

## During the health crisis, per capita productivity and hourly labour productivity fluctuated considerably

Since the beginning of the health crisis, apparent per capita labour productivity and hourly productivity have seen variations that are the mirror image of each other: per capita productivity fell and then recovered, driven by intense use of short-time working; hourly productivity, on the other hand, increased temporarily driven by a pronounced sectoral composition effect. In Q3 2021, these effects faded significantly: per capita productivity and hourly productivity both returned to close to their pre-crisis levels. These variations should continue to return to normal over the coming period, but it is difficult at present to assess the extent of the potential for a rebound in (hourly or per capita) productivity in the short-to-medium term.

The purpose of this focus is to explain the recent variations in (per capita and hourly) labour productivity, and in particular to show the role of use of the short-time working scheme in fluctuations in per capita productivity and the effect of sectoral deformation in fluctuations in hourly productivity. Its aim is not to provide a quantitative analysis of any lasting effect of the health crisis on labour productivity.

### Apparent per capita labour productivity has varied considerably over the past two years, linked closely with use of the short-time work scheme.

At the height of the health crisis (Q2 2020), economic activity fell very suddenly, while the decline in employment was much more moderate. This resulted in a collapse in the apparent per capita productivity of labour (measured here as the ratio of added value to the salaried workforce). Over the following quarters, productivity per capita recovered significantly, while continuing to fluctuate considerably with variations in activity, and remaining below its pre-crisis level (► [Figure 1](#)).

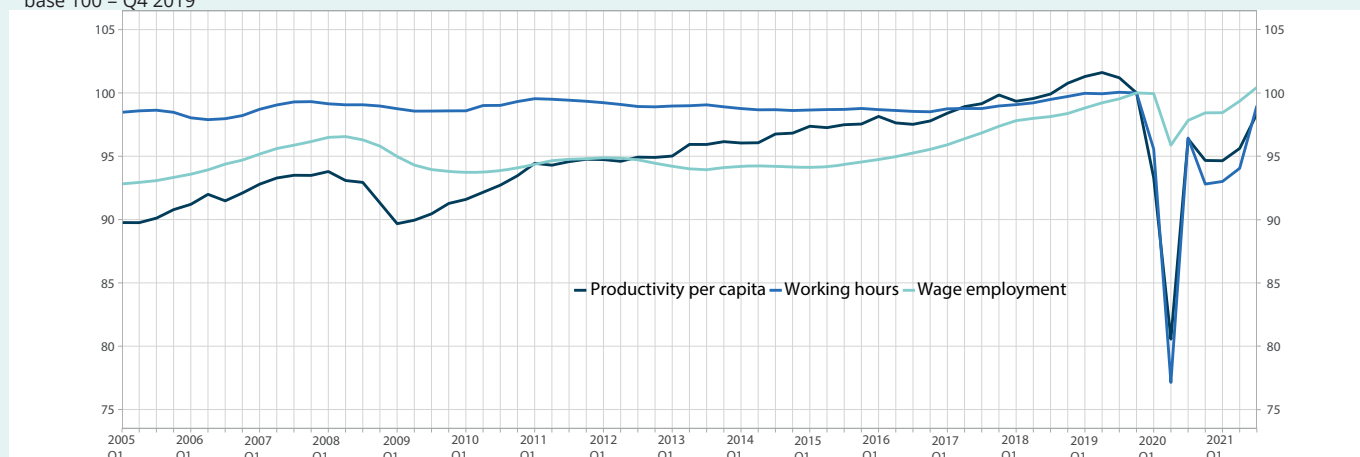
This very irregular trend in per capita productivity can be explained first by the use of the enhanced short-time work scheme. This enables many employees to keep their jobs without working over considerable periods, which resulted in sharp variations in working hours per employee. Fluctuations in per capita productivity and working hours have thus been closely correlated since early 2020, in contrast with the pre-Covid period when per capita productivity was on a growing trend and working hours per employee were flat. At the height of the health crisis, market-sector hourly productivity increased.

### Hourly productivity showed fluctuations in a mirror image of per capita productivity

Apparent hourly productivity of labour (measured here via the ratio between value added and hours worked by employees) has also varied considerably since the beginning of the health crisis. Its fluctuations over the past two years mirror those in per capita productivity, but on a lesser scale (► [Figure 2](#)). Here too, these uneven movements contrast with the somewhat smooth trend followed previously by hourly productivity.

