



The conversion of office real estate into residential real estate: trends following Covid-19 and the surge in teleworking

The real estate market is comprised of two segments: the residential market, which enables households to find dwellings, and the commercial market, targeted at businesses and investment funds, which supplies offices and commercial premises for productive purposes. The repurposing of buildings creates porosity between the two market segments and can cause them to share similar dynamics. Recently, the acceleration in teleworking has led to a decline in demand for office space. By quantifying the mechanisms behind office conversions – and their determinants – it is possible to forecast the potential impact this will have on the residential real estate market through the adjustment of building supply. In France, office to housing conversions remain very limited. However, a desynchronisation of trends in residential and commercial real estate, coupled with changes to administrative constraints, could lead this situation to evolve.

Antonin Bergeaud, Jean-Benoît Eyméoud
Directorate General Statistics, Economics and International
Business Surveys, Microeconomic and Structural Analysis Directorate
Thomas Garcia
Directorate General Financial Stability and Operations
Financial Stability Directorate

JEL codes
G11, G14,
G23

This article presents the findings of research carried out at the Banque de France. The views expressed in this bulletin are those of the authors and do not necessarily reflect the position of the Banque de France. Any errors or omissions are the responsibility of the authors.

468,111 m²

of office space converted into housing
in 2019

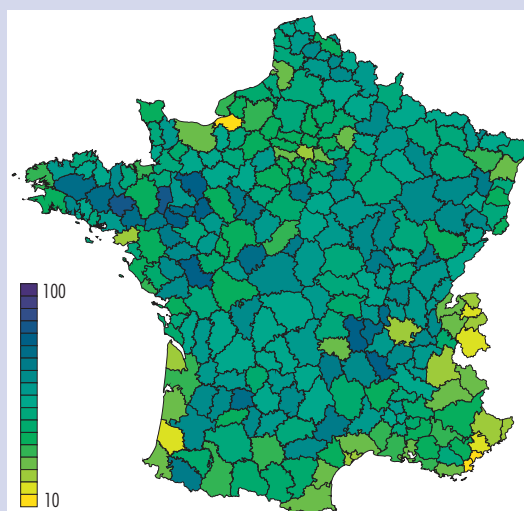
+1.6%

expected increase in the conversion
rate (ratio of conversions to
constructions) since the introduction of
teleworking in 2020 in response to the
Covid-19 shock, with no adjustment to
regulations

-5.4%

fall in the office occupancy rate
since 2020

Office space per employee in the services sector in 2019, by employment zone
(m²)



Sources: DADS data (annual declarations of social data by businesses) and CFE data (corporate property tax); authors' calculations.

Interpretation: In the Paris employment zone, the average number of square metres of office space per employee was 20.5 compared with 64.2 in Châteauroux.

Note: The number of employees is in full-time equivalent.



1 The surge in teleworking since the Covid-19 shock is driving down demand for offices

The introduction of social distancing measures in 2020 accelerated the spread of teleworking, and in just a few months it became standard practice for those able to do at least part of their jobs outside the workplace. In France, as in other European countries, the number of people working from home one or two days a week has increased sharply (from 3% of employees in 2019 to over 15% at the start of 2022 in France according to the Acemo Covid survey conducted by the government labour statistics office, DARES).¹ This structural change could lead to major shifts, especially in urban geography. For example, workers who split their time between home and the office can move further away from urban centres, thereby reducing the income share they spend on housing. Businesses can also benefit significantly by reducing the volume of real estate they occupy, as it is becoming increasingly expensive and limits their flexibility due to standard real estate market frictions – for example the length of leases (Bergeaud and Ray, 2020)

In a recent article, Bergeaud, Garcia and Henricot (2023) identify the existence of a negative demand shock in commercial real estate linked to the introduction of teleworking. Moreover, observed changes in prices and vacancy rates suggest that investors and other real estate professionals expect this shock to become permanent. This fall in demand should contribute to a moderation of commercial real estate prices, at least in those areas where the market is tightest (see, for example, Gupta, Mittal and Van Nieuwerburgh, 2022 for a study of New York).

