is the price measure on this market. Nevertheless, these indicators are generally made available only for the Paris region and the office sector. For the investment side, aggregate investment breakdown by sector, published every quarter, covers the whole French area. Price information on the investment market are also estimated by commercial real estate agencies, but mainly through measures of profitability such as a yield measure for each sector and certain type of properties, generally *prime* transactions. Recently, Immostat also made available the average price of investments, but only for the

office sector and the Paris region. Indeed, information on prices are sparse and not representative of the different segments of the commercial property market.

In parallel with its exercise, the ESCB Working Group on General Economic Statistics (WGGES) launched in 2010 a stocktaking exercise on commercial property markets to identify potential sources of commercial property prices in each member state ultimately to design a commercial property price index for the euro area market. At that time, several countries such as Germany, Italy and Denmark already computed or collected price indexes on commercial property markets, while other countries such as France and Spain were not able to provide price indexes for these markets. To fill these data gaps, a partnership with the data provider MSCI/IPD was set up to obtain price indicators for member states for which no price index was available. For France, several indexes are made available on a quarterly basis. Appraisal values breakdown by sector, available on a bi-annual basis from other private data providers, are interpolated on a quarterly basis and made available each quarter. Nevertheless, price indexes built on appraisal values are frequently criticized, because of deceiving low volatility and difficulties to capture turning points. Therefore, for each sector, a semi-hedonic price index relying on both transaction prices and appraisal values is calculated every quarter. In fact, IPD gathers, from commercial real estate agencies, granular data, especially transaction prices, appraisal values and distinctive features of each property, accounting for around 40% of the French commercial property markets. The econometric methodology used to develop French semi-hedonic quarterly price indexes was primarily defined for the MSCI/IPD UK commercial property indexes from a partnership between MSCI/IPD and the University of Aberdeen<sup>4</sup>. These indicators, made available every quarter by the ECB to euro area member states, are retrieved to monitor French price developments on commercial property markets.

Gathering information from commercial real estate agencies, Immostat and MSCI/IPD, a reasonable set of indicators on both the end-user and the investment markets is gathered every quarter to monitor commercial property markets. Nevertheless, at this stage, some indicators only cover the office sector in the Paris region.

### A confirmed recovery on both end-user and investment markets

Quarterly amounts of investments on commercial property markets are generally identified as the best proxy of the demand on the investment market and vacancy rates are privileged to measure the demand on the end-user market. Nevertheless, while indicators on the investment part of the market are available for France, those for the end-user market cover generally only the office sector for the Greater Paris region. In fact, investments in the Greater Paris region and in the office sector account for respectively around 75% and 60% of this aggregate.

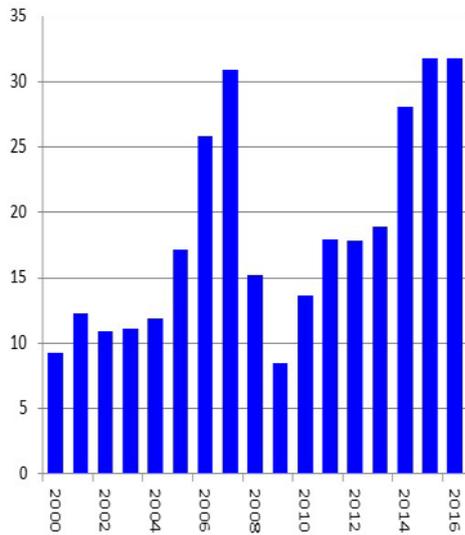
From 2000 to 2016, different market periods can be identified. In the early 2000s, investments in commercial property markets remained stable. Meanwhile, the end-user market was hit by the burst of the dotcom bubble, the office vacancy rate in the Paris region highly increased. From 2003 to 2007, both end-user and investment markets were in an upswing phase of their cycle: aggregate investments

<sup>4</sup> Devaney & Diaz (2011)

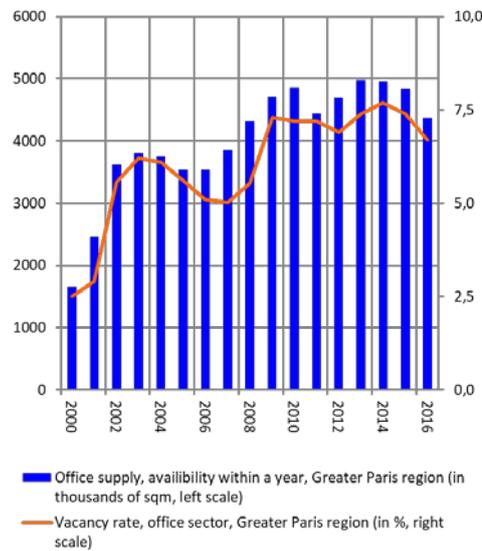
increased to reach a record level in 2007 while vacancy rate constantly decreased over this period. This flourishing period ended in 2008: the burst of the subprime crisis hit both markets. Nevertheless, the investment market displayed some signs of recovery as of 2010 while the end-user market remained sluggish. The investment market was recovering at a strong pace, and reached its highest level, 32 bn €, in 2015. Since mid-2015, the state of the end-user market has been improving; the office vacancy rate has been declining. Office space available for lease has reduced in some geographical areas such as the central business district of Paris and the business quarter La Défense.

**Figure 1.** Examples of key indicators on end-user and investor commercial real estate markets actually available

Aggregate investments, all sectors, France, in bn€



Office supply available within a year in thousands of sqm, vacancy rate in %, Greater Paris region



Sources: BNP Paribas Real Estate.

### For all property sectors, prices have been rising since 2014

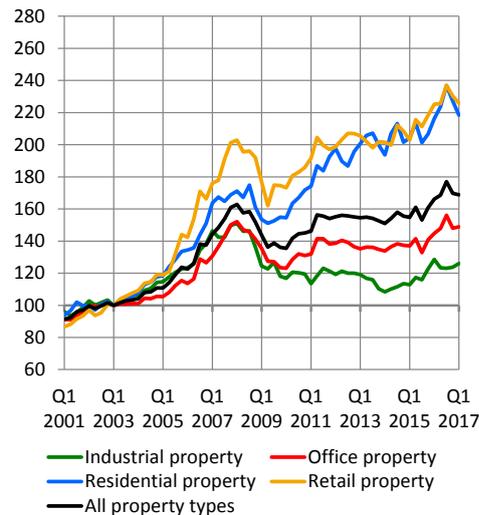
In France, property price index for the residential sector produced by the French national institute of statistics is well-known for its high quality. Nevertheless, the same methodology cannot be applied for commercial property markets: these markets are highly heterogeneous and illiquid. In this context, transaction data gathering information on prices and property characteristics cannot be the only source of information to build this type of indexes. At this stage, we rely on quarterly semi-hedonic MSCI/IPD price indexes built with both appraisal values and transaction prices and available as of Q1 1999.