## ► 1. Salaried employment, working hours per employee and apparent per capita productivity of employees

base 100 = Q4 2019



Scope: excluding real estate non-agricultural market sector excluding the real estate sector.

Note: per capita productivity corresponds to the added value by volume in relation to salaried employment of natural persons.

Source: INSEE, quarterly accounts

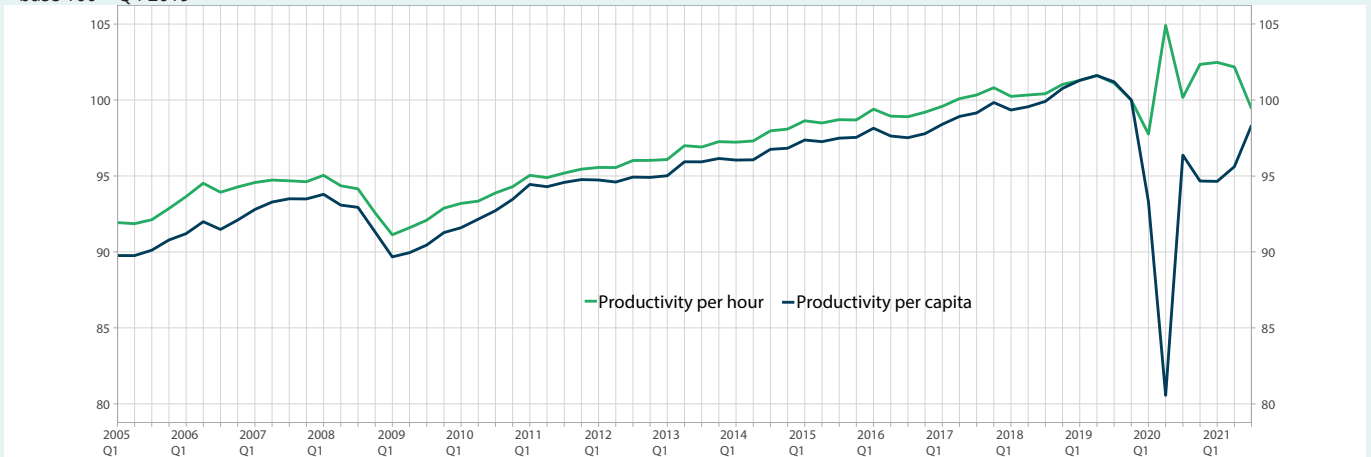
Use of the short-time working scheme does not have a direct influence on hourly productivity insofar as, by definition, the latter is calculated on the basis of a volume of hours actually worked. However, it is the intensity of use of the scheme, and more broadly deformations in the breakdown of hours worked between productive branches, which explain most of the recent movements in hourly productivity at aggregate level.

## A novel sectoral composition effect explains the temporary increase in hourly productivity

In 2020-21, the crisis had a bigger impact on branches of activity in which the level of productivity is lower than the average (► **Figure 3**). For instance, some relatively unproductive branches were particularly affected, such as accommodation and food, services to households