To what extent could this trend affect residential real estate, i.e. real estate owned by households and used for housing? To attempt to answer this question, we need to examine the links between commercial and residential real estate. The two markets have several common determinants: both are boosted by the cultural or natural environment (e.g. presence of a river), and both benefit from positive externalities linked to agglomeration mechanisms (Duranton and Puga, 2004).

To illustrate the strong link between the two segments, we estimate the correlation between the price of a standard dwelling and the price of a standard office in each employment zone, using government data on real estate transactions (DV3F database).² The results are presented in Chart 1 *infra*. As expected, prices in the two segments are positively correlated; in other words, employment zones with high residential real estate prices also have high commercial real estate prices (see Chart 1a). The growth rates for the two segments are also positively correlated, albeit to a lesser extent (see Chart 1b). This result supports the findings of a Banque de France *Eco Notepad* blog post (Ferrière and Henricot, 2021), which identifies a strong correlation between price cycles in both segments, but anticipates that the pandemic could lead to a break in this co-movement.³

The future path of residential real estate prices, and therefore the potential desynchronisation of price cycles, will depend on two main factors:

- the relocation of households away from urban zones, which should inflate house prices in suburban areas and lower them in town centres (the “doughnut effect” identified in the United States by Ramani and Bloom, 2021);

1 DARES (2022), “Activité et conditions d’emploi de la main d’œuvre pendant la crise sanitaire Covid-19”, March. <https://dares.travail-emploi.gouv.fr/enquete/>

2 <https://datafoncier.cerema.fr/donnees/donnee-dv3f>

3 Ferrière and Henricot (2021) “Corporate and residential real estate: what spillovers in the context of the health crisis?” *Eco Notepad* blog, post No. 220, Banque de France, June. <https://blocnotesdeleco.banque-france.fr/en/blog-entry/>

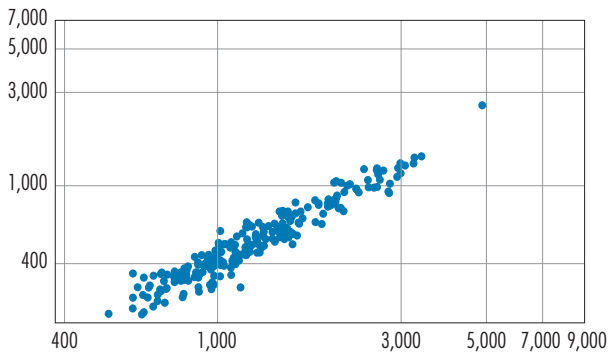


C1 Price per square metre between 2014 and 2020 by *département*: commercial and residential real estate

(x-axis: price of residential real estate; y-axis: price of commercial real estate)

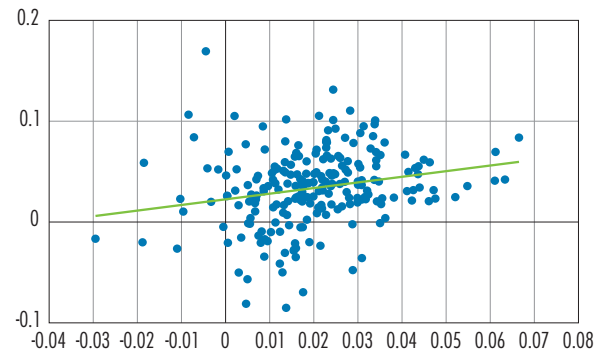
a) Average price level

(logarithmic scale)



b) Average annual change in average price per m²

(%)



Sources: DV3F data (land and property database); authors' calculations.