Evolutions of French commercial property price indexes share some similarities with those observed for the French residential real estate sector. From the end of the 1990s to 2008, commercial property prices doubled. In 2009, commercial property prices fell sharply on all property sectors but began to recover as of 2010. Unlike residential property prices, commercial ones remained quite stable from 2011 to 2014. Property prices increased again in all sectors from 2014 to 2016, and remained relatively stable in 2016. Recent evolutions of French commercial property

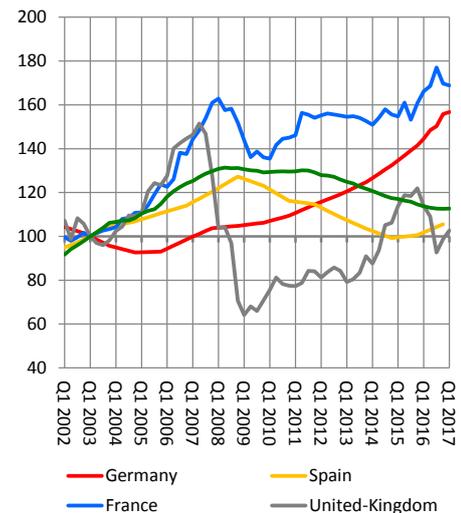
prices are singular compared to those of other European countries. In particular, French commercial property prices are higher in 2017 than their pre-crisis levels. This particular feature is shared only with German commercial property prices. Nevertheless, for this specific country, prices remained flat during the 2000s.

**Figure 2.** French commercial property price indicators by sector and commercial property price indicators by country, index base 100 in 2003

French commercial property price indicators, by sector, index base 100 in 2003



Commercial property price indicators, by country, index base 100 in 2003



Sources: ECB from MSCI/IPD, Bulwiengesa and vdp for Germany, Banca d'Italia for Italy.

In this context, monitoring French commercial property prices is crucial especially to assess the probability of a commercial real estate bubble. At this stage, only the office sector is reasonably covered by indicators at our disposal. Indeed, the econometric evaluation of a possible overvaluation of commercial property prices can be carried out only for the office sector.

## A model of market interactions to evaluate risks on the office sector

In France, evolutions of the office sector, for which we have a reasonable set of indicators, raised concerns as of 2010. The end-user market remained sluggish, while the investment market recovered in 2010, boosting office prices. From this diverging path taken by office markets, it appeared crucial to evaluate whether the investment market was not in an overheating state, by assessing whether office prices were overvalued. For this purpose, we defined a model combining information from both end-user and investment markets. While there are few empirical papers on commercial property markets, several theoretical papers describe how end-user and investor office markets interact. Among them, DiPasquale & Wheaton (1992) and Wheaton, Torto & Evans (1997) proposed a general framework describing interactions between these markets in both the short

and long run. The end-user and investment markets interact on these time horizons through levels of rents and new constructions of office space.

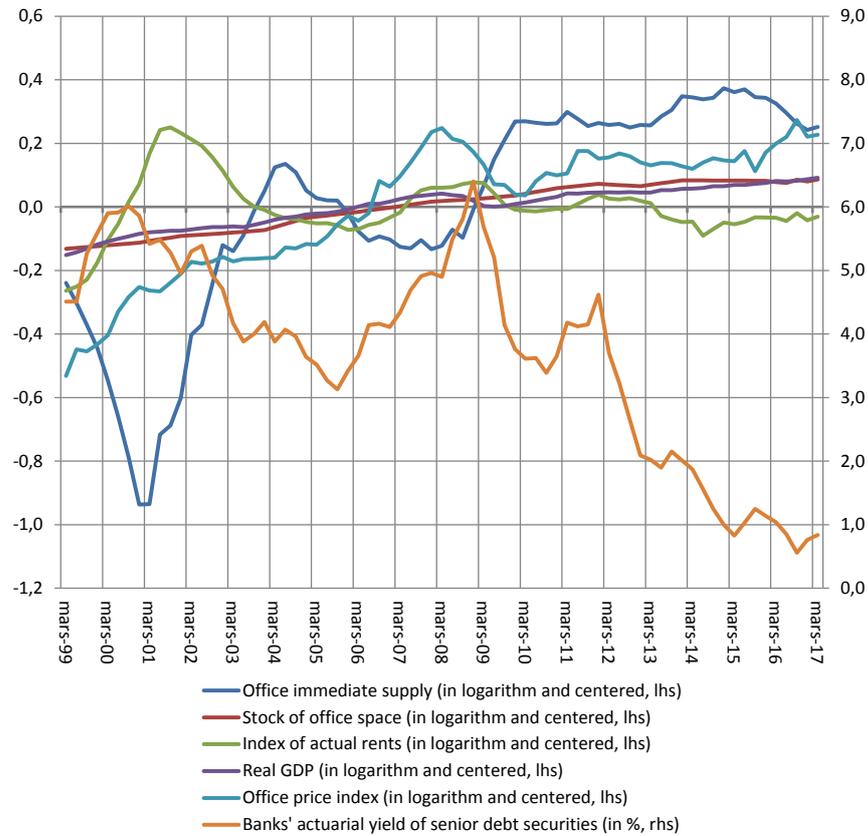
In the short run, stock of office space is inelastic; levels of rents strongly depend on general economic conditions such as the level of employment, companies' demand of office space and the office immediate supply measuring excess supply on the market. Property prices depend on the demand on the investment market which is strongly linked to the expected profitability of the office market. The profitability depends positively on future income flows relying mostly on the level of rents and the vacancy rate, and negatively on the level of yields on other markets such as debt securities market. Depending on the level of property prices, new constructions are initiated if projects are profitable; in the long run, new constructions drive down rents and prices on the long run.