### ► 2. Apparent productivity of employees, hourly and per capita

base 100 = Q4 2019

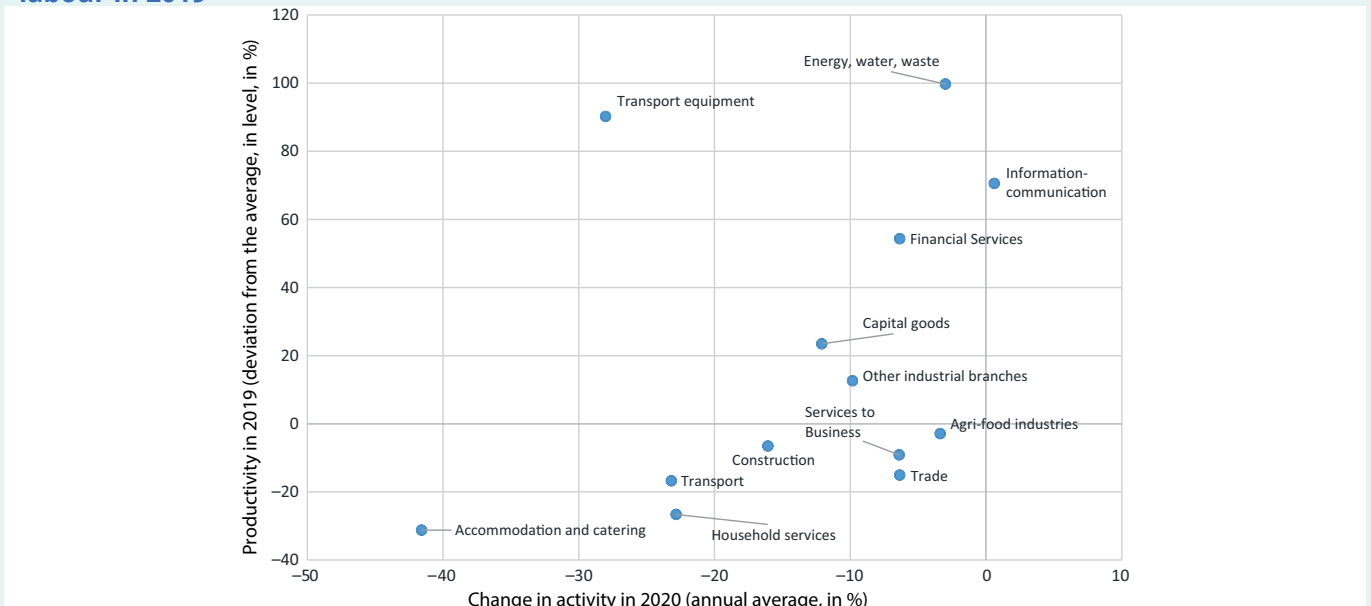


Scope: excluding real estate non-agricultural market sector excluding the real estate sector.

Note: apparent hourly productivity corresponds to value added by volume in relation to the volume of hours worked by employees.

Source: INSEE, quarterly accounts

### ► 3. Variation in added value by volume in 2020 and the level of apparent hourly productivity of labour in 2019



Scope: excluding real estate non-agricultural market sector excluding the real estate sector.

Source: INSEE, quarterly accounts

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or, to a lesser extent, commerce. On the other hand, high labour productivity sectors such as energy or information-communication suffered only limited losses of activity, or even posted gains. The economy was thus deformed at least temporarily, with an increased weight of sectors that are more productive than average. This was not systematic, however, as activity in certain high-productivity branches, such as the manufacturing of transport equipment, for example, also saw some considerable falls in activity.

Such a deformation of the productive structure has consequences for the trend in hourly productivity measured in all branches, even when hourly productivity within each branch is unchanged. It is this composition effect that explains the temporary increase in the

aggregate hourly productivity of the market branches during the health crisis.

The trend in aggregate hourly productivity can thus be broken down in accounting terms into two contributions (► **Box**):

- The variation in productivity specific to each branch. The greater the weight of the branch, the greater the influence on aggregate productivity.
- The deformation effect of the breakdown between branches of the hours worked (“composition effect”). For example, when the relative weight of a branch in the total hours worked decreases and this branch has lower-than-average productivity, then this contributes to an increase in overall productivity.

## Methodology and main concepts used

Hourly productivity of labour is defined as the ratio of value added (or GDP) by volume to the total volume of hours worked. This definition can be applied at a global level (the whole economy) or for each branch.

In accounting terms, aggregate productivity is written as the sum of the productivities of the different branches weighted by the weight of each of them in hours worked. Thus, each branch contributes to the variation in aggregate productivity via two effects:<sup>1</sup>

(1) The contribution of the productivity specific to the branch (“intra-branch effect”), defined as the productivity of the branch weighted by its weight in hours worked: for each branch, if the structure of hours worked remains unchanged, the variation in its productivity affects the variation in aggregate productivity, and all the more so when the share of that branch in the hours worked is greater;

(2) A “composition” effect reflecting the reallocation of hours worked between branches, calculated as the variation in the share of a branch in hours worked weighted by the productivity related to this branch: this effect can capture the variation in aggregate productivity that results from variations in the structure of the hours worked; it is all the more marked (in absolute value) when the difference from the average productivity of the branch is greater.

This structure effect can come either from a deformation in the structure of hours per capita, or from a reallocation of jobs between branches. In practice, as the crisis mainly resulted in falls in hours worked, to a much greater extent than the fall in the number of jobs, it is above all the first effect that played a part in the composition effect.