Note: Real estate prices are calculated based on the fixed effect of a hedonic price regression on the different characteristics of the dwellings, notably their surface area (surface area and prices are expressed as a logarithm). The price shown is the price per square metre of a 90 m² building for residential real estate, and of a 600 m² office. Data are averaged between 2014 and 2020.

- the ability of supply to adapt, notably through the conversion of part of the existing office stock into new housing. This second factor is often examined from a qualitative perspective (see, for example, Gupta, Mittal and Van Nieuwerburgh, 2022, or Remøy and Van der Voordt, 2007). However, to date, no attempt has been made to quantify it or examine its determinants. This study therefore focuses on this latter aspect. In particular, by analysing past trends in the conversion of offices into housing, we are able to make some

deductions regarding how building supply will adjust via this mechanism following the rise of teleworking.

2 Office to housing conversions are rare and unevenly distributed across France

To evaluate the potential impact on residential real estate of a slowdown in the office real estate market, we quantify the magnitude of office to housing conversions both historically and spatially.

BOX 1

Estimation of the conversion rate

The Sit@del database¹ provides comprehensive information on all new building permits granted since the 1970s. It can therefore be used to identify office to housing conversions. The data indicate the source of all new space authorised by a building permit, and notably show whether it stems from the repurposing of another type of building. Using this data, we first estimate the creation rate for both commercial and residential real estate. This estimate is calculated by comparing new construction flows with the building stock by real estate category.² The share of new housing space stemming from office conversions is obtained by dividing the number of square metres of office space converted into housing by the total surface area of new housing. This represents the propensity to create housing through repurposing.

We first quantify recent conversions at the national level, and then examine their geographical distribution and how they have evolved over time.

¹ <https://artificialisation.developpement-durable.gouv.fr/bases-donnees/sitadel-2>

² The building stock is estimated using a permanent inventory based on new construction flows since 1970 with an amortisation coefficient of 2.5%, and assuming the economy was initially in a stationary state.



Office to housing conversions are limited by strong constraints

The conversion of offices into housing is highly regulated: in addition to the physical constraints (structure of the building), there are also strong administrative constraints. Building conversions have to be approved by local authorities and local planning regulations have to be changed.⁴ Moreover, in many towns, the presence of historical monuments poses a further obstacle to conversions. Even when the necessary approvals have been obtained, the need to comply with new building standards can lead to a loss of living space and drive up costs, making it cheaper in some cases to demolish and rebuild.

These constraints and costs explain why office to housing conversions are relatively rare in France. Between 2015 and 2019, there were 10,474 office conversions, representing a total surface area of 2.1 million square metres. On average, they accounted for 0.99% of new housing space and 0.05% of total housing space. Conversions of housing into offices were even more limited, at around 0.8 million square metres (3.36% of new office space and 0.16% of total office space).

The conversion rate has increased in the past decade but remains low

Chart 2 shows the change in the creation rate (construction as a share of total building stock) for both market segments since 1985. Chart 2a shows that creation rates have followed a fairly procyclical path, with the rate for offices tracking the cycle more closely than that for housing. Chart 2b shows a clear increase in the amount of new housing space created through office conversions, even though the absolute level remains low (1% in 2019).

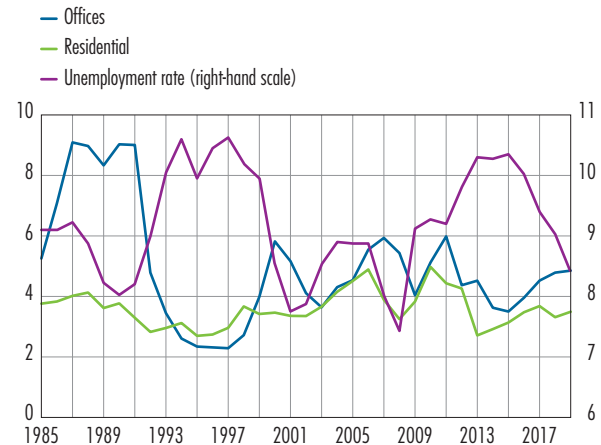
Conversion rates vary across the country

