

Recruitment Difficulties and Firms' Characteristics: An Analysis of French Company Data

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Abstract – This article uses a survey conducted in 2019 among companies in the manufacturing sector on the recruitment difficulties they may encounter. By linking this information with the companies' income statements, we show that those facing these difficulties are, on average and other things equal, more productive than others. This suggests a potential misallocation of production factors, which would not be attracted by the most efficient companies. A very simplified estimation suggests that these inefficiencies could reduce the average productivity in the manufacturing industry by around 0.10% to 0.15%, which is low. The survey also enables us to analyse the causes of these difficulties. In addition to the problems of matching supply and demand in terms of skill levels in the labour force, the wages offered and the competition with other companies also appear to be key factors behind recruitment problems.

JEL Classification: J63, M5, J21, D22

Keywords: recruitment difficulties, productivity, unemployment, employment

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Recruitment difficulties reported by companies reached a peak, and in some cases even a record high, in numerous countries before the COVID-19 pandemic. The crisis led to a fall in these tensions, which, however, quickly rose again from late 2020/early 2021. In France, the high proportion of companies facing recruitment difficulties measured by INSEE as part of a European survey, or a survey conducted by Banque de France as part of its Monthly Business Survey, together with the number of vacancies as measured by the French Directorate for Research, Studies and Statistics (DARES), attest to these high tensions. The high mismatch between labour supply and demand reflected by the high levels of these indicators may seem paradoxical in a country such as France, which is still suffering from high unemployment. There is a fear that the post-COVID economic recovery and, beyond this, medium-term growth and reduction in unemployment, are being hamstrung by the difficulties faced by companies in finding suitable labour for their needs.

There may be a wide range of reasons behind these labour market shortages. They may equally be due to the supply of or demand for labour or a mismatch between the two. Recruitment difficulties may also reflect a misallocation of production factors, in particular depending on company size, and impact productivity.

The analysis below aims to improve the diagnosis of the nature and potential consequences of the recruitment difficulties encountered by French companies. It is based largely on responses given by industrial companies to a survey conducted in September 2019 by Banque de France as part of its *Enquête annuelle sur l'utilisation des facteurs de production* (Annual survey on the Use of Production Factors – UFP), which asks companies about their recruitment difficulties and the characteristics and consequences of these difficulties. The responses to this survey were matched with the FiBEn data (*Fichier bancaire des entreprises*) based on tax returns. These data were then used to develop, over the 2014-2019 period, indicators for company characteristics and performance (business growth, labour productivity, total factor productivity, economic or financial profitability, etc.). Combining these two sources of information, we develop an original dataset covering around 1,300 companies from the manufacturing sector.

Using these data, we estimate various models with the aim of studying the origins of these recruitment difficulties and their consequences

on production factor utilisation and production performance. To our knowledge, this analysis is the first of its kind to be based on data relating to recruitment difficulties from the company perspective.

The main results of the analysis are as follows. Firstly, productivity is significantly higher in companies experiencing recruitment difficulties than in others. Depending on various characteristics, the productivity of companies reporting recruitment difficulties is on average around 8% higher than other companies that had sought to recruit new employees in 2019. This suggests that recruitment difficulties are likely to lead to a misallocation of production factors, at a global level. Secondly, in companies identifying insufficient starting salary as the reason for their difficulties, the average salary is, on average, almost 2% lower than in other companies. Conversely, in companies identifying competition from other companies as the reason for their recruitment difficulties, the average salary is around 1.5% higher. Companies attributing their recruitment difficulties to insufficient salaries have lower profitability than other companies experiencing recruitment difficulties, which probably represents a constraint should they want to increase salaries.

The rest of the article is structured as follows. After a brief literature review (Section 1), Section 2 presents the changes in recruitment difficulties in France and other developed countries over the last few decades. The individual company data used in the empirical analysis are presented in Section 3, the results of the estimations are presented and discussed in Section 4, followed by our conclusion.

1. Recruitment Difficulties in Recent Empirical Literature

This section offers a brief literature review of the sources and potential consequences of recruitment difficulties.

1.1. Factors of Mismatch in Labour Supply and Demand

An initial factor of imbalance between the supply and demand of labour may come from demographics, for example in countries such as Germany, which is characterised by an enduring low fertility rate and an ageing population. Garloff & Wapler (2016), however, show that the demographic factor generally has a very weak impact, even in Germany and including in the future, as it is largely offset by other labour market adjustments, particularly the increase

in participation rates. A second factor may be insufficient geographical mobility of the labour supply compared with business demand. In the case of the United States, Marinescu & Rathelot (2018) found a geographical mobility reluctance in the labour supply (see also Kline & Moretti, 2013 and Rodríguez-Pose, 2018). However, according to their evaluation, significantly increasing worker mobility would provide only a minor contribution to reducing the mismatches on the US labour market. These results confirm those previously obtained, also in the USA, by Sahin *et al.* (2014) and Manning & Petrongolo (2017).