The formula taken to break down the figures is formally that proposed by Berthier (2002)<sup>2</sup> for the calculation of contributions.

Thus, if we denote  $P_{jt}$  as the productivity in branch  $j$  at date  $t$ , and  $\alpha_{jt}$  as the share of branch  $j$  in the total hours worked at date  $t$ , the different in aggregate productivity between date  $t$  and date  $t_0$  is written

$$P_t - P_{t_0} = \sum_j (\alpha_{jt} - \alpha_{jt_0}) \left( \frac{P_{jt} + P_{jt_0}}{2} - \frac{P_t + P_{t_0}}{2} \right) + \sum_j \frac{(\alpha_{jt} + \alpha_{jt_0})}{2} (P_{jt} - P_{jt_0})$$

where  $P_t = \sum_j \alpha_{jt} P_{jt}$  is the aggregate productivity of all branches. The first term of this represents the composition effect and the second the intra-branch effect. ●

<sup>1</sup> See exemple: Schreiber, A. et A. Vicard (2011), “Tertiariation of the French Economy and the slowdown in labor productivity between 1978 and 2008”, *Document de Travail de la Direction des Etudes et des Synthèses Economiques*, G 2011/10, June 2011.

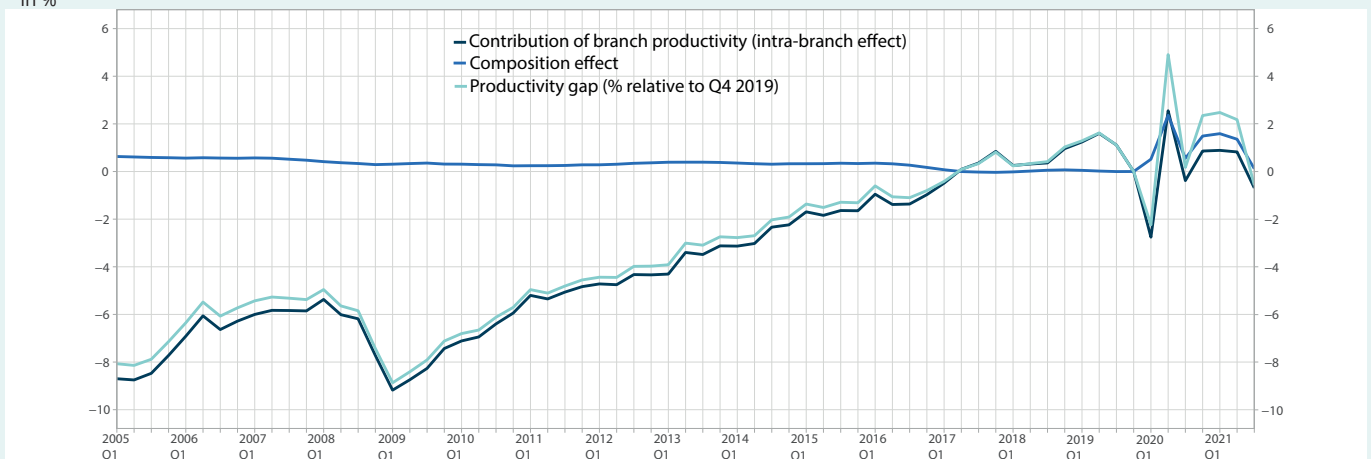
<sup>2</sup> JP. Berthier, “Réflexions sur les différentes notions de volume dans les comptes nationaux”, *Document de travail de l'INSEE* n°8, June 2002.

In general, the composition effect plays a very moderate role (at least at the granularity level taken here). It is therefore the variation in productivity within the branches that explains almost all of the variations in aggregate hourly productivity from 2005 to 2019 (► [Figure 4](#)). However, the composition effect has played a novel role in variations in hourly productivity since the beginning of 2020.

The inter-branch composition effect contributed overall to an increase in market-sector hourly productivity during the health crisis. Between Q1 2020 and Q2 2021, this came on average to +1.3 points, thus explaining most of the increase in hourly productivity over the same period (+1.6 points), in relation to the level at the end of 2019 (► [Table](#)).