The rate of conversion of offices into housing is not homogeneous, as shown in the map *infra* which was

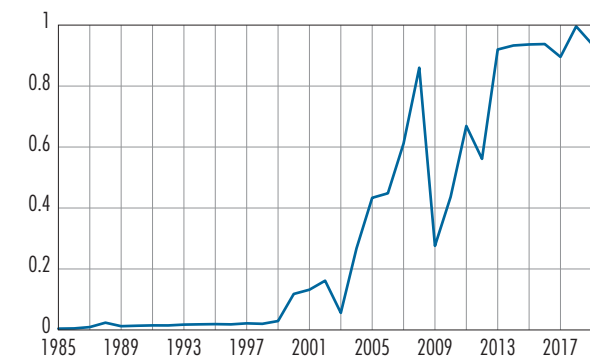
C2 Change since 1985 in the construction of new building space

(%)

a) Creation rate



b) Share of creations stemming from office conversions



Sources: Sit@del and authors' calculations.

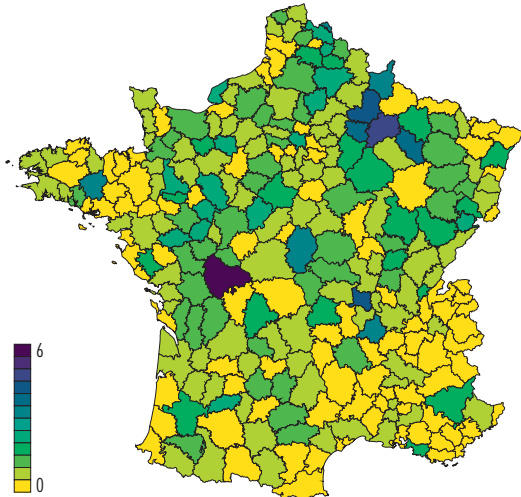
Note: The creation rate is calculated as construction divided by the building stock (in square metres); creations refer to surface area transformed into housing and newly constructed housing.

created using estimated data for 2015-19. Certain employment zones therefore have features that make conversions easier or more attractive, for example Poitiers, Roubaix, Reims and Paris. Conversely, others have seen relatively few office to residential conversions: Menton, Sète, Fréjus.

⁴ Unlike other laws that strictly regulate conversions, the Elan Law of 2018 provided an incentive for conversions by granting a constructibility bonus or a derogation to social mix requirements for towns with insufficient social housing (provided a minimum threshold of social housing is reached).



C3 Rate of conversion of offices into residential real estate by employment zone, in 2019



Sources: Sit@del and authors' calculations.
Scope: Metropolitan France (excluding Corsica).
Note: Number of square metres of new housing stemming from office conversions, as a percentage of the total surface area of new housing constructed in 2019 for each employment zone.

3 The geographical heterogeneity of conversions is mainly explained by physical characteristics

Using estimations of the model described in Box 2, it is possible to explain the frictions or, conversely, the incentives for office conversions.

First we look at the impact of the office occupancy rate, using the number of square metres per employee. Chart 4 shows that this measure is strongly correlated with the average price per square metre of office space in that employment zone, and that zones where space is most constrained are also those with the highest density and prices. An econometric analysis reveals that the average space per employee (inverse of the office occupancy rate) has a positive impact on the conversion rate: **a low constraint on office occupancy has a positive impact on the conversion of offices into housing.**