### Our empirical approach to describe these interactions

Previously described interactions between office prices and its key determinants can be well-described with a co-integrated vector autoregressive model. In this model, each variable, and especially the value of the office price index, is supposed to depend on its previous values and previous values of its key determinants. Besides, this model is also used in an innovative way to propose a measure of price overvaluation. For that purpose, we rely on the Granger's decomposition from which each variable considered in the model can be broken down into a "cycle" component and a "trend" component. The trend component is supposed to represent the long run equilibrium of the variable while the cycle component accounts for the temporary deviation from this equilibrium. This method has some comparative advantages compared to other well-known methods such as the Hodrick-Prescott filter, in our case, the decomposition will be less subject to revisions especially at the end of the period.

This model is estimated on a restricted time set from Q1 2003 to Q1 2017, even though we can build time series started not later than 1999. Considering the complete set would have significantly attenuated causal links between our variables, as the French market observed a crisis in the beginning of the 2000s. The evolutions of the logarithm of the office price index is explained by five determinants represented on figure 3: the logarithm of the real GDP, the logarithm of the index of actual rents in Paris region, the logarithm of the office immediate supply in Paris region, the logarithm of the stock of office space in Paris region and the banks' actuarial yield of senior debt securities. Index of actual rents is favoured to the detriment of index of facial rents: unlike actual rents, measures of facial rents are published every quarter; nevertheless, this measure does not include incentives reducing headline rents. We estimated the index of actual rents from the index of facial rents and incentive rate made available by real estate agencies. Furthermore, the measure of the stock of office space is estimated by the real estate observatory of the Paris region, but this information is not publicly made available. In practice, this indicator is approached by the ratio between the office immediate supply and the vacancy rate, both information are published on a quarterly basis by BNP Paribas Real Estate.

**Figure 3.** Evolutions of each dependent variables included in the model



Sources: Immostat (actual rents), BNP Paribas RE (Office immediate supply and estimations of stock office space), INSEE (Real GDP), ECB from MSCI/IPD (Office price index), Datastream (Actuarial yield).

### Description of the model considered

As all indicators considered in this model are non-stationary ones, a cointegrated vector autoregressive model is implemented. This type of model relies on variables in first differences while preserving the information carried by variables in level such as common trends between these variables. The estimated model is a cointegrated vector autoregressive model of order 2 with 2 cointegration relationships. The short-term equation of the model can be expressed as:

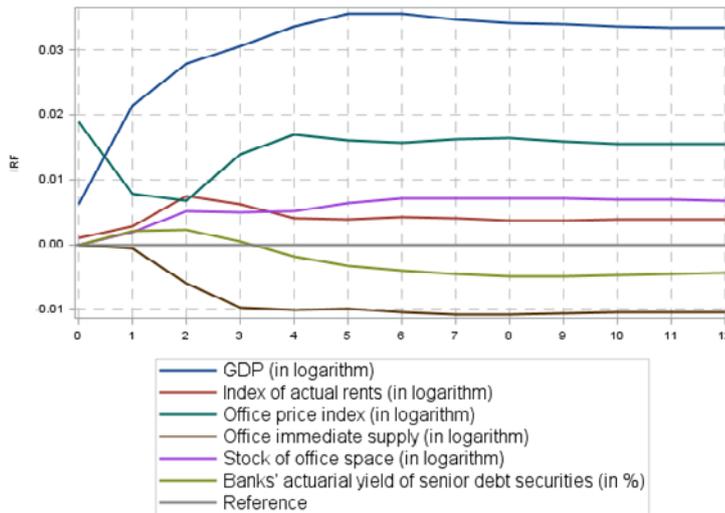
$$\Delta Y_t = c + \alpha \beta^T Y_{t-1} + \Phi_1 \Delta Y_{t-1} + u_t \quad (1)$$

Where  $Y_t$  accounts for the vector of dependent variables at time  $t$ :  $Y_t = (\log\_GDP_t, \log\_Rent_t, \log\_Price_t, \log\_Office\_supply_t, \log\_Stock\_Office\_Space_t, Yield_t)$ ,  $\Delta Y_t$  its first differences,  $u_t$  the residual terms, and  $\beta^T Y_{t-1}$  the co-integration relationships representing "the long run relationships of the model". A further hypothesis on a linear trend in level is added to the model implying a constant term  $c$  in the short-term equation of the model.

To analyse interactions between dependent variables identified by the model, orthogonalized impulse response functions, accounting for the impact of an orthogonalized shock of one variable on other variables, are calculated. Beforehand, dependent variables must be ordered by relying on Granger's causality tests. The

order chosen is to consider first the logarithm of the real GDP followed by the logarithm of actual rents, the logarithm of office prices, the logarithm of office supply, the logarithm of stock office space and the banks' actuarial yield of senior debt securities as the last variable. This structure implies that a shock on yield does not have an immediate impact on any other variables, while a shock on GDP immediately impacts all other variables.

**Figure 4.** Variations in percentages over quarters of office prices after a shock at quarter 0 of one standard deviation of each variable



Amplitude of the standard deviation of the shock on each variable

Table 1

Variable	Value of the standard deviation
GDP	0.3%
Index of actual rents	1.1%
Office price index	1.9%
Office immediate supply	2.5%
Stock of office space	0.2%
Bank's actuarial yield of senior debt securities	0.25%

As expected, a positive orthogonalized shock on the GDP or on the index of actual rents positively impact office prices, while a positive shock on office immediate supply or on the actuarial yield negatively impact office prices. Nevertheless, a positive shock on the stock of office supply positively impact office prices; this last result is hardly interpretable.

### The overvaluation measure of office prices

Co-integrated autoregressive models split the estimation into short term equations and long terms ones. The Granger's representation consists in rewriting a co-integrated auto-regressive process such as the one described by the formula (1) in a synthetic way gathering both short and long term impacts of other variables on the

variable of interest. This representation was demonstrated by Engle & Granger (1987) and Johansen (1991) while the exact formula was obtained by Hansen (2005). Levels of dependent variables are expressed as the sum of a trend components and a cycle component:

$$Y_t = C \sum_{s=1}^t u_s + C(L)u_t + \tau(t) + \bar{Y}_0 \quad (2)$$

Where  $\bar{Y}_0$  the initial component,  $C \sum_{s=1}^t u_s$  the stochastic trend,  $\tau(t)$  the deterministic trend accounts for the trend component and  $C(L)u_t$  is the cycle component. The matrix C is computed from the matrices  $\alpha$  and  $\beta$  defined in the formula (1) and  $C(L)$  is a lag polynomial depending on the parameters of equation (1). All formulas can be retrieved from Hansen (2005).