## ► 4. Breakdown of the apparent hourly productivity of labour

in %

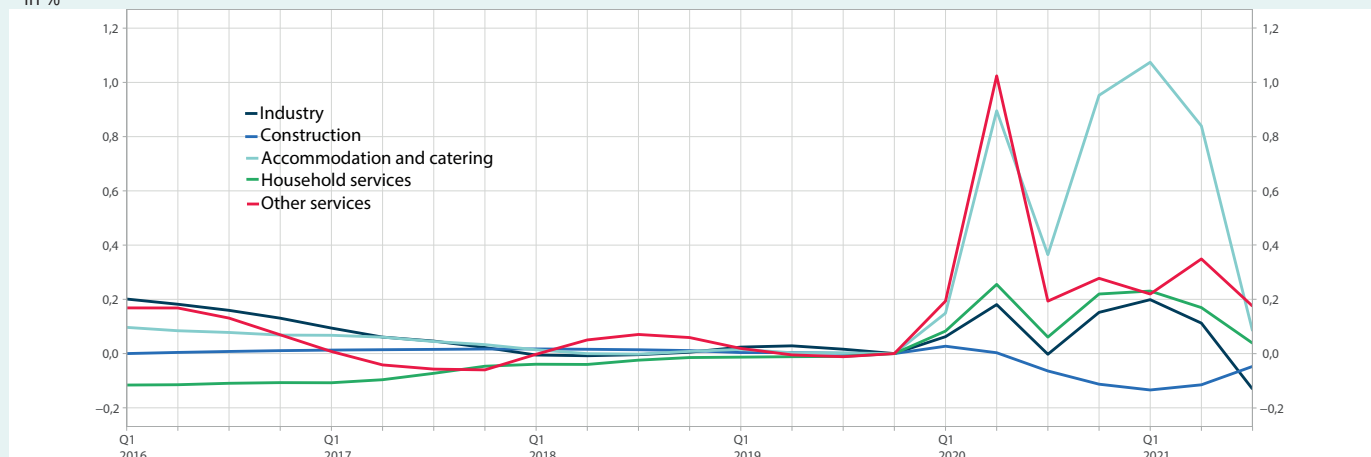


Scope: excluding real estate non-agricultural market sector excluding the real estate sector.

Source: INSEE, quarterly accounts

## ► 5. Contribution of the branches to composition effects

in %



Scope: excluding real estate non-agricultural market sector excluding the real estate sector.

Source: INSEE, quarterly accounts

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The branch of accommodation and food services alone made a large contribution to this composition effect (► **Figure 5**), as the fall in hours worked in that sector was much greater than in the other market-sector branches. In the more productive branches, such as information-communication or financial services, the fall in hours was more limited, which also provided a one-off boost to hourly productivity.

The contribution of productivity variations that are specific to the branches has been more variable over the past two years and is more difficult to interpret. The average net effect over the period from Q1 2020 to Q2 2021 is slightly positive (+0.3 points), with contributions that vary from one main branch to another (► **Figure 6**). Caution is required, however, when comparing productivity branch by branch, given the degree of precision of these measurements, which come from different information systems which were themselves being tested by new types of variations.

### In Q3 2021, per capita productivity and hourly productivity return to their pre-crisis levels

In Q3 2021, activity returned much closer to its pre-crisis level, with the added value of the market-sector branches other than real estate standing just a little over 1% below its level in Q4 2019. Per capita productivity thus rebounded significantly, a trend that was consistent with the sharp fall in use of the short-time work scheme. However, given the fact that the salaried workforce has already exceeded its pre-crisis level and the remaining use of the short-time working

scheme, per capita productivity remained 1% lower in Q3 2021 than in Q4 2019.

At the same time, hourly productivity fell back considerably in Q3 2021, as the composition effect which had been increasing it decreased and almost disappeared. The two notions of productivity thus came singularly closer to each other. In light of their respective pre-crisis levels, hourly productivity remained a little higher than per capita productivity, however, in particular due to even greater use of the short-time working scheme than pre-crisis.

In terms of level, market-sector hourly productivity is very close to its pre-crisis level, at 0.6% below its level at the end of 2019, which is a small figure given the usual fluctuations of this indicator. In light of the positive trend in (per capita or hourly) productivity in the 2010s, the fact that productivity in Q3 2021 is just below its level at the end of 2019 would appear to indicate a loss of productivity in relation to a counterfactual scenario without a crisis. It is difficult at this stage, however, to assess such a hypothesis precisely.