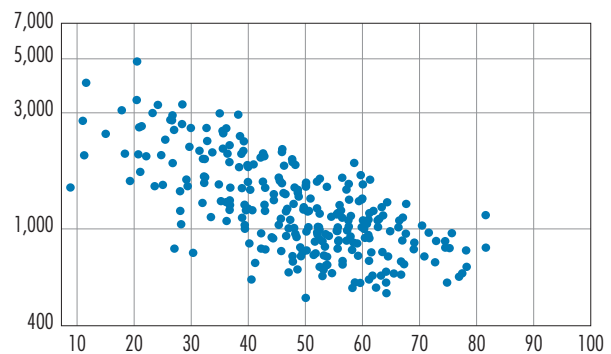
Second, we look at the impact of the quantity of offices and housing on the conversion rate. Both factors have an effect on conversions: **a large stock of offices and low stock of housing increases office to housing conversions.**

Last, we analyse the impact of the relative prices of offices and housing. Our model does not identify an effect on market incentives: **the price of housing relative to offices has no statistically significant effect.** Hence, the substitution between housing and offices is not influenced by relative prices, as would be predicted using a simple microeconomic model. This result illustrates the role played by regulatory constraints in hindering the adjustment of building stock in France, as already highlighted by Chapelle and Eyméoud (2018) for residential real estate.

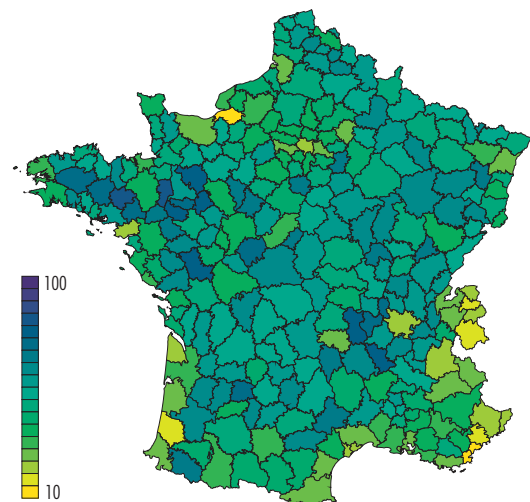
C4 Average surface area per employee in 2019

a) Price of commercial real estate based on average surface area per employee

(x-axis: surface area in m²; y-axis: price in euro)



b) Office space per employee in the services sector, by employment zone (m²)



Sources: DV3F data (land and property database), DADS data (annual declarations of social data by businesses), and CFE data (corporate property tax); authors' calculations.
Scope: Metropolitan France (excluding Corsica).
Interpretation: In the Paris employment zone, the average number of square metres of office space per employee was 20.5 compared with 64.2 in Châteauroux.
Note: The number of employees is in full-time equivalent.



BOX 2

Explanatory model for the office to housing conversion rate

We first describe our choice of variables and the way we measure them, and then present the results of our model estimation.

We examine the price of commercial real estate relative to residential real estate at a given point in time. A low relative price indicates that pressures are higher in the housing market than in the office market and should be associated with a larger number of conversions, all other things being equal. To characterise this pressure, we calculate hedonic price indexes (i.e. price indexes that can be used to control for observed differences in housing characteristics) using data from the government DV3F land and property database which contains information on all repurposings of residential and commercial real estate.

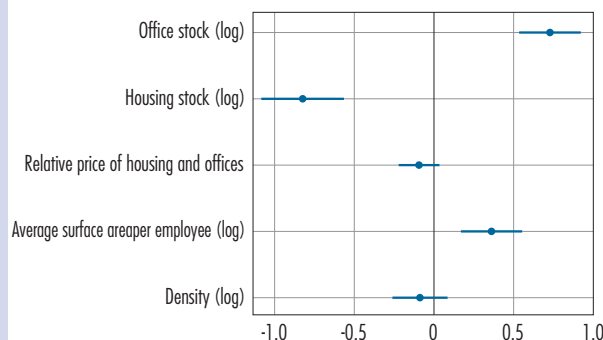
Similarly, the size of the office stock and size of the housing stock could also play an important role, since a high office stock increases the potential for conversions, and a low housing stock provides an incentive for conversions.