The overvaluation measure of office prices can be approached by the cycle component of the office prices equation, i.e. the difference between the observations and the trend component extracted from the model.

In order to assess the robustness of estimated parameters, we run stability tests, in particular the Ploberger's stability test<sup>5</sup>. Estimated parameters appear to be unstable; a breaking point on the parameters of the long-run relationships can be observed in 2013. This instability raises an additional difficulty; which set of parameters should be chosen to model the relationships between dependent variables and estimate the overvaluation measure.

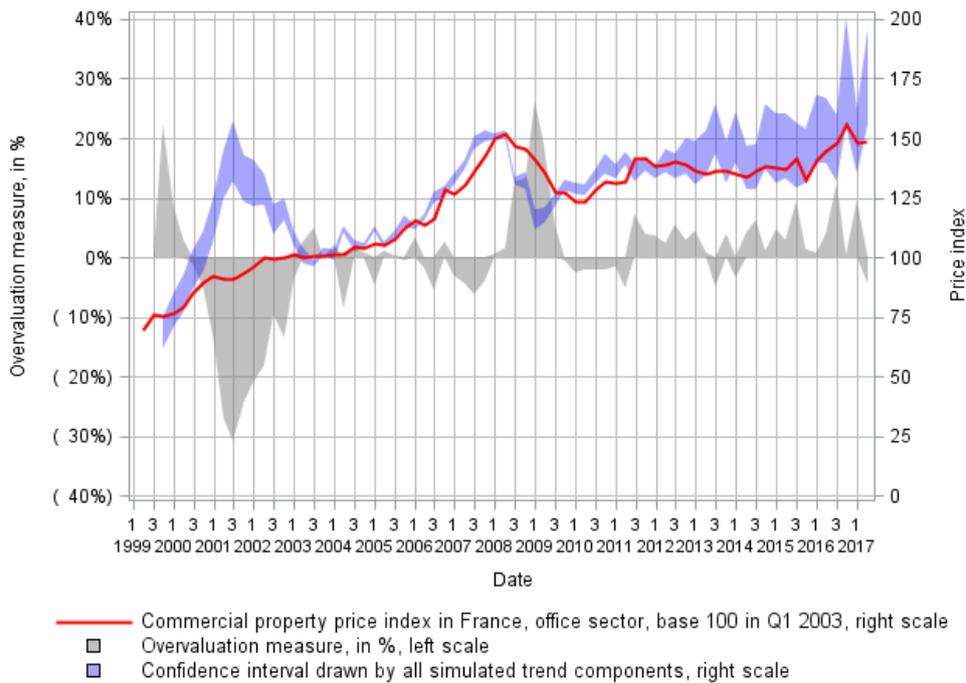
To circumvent this instability issue, we estimate an upper bound of the overvaluation measure. For this purpose, we estimate our model on different samples, firstly on the sample gathering observations from Q1 2003 to Q2 2009, and on the following samples obtained by increasing by an increment of one quarter at the end of the sample, up to Q4 2011, therefore on the samples from Q1 2003-Q2 2009, Q1 2003-Q3 2009, Q1 2003-Q4 2009, ..., to Q1 2003-Q4 2011. We stop at the end of 2011 instead of taking the result from the stability tests at granted by taking the end of 2012. Indeed, the diverging trends between the end-user and investment markets have been observed since 2012.

From each set of estimated parameters, a trend component is simulated over the complete set of observations, i.e. from Q1 1999 to Q1 2017. A confidence interval surrounding all simulated trend components can be derived. The lower bound of the confidence interval, i.e. the lowest values taken by the simulated trend components over time, is used to define an upper bound of the overvaluation measure. This last metric is defined as the difference between the observed values of the office price index and the lower bound of the confidence interval.

Considering the evolutions of its key determinants, office prices appear to be undervalued from 2000 to 2003 (Figure 5). In fact, during the dot-com crisis, the end-user market may have been overvalued: office rents increased significantly while office prices remained flat. During the subprime mortgage crisis, office prices adjusted lately compared to its key determinants, office prices were overvalued by more than 25% at the end of 2008. Since 2011, office prices may have been overvalued but only to a limited extent. The overvaluation measure increased slightly in Q2 2016 reaching 12%, but decreased after this quarter.

<sup>5</sup> Hansen & Johansen (1999)

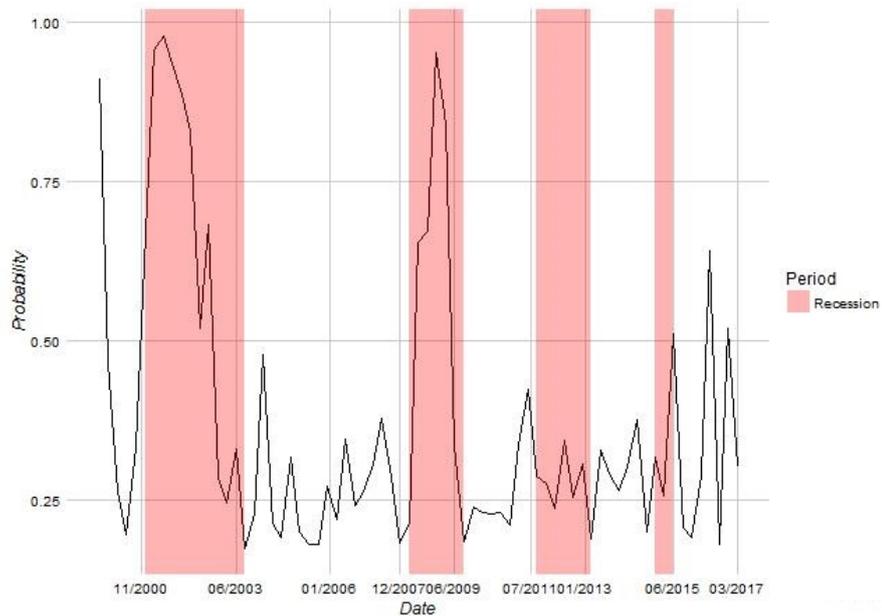
**Figure 5.** Evolutions of the IPD office price index, the overvaluation measure and the confidence interval estimated from all the simulated trend components.