**Looking forward, the two notions of productivity are likely to progress and to continue coming close to each other, although significant uncertainties remain as to the extent of their potential rebound.**

In the short-term future:

- the composition effect is likely to remain weak if use of short-time activity remains moderate in the less productive branches, as was already the case in Q3 2021;

### ► 6. Difference in hourly productivity in relation to pre-crisis level (Q4 2019)

difference in %, contributions in points

	2020 Q1-2021 Q2	2021 Q3
<b>Total difference</b>	<b>1.6</b>	<b>-0.6</b>
<b>Contribution of the branches (intra-branch effect)</b>	<b>0.3</b>	<b>-0.7</b>
of which industry	0.3	0.2
of which construction	-0.7	-0.6
of which commercial tertiary	0.7	-0.2
<b>Composition effect (inter-branch effect)</b>	<b>1.3</b>	<b>0.1</b>
of which industry	0.1	-0.1
of which construction	-0.1	0.0
of which commercial tertiary	1.3	0.3

Scope: excluding real estate non-agricultural market sector excluding the real estate sector.

Note: between Q1 2020 and Q2 2021, hourly productivity was higher on average by 1.6% than in Q4 2019, of which 1.3 points attributable to the sole composition effect.

Source: INSEE, Quarterly accounts

• The variation in hourly productivity of labour in each of the branches remains uncertain; it could be affected by several effects that could potentially work contrary to each other:

- upwards: by the reorganisation of businesses and the innovations they could make use of in the management of their resources, with accelerated adoption of new technologies;
- uncertain: by maintaining an organisation that allows considerable use of remote working;

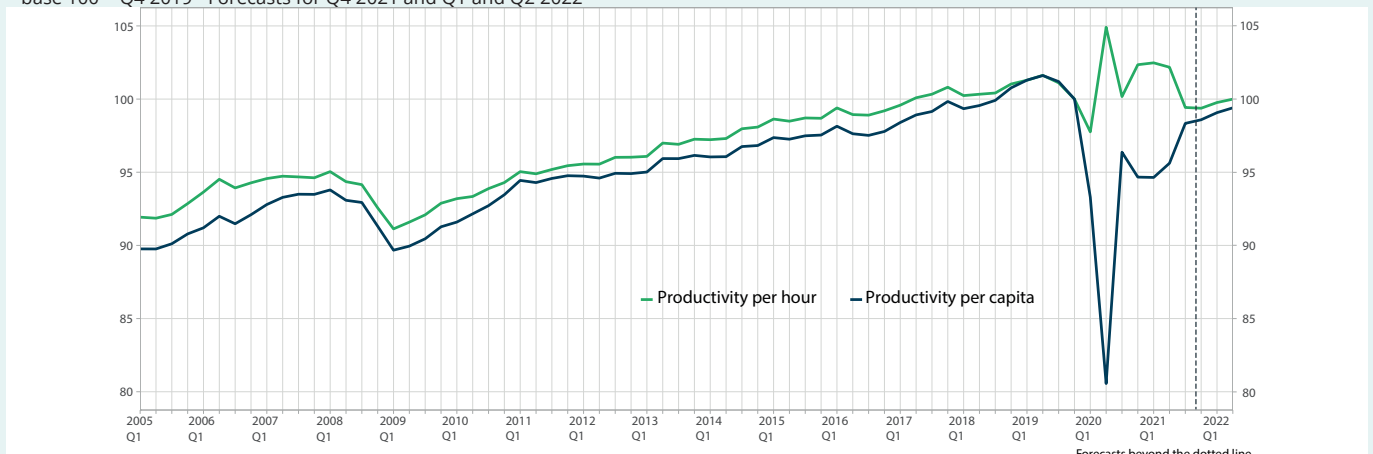
- downwards: by a possible lasting impact of the health restrictions and an effect of the crisis on human capital which might prove significant.

Over the forecasting period, hourly productivity should therefore return to its pre-crisis level or even a little higher, as in previous phases of acceleration in activity (► **Figure 7**). Also, per capita productivity should increase slightly more quickly, with a gradual fall in the level of use of the short-time working scheme (► **Employment sheet**). ●

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## ► 7. Apparent productivity of employees, hourly and per capita

base 100 = Q4 2019 - Forecasts for Q4 2021 and Q1 and Q2 2022



Scope: excluding real estate non-agricultural market sector excluding the real estate sector.

Source: INSEE, quarterly accounts