At a given price, the constraint on office real estate may differ for reasons of space, sectoral composition or preference. To evaluate the constraint, we estimate the average number of square metres of office space per employee using two administrative data sources. The denominator is calculated using the number of full-time equivalent employees in a given establishment, taken from DADS data (DADS stands for *déclarations annuelles de données sociales* or annual company declarations of social data). The numerator is the amount of office space obtained from CFE data (CFE stands for *cotisation foncière des entreprises* or corporate property tax, a local tax paid by companies according to the amount of real estate they occupy).

We then add the density of the employment zone (in log) to the model to capture residual effects, even though a large part of the difference in conversion trends is explained by other elements of the model (notably average surface area per employee).

The dependent variable is the office to housing conversion rate, defined as the ratio between the number of square metres of new housing created by office conversions and the number created through construction. The marginal effect of each dependent variable is shown in the chart opposite.

Results of the estimation of the explanatory model for the office to housing conversion rate



Sources: DV3F data (land and property database), DADS data (annual company declarations of social data) and CFE data (corporate property tax); Sit@del and authors' calculations. Note: Coefficient and confidence interval of 90%, the results of the model estimation are described in section 3. The dependent variable is the ratio between the number of square metres of new housing created by office conversion and the number created through construction.

The model is estimated using ordinary least squares and the error vector is robust to heteroscedasticity (difference in the variances of residuals). The unit of observation is the employment zone (225 observations due to the absence of data on Bas-Rhin, Haut-Rhin and Moselle in the DV3F database).



4 The long-term effects of teleworking on conversions

Exploiting the observed heterogeneity across employment zones, we use the model described in Box 2 to measure the sensitivity of the conversion rate to different factors likely to be affected by a rise in teleworking. The results provide an approximation of the increase in the conversion rate that can be expected following a widespread adoption of teleworking.

Using the model, we find that the main channel of transmission is the change in the number of square metres occupied per employee. According to 2019 data, 3% of employees worked an average of one day a week from home. If 15% of employees decided to work from home two days a week (Barrero, Bloom and Davis, 2021 or Bergeaud, Cette and Drapala, 2022), this would correspond to an increase of 5.4% in the number of square metres of office space per full-time equivalent employee.

Assuming there is no direct impact on the price of residential real estate or on the total building stock, the office to housing conversion rate could be expected to rise by 1.6% compared to its average value. As conversions are rare, the impact could at best be expected to be modest and the effect on prices marginal. According to our analysis, therefore, without regulatory changes to encourage office to housing conversions, teleworking should not have a major impact on housing supply via the conversion channel: while certain conversion projects might indeed be financially viable, the addition of external constraints will potentially limit their implementation and cause developers to favour demolitions over conversions.

The demolition and construction of buildings generates significant carbon emissions, and building conversions appear to be one solution for reducing carbon footprints (see, for example, Douglas, 2006 or Owojori, Okora and Chileshe, 2021). This potential benefit needs to be

weighed against the energy performance of the finished building, which is often lower for a new construction than for a renovation. However, several studies appear to show that, over their lifespan, converted or renovated buildings have lower carbon emissions (Thornton, 2011; Assefa and Ambler, 2017). Consequently, the much-needed energy transition of our building stock could be accompanied by administrative incentives for conversions, as this would help to lower carbon emissions.

One limitation of our study is that the data used to study conversions date from before the pandemic. Over this period, in any given employment zone, relative pressures between the commercial and residential markets followed similar trajectories and remained contained, which partly explains the absence of a relative price effect on conversions identified in the study. However, the pandemic and teleworking shock could affect the two sectors asymmetrically. The office real estate sector is most exposed and is being strongly impacted by the increase in teleworking, with the shift of work away from offices leading to an economic slowdown in the sector.⁵ The residential real estate market is seeing healthy growth on the whole, despite the pandemic, but is being hit by second-round effects from teleworking: employees who work from home regularly are more geographically mobile as they have a reduced incentive to work near their place of work. In France, this could lower the popularity of urban centres in favour of suburban areas (in a doughnut effect similar to that highlighted in the United States by Ramani and Bloom, 2021). These trends are already visible, for example in the rise in prices in the Ile de France region: according to national statistics office INSEE, house prices in Paris fell by 1.6% in 2021 but rose by 6.7% in the rest of the region.