Finally, in order to assess the value-added of this indicator, the overvaluation measure is used to predict French recession periods identified by the OECD. The OECD used a list of leading indicators, such as car registrations, consumer confidence indicators, production survey, or export order books. Bry & Boschan methodology is used to detect peaks and troughs. At the time of this estimation, from January 1999 to March 2017, the OCDE have identified 4 periods of recession: from December 2000 to June 2003, from January 2008 to June 2009, from July 2011 to January 2013, and from October 2014 to June 2015.

To compute a recession indicator for France, the absolute value of the overvaluation measure is used as an explanatory variable in a logistic regression of the OECD recession periods. In practice, the estimated recession indicator succeeds to identify the dotcom crisis and the subprime mortgage crisis, while the sovereign debt crisis did not affect commercial property markets. The probability to be in a recession period slightly increased in 2015 and 2016 but is under 50% in Q1 2017.

**Figure 6.** A recession indicator for France estimated from the estimated overvaluation measure of office prices



Sources: OECD for the recession periods

## Concluding remarks

From this stocktaking exercise to gather information on commercial real estate, it appears that, as the ESRB highlighted in its latest report on commercial real estate, some indicators are already made available but cover only partially markets to be monitored. For the French end-user market, key indicators made available by commercial real estate agencies focus mainly on the office sector and the Paris region. The investment market is better covered; in particular, French semi-hedonic price indexes estimated by MSCI/IPD and delivered to the ECB cover relatively well the French area and the different sectors.

From this exercise, a reasonable set of data on the office sector give us the opportunity to estimate monitoring indicators. For this purpose, we rely on an econometric approach, a co-integrated vector autoregressive model, to estimate an overvaluation measure of office prices. From this approach, office prices appear to be overvalued at the end of 2008 by more than 25 %, and since 2011, but only to a limited extent. To assess the predictive power of this indicator, a recession indicator is estimated by modeling OECD recession periods with the overvaluation measure. This measure appears to capture relatively well the dotcom crisis and the subprime mortgage crisis, while the sovereign debt crisis did not stand out.

This encouraging work needs to be carried on. Firstly, successive revisions on MSCI/IPD property price indexes observed in the past have significantly modified the results obtained and the resulting analysis. For these reasons, monitoring revisions of data provided by private entities appears crucial. Besides, to enlarge our information set, we need to assess the value added of granular sources of information already collected, such as transaction prices and characteristics stored in notarial databases. This type of dataset show several advantages, firstly as a tool

to evaluate the quality of private sources. Secondly, this dataset cover all sectors, especially the retail one which also rose concerned recently. Finally, precise geographic localization of exchanged property is made available; geographic areas boosting prices could be properly identified.

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# **Evaluating risks in the French office market with new sources of data on commercial property prices**

May 18th, 2017

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## Motivations

- Financial risks of commercial property markets
  - The commercial real estate market is highly capital intensive and dependant on external financing
- Recommendation 19 of the G20 Data Gaps Initiative and Recommendation 2016/14 of the ESRB on closing real estate data gaps
  - Need of comprehensive and timely data on both residential and commercial property prices

## In France

- Quarterly *residential property price index* recognized for its high quality, timeliness and historical depth, but some reluctance to apply the same methodology on commercial property prices:
  - Commercial markets are heterogenous and illiquid.
- Some statistics made available by French public institutions:
  - Monthly building permits,
  - Construction starts breakdown by sector.

**A strong need to improve our statistical knowledge of commercial property markets !**

**Regular collection of information from websites of commercial real estate agencies (BNP Paribas RE, CBRE, JLL, Immostat) and books of commercial real estate professionals (IEIF)**

**End-user market, focus generally on Greater Paris region and office sector:**

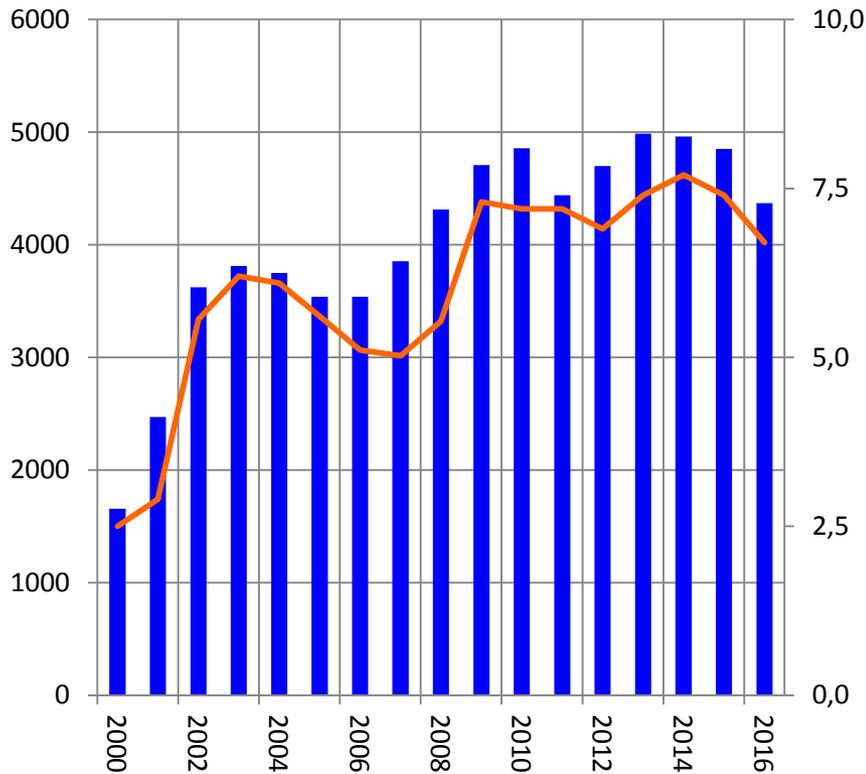
- “Volume measure”: office take-up in square meters,
- “Price measure”: average rent,
- Measures of occupancy such as vacancy rates.