If the teleworking shock becomes permanent, the slowdown in the office market could prove sufficiently strong to generate a clear trend of conversions. However, this would be partially attenuated if housing and offices became strongly polarised geographically.

⁵ In zones with a high office density – such as New York – Gupta, Mittal and Van Nieuwerburgh (2022) estimate that the value of corporate real estate could decline by 28% over the long term. In France, Bergeaud, Eyméoud, Garcia and Henricot (2023) estimate that teleworking has caused prices to fall by 4.9% in the short term.



References

Assefa (G.) and Ambler (C.) (2017)

"To demolish or not to demolish: life cycle consideration of repurposing buildings", *Sustainable Cities and Society*, Vol. 28, January, pp. 146-153.

Barrero (J. M.), Bloom (N.) and Davis (S. J.) (2021)

"Why working from home will stick", *NBER Working Paper Series*, No. 28731, National Bureau of Economic Research, April.

Bergeaud (A.) and Ray (S.) (2020)

"The macroeconomics of teleworking", *Banque de France Bulletin*, No. 231/2, September-October.

[Download the document](#)

Bergeaud (A.), Cette (G.) and Lecat (S.) (2022)

"Télétravail et productivité avant, pendant et après la crise sanitaire", *Économie et Statistique*, forthcoming.

Bergeaud (A.), Eyméoud (J.-B.), Garcia (T.) and Henricot (D.) (2023)

"Working from home and corporate real estate", *Regional Science and Urban Economics*, forthcoming.

Chapelle (G.) and Eyméoud (J.-B.) (2018)

"The housing supply elasticity and the cost of agglomeration", SciencesPo, mimeo, May.

Douglas (J.) (2006)

Building Adaptation, Routledge, 678 pp.

Duranton (G.) and Puga (D.) (2004)

"Micro-foundations of urban agglomeration economies", in Vernon Henderson (J.) and Thisse (J.-F.), *Handbook of Regional and Urban Economics*, Vol. 4, pp. 2063-2117.

Ferrière and Henricot (2021)

"Corporate and residential real estate: what spillovers in the context of the health crisis?" *Eco Notepad* blog, post No. 220, Banque de France, June.

[View blog post](#)

Gupta (A.), Mittal (V.) and Van Nieuwerburgh (S.) (2022)

"Work from home and the office real estate apocalypse", *Stern School of Business*, mimeo.

Owojori (O. M.), Okoro (C. S.) and Chileshe (N.) (2021)

"Current status and emerging trends on the adaptive reuse of buildings: a bibliometric analysis", *Sustainability*, Vol. 13(21), 11646, October.

Ramani (A.) and Bloom (N.) (2021)

"The donut effect of COVID-19 on cities", *NBER Working Paper Series*, No. 28876, National Bureau of Economic Research, May.

Remøy (H. T.) and Van der Voordt (T. J. M.) (2007)

"A new life: conversion of vacant office buildings into housing", *Facilities*, Vol. 25, No. 3/4, March, pp. 88-103.

Thornton (B. J.) (2011)

"The greenest building (is the one that you don't build!): effective techniques for sustainable adaptive reuse/renovation", *Journal of Green Building*, Vol. 6, No. 1, pp. 1-7.

Published by
Banque de France

Managing Editor
Claude Piot

Editor-in-Chief
Claude Cornélis

Editor
Alexandre Capony

Translator/English Editor
Vicky Buffery

Technical production
Studio Creation
Press and Communication

ISSN 1952-4382

To subscribe to the Banque de France's publications

<https://publications.banque-france.fr/en>
"Subscription"