**Investment market:**

- “Volume measure”: Aggregate volume of investments, breakdown by sector,
- Measures of profitability such as commercial property yield index, breakdown by sector and specific areas,
- “Price measures”:
  - Directly, recently made available for offices in Greater Paris, the average price of investments,
  - Indirectly, the ratio between the rent and the yield index, especially for the prime sector.

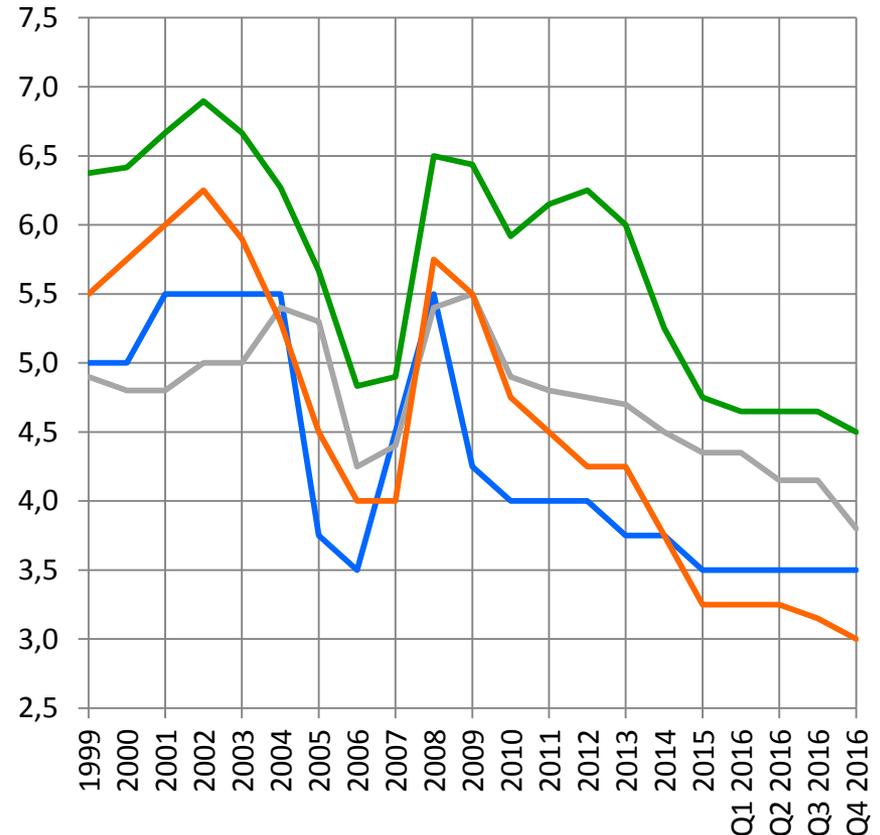


**Office supply available within a year and vacancy rate, Greater Paris region**



■ Office supply, availability within a year, Greater Paris region (in thousands of sqm, left scale)  
— Vacancy rate, office sector, Greater Paris region (in %, right scale)

**Commercial property rental yield index in %, prime transactions, office sector**



— London West End      — Frankfurt  
— Paris CBD      — La Défense

Sources: IEIF, BNP Paribas RE, CBRE, JLL

An Eurosystem working group (WGGES) launched in 2010 a stock-taking exercise on commercial property markets:

- To identify potential sources of commercial property prices in each member state,
- To design a commercial property price index for the euro area.

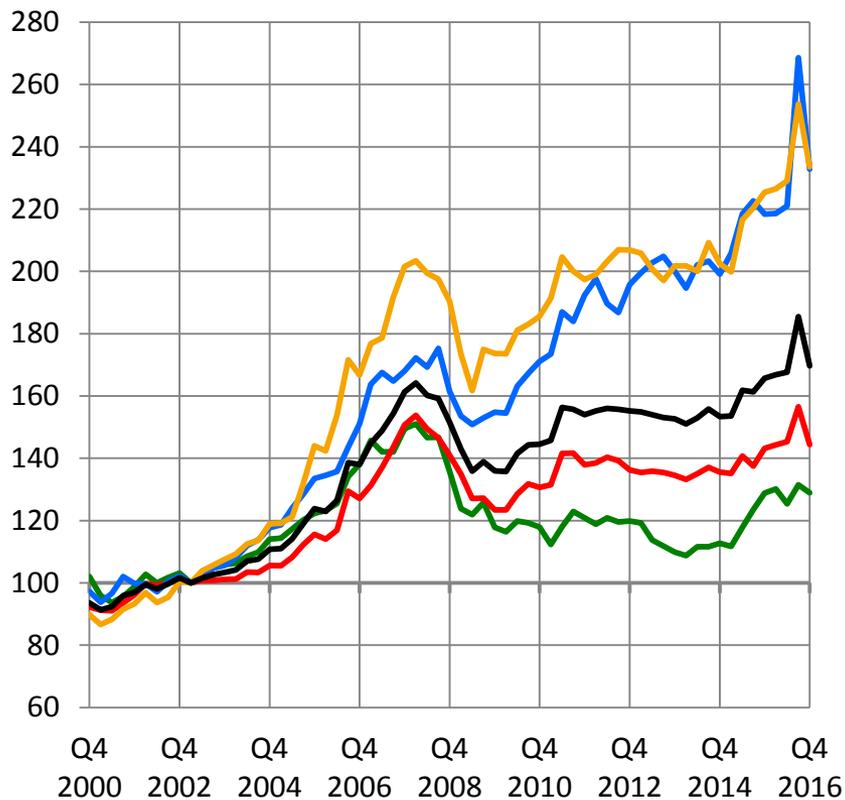
**A partnership with MSCI/IPD was set up to obtain price indicators for member states like France, for which no price index was available.**

**For France, several indexes are indeed made available by MSCI/IPD each quarter:**

- **Appraisal values** breakdown by sector, also available from other data providers,
- And a **semi-hedonic price index for each sector** relying on both transaction prices and appraisal values,
- With a relatively good coverage of the market : IPD sample covered around 40% of the market in 2011.

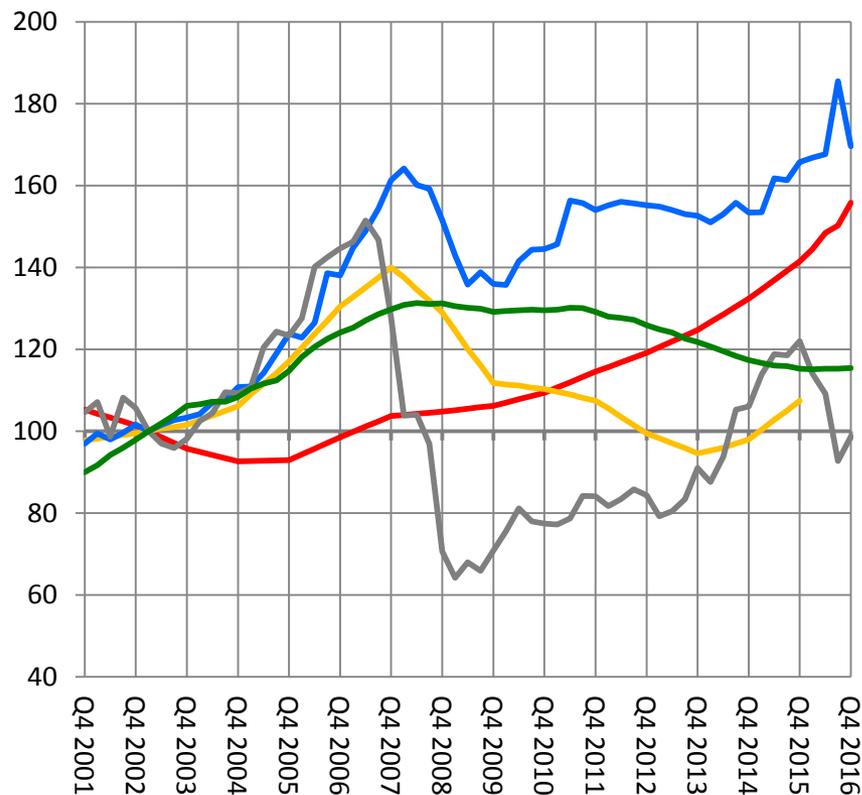


**French commercial property price indicators, by sector, index base 100 = 2003**



- Industrial property
- Residential property
- All property types
- Office property
- Retail property

**Commercial property price indicators, by country, index base 100 = 2003**



- Germany
- Spain
- France
- United-Kingdom
- Italy

Sources: ECB from IPD, Bulwiengesa and vdp for Germany, Banca d'Italia for Italy

## Strong expectations to assess whether commercial property prices were overvalued:

In France, evolutions of commercial property market raised concerns, especially since 2010:

- The end-user market remains sluggish,
- While the investment market has recovered since 2010, boosting commercial property prices.

## How to measure price overvaluation ?

- Theoretically (DiPasquale & Wheaton 1992),
  - **In the short run**, property prices depend positively on rents and negatively on interest rates. While rents depend negatively on vacancy rates and positively on economic growth.
  - **In the long run**, new construction should drive down rents.
- Empirically,
  - **A cointegrated vector autoregressive model** can be used to model interactions between the property price index and its economic determinants,
  - The “equilibrium” commercial property price index is defined as **the trend component explained by its economic determinants** (Hansen, 2005) and “overvaluation” is defined as the deviation from this equilibrium price index.

**In practice, we focused on the office market,**

**Some variables were selected to explain the IPD semi-hedonic office price index,**

- Market-specific variables: index of actual rents, office immediate supply, stock of office space,
- and other macroeconomic variables: GDP, banks' actuarial yield of senior debt securities.

**But because of breaks in time series,**

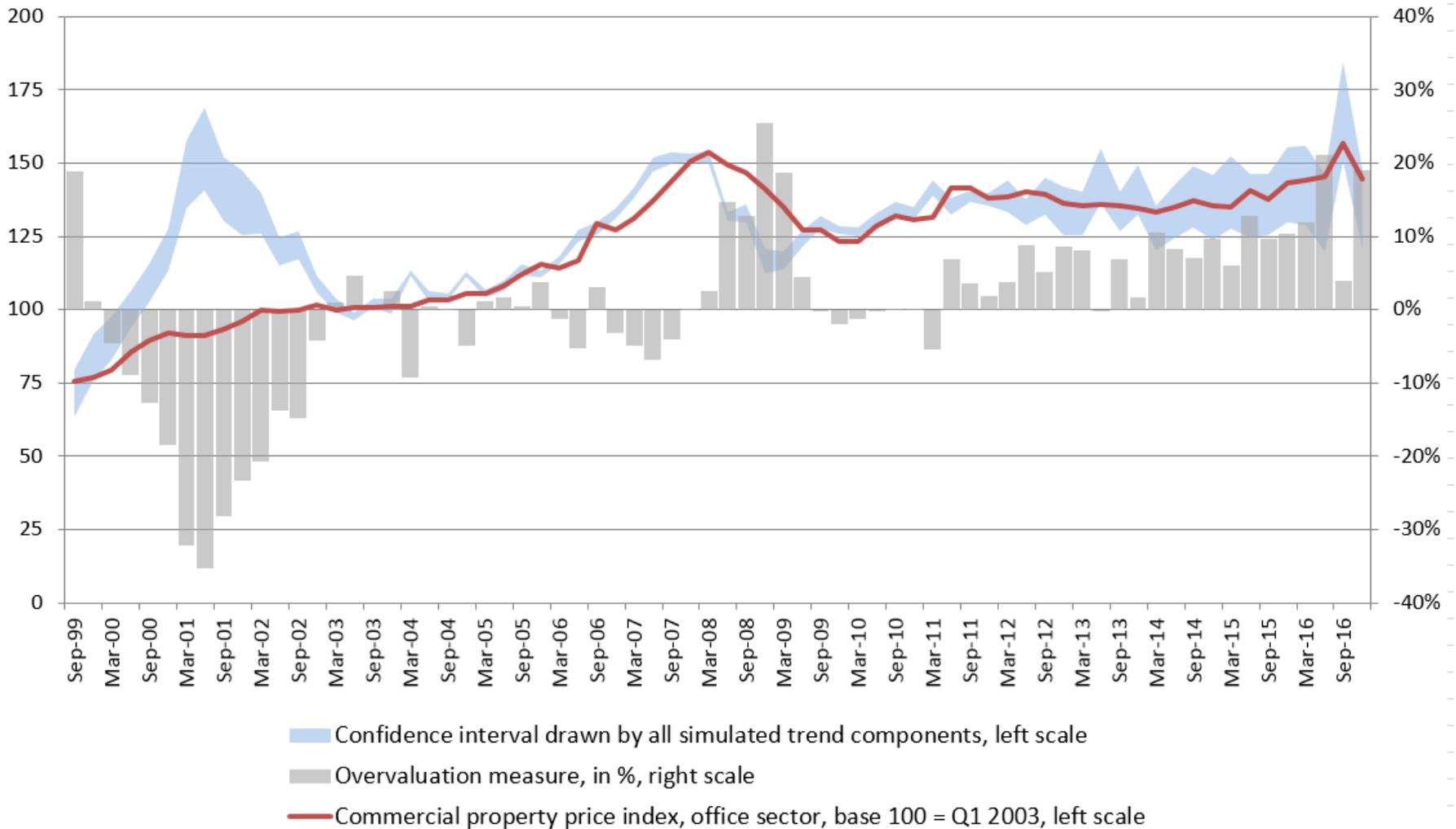
- some points were initially withdrawn for the estimation part,
- and the model was estimated on several subsamples from 2003Q1 - 2009Q2 to 2003Q1 - 2011Q4

From these multiples estimations, several trend components are **simulated dynamically over 1999Q1 to 2016Q4.**

**The trend component is defined as the minimum within the set of simulated trend components.**

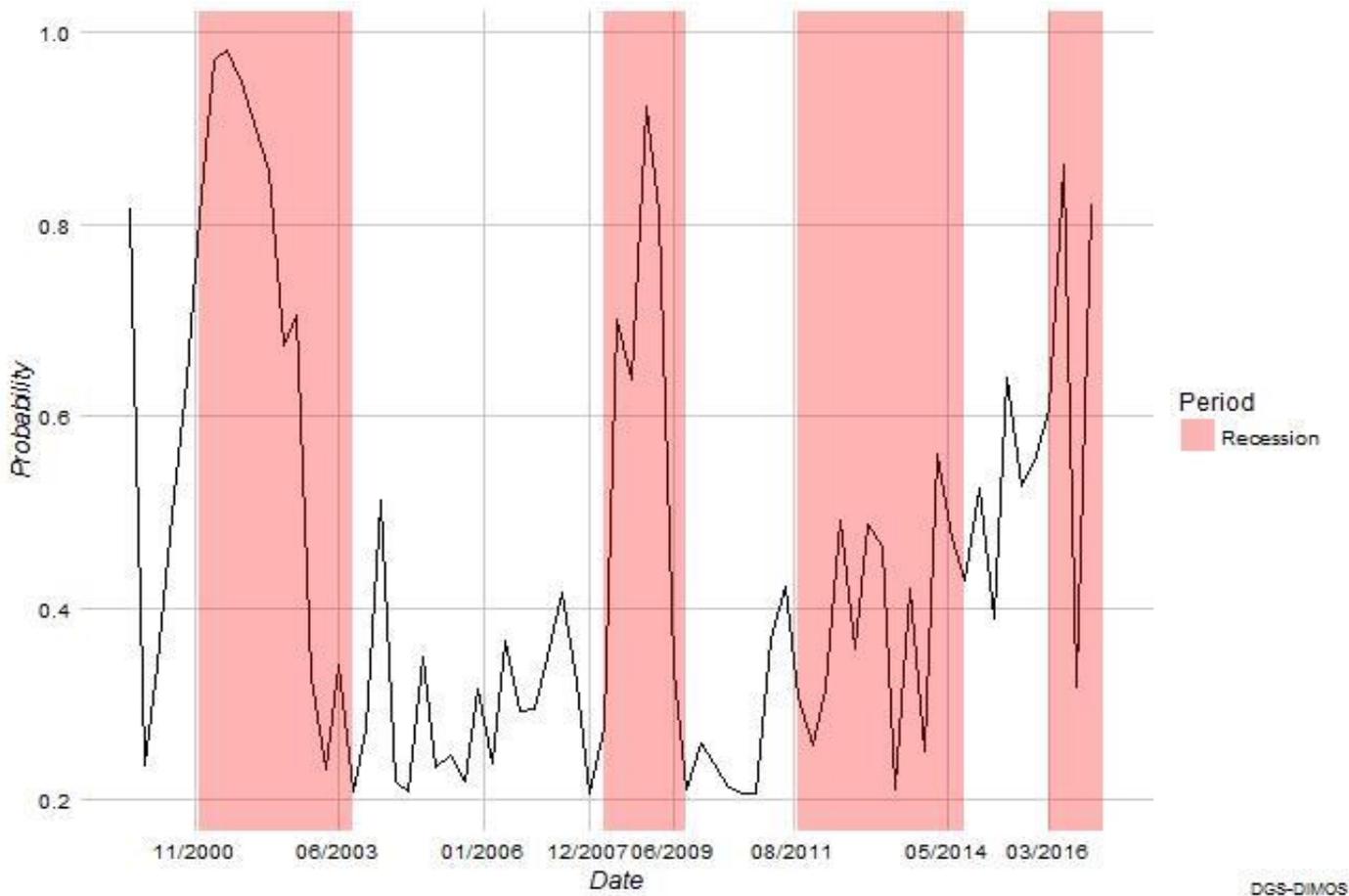
**The overvaluation is the deviation of this trend component from the observed series.**

### Evolutions of the IPD office price index, the overvaluation measure, and the confidence interval drawn by the simulated trajectories



**The estimated measure of price overvaluation is used to compute a recession indicator for France**

This indicator is estimated by calibration of the absolute value of the overvaluation measure on recession periods identified by the OECD.



\*According to the OECD, France entered in recession in 2016, but other publications such as the composite leading indicators indicate a recovery as of 2016 Q3.

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- The quality of the IPD index must be better assessed:
  - for some quarters, the magnitude of revisions can be higher than the standard deviation of the time series.
- We are working on granular data such as transaction prices and characteristics stored in notarial databases, in order to identify properly geographic areas boosting prices.
- Strong need to evaluate an overvaluation measure for other sectors (retail in particular)
  - But we do not have enough data on that sector,
  - Hardly possible to set up good indicators for this sector as this market is highly heterogeneous.



Thank you for your attention  
Any question ?