The imbalances on the labour market may also be one of the consequences of ongoing technological changes, which are profoundly changing the structure of the labour demand, while the labour supply is not changing quickly enough to meet this. Haskel & Martin (2001) show a growing mismatch in this regard in the United Kingdom. Autor *et al.* (2003) posit that technological changes, including computerisation and digitalisation, are eliminating manual and non-manual routine jobs and increasing the labour demand for non-routine positions, leading to a polarisation of the labour market. This perspective has generated a high volume of literature attributing to technological transformations a growing imbalance between the labour supply and demand in terms of qualification, and consequently an increase in structural unemployment (for a literature review and perspective on this, see for example Restrepo, 2015) and Aghion *et al.* (2019) show, using British data, that this structural change does not just affect qualified employees. The most innovative companies are also looking for less qualified employees with specific non-cognitive skills. Despite this significant upheaval on the labour market, associated with technological changes, there is less consensus on the extent of their impact on recruitment difficulties. For example Weaver & Osterman (2016) show that lasting imbalances in which the labour supply does not meet the demand relate, in the USA, only to very specific qualifications that are associated with new technologies. For Cappelli (2014), the labour supply in the USA is, in general, overqualified for the demand and the country is not suffering from a structural imbalance whereby the supply does not meet demand due to the unsuitability of qualifications. Furthermore, the unemployment rate in the USA and numerous other developed countries before the COVID-19 pandemic was at historically very low levels, which does not seem to reflect growing structural unemployment,

even though this overqualification of the labour supply for low- or medium-skilled jobs could have a long-term impact on employment, as suggested by Zago (2021).¹

These mismatches between worker qualifications and the positions they hold have also been the subject of extensive literature. For example, Büchel (2002) shows that, in Germany, workers who are overqualified for the positions they hold have higher productivity than those whose qualifications match their positions. Kampelmann & Rycx (2012) also show, using Belgian data, a favourable impact of employee overqualification on labour productivity. Recruiting overqualified employees could therefore be a deliberate choice on the part of companies.

1.2. Potential Consequences of Recruitment Difficulties

Barstelman *et al.* (2013) show that this misallocation based on company size could have a significant impact on average productivity. Garicano *et al.* (2016) estimate that, in France, the social thresholds, and more specifically the 50-employee threshold, lead to an unfavourable distribution of company sizes, the cost of which, in terms of GDP, is 1.3% to 3.4% of GDP.² Klinger *et al.* (2011), however, show that the recruitment difficulties encountered by German companies before the 2008 financial crisis had no significant impact on the retention of workers during the crisis.

More generally, the misallocation of production factors between companies depending on their productive efficiency can have very considerable effects on aggregate productivity. On the basis of individual company data from the late 1990s and early 2000s, Hsieh & Klenow (2009) show that an allocation comparable to that of the USA alone would increase the total factor productivity of the manufacturing sector by 30% to 50% for China and even 40% to 60% for India. In an evaluation carried out in France, Libert (2017) obtains similar orders of magnitude and shows that these effects can essentially be explained by a misallocation of labour over the 1990-2010 period, excluding the early 2000s. Hsieh *et al.* (2019) take the evaluation of labour misallocation even further by analysing the impact of racial and sexual discrimination in the USA, which causes some companies to miss out on talent. They show that the gradual reduction

1. For a recent literature review of the issues surrounding the skill mismatch on the labour market, see in particular Asai *et al.* (2020).

2. Aghion *et al.* (2021) show that these same thresholds reduce innovation and may therefore have an even greater impact on GDP.

in these forms of discrimination alone accounts for around 40% of the increase in GDP per capita in this country between 1960 and 2010. Even if this does not relate directly to recruitment difficulties, this discrimination could lead to significant losses in productivity if it concerns efficient companies in particular and leads to a misallocation of production factors.

2. Recruitment Difficulties and the Functioning of the Labour Market

Quantitative mismatches on the labour market can be characterised by recruitment difficulties and vacancy rates. The change in these indicators in France is presented here, followed by a comparison of labour market tensions with four other large EU countries.

2.1. Indicators of the Imbalances on the Labour Market in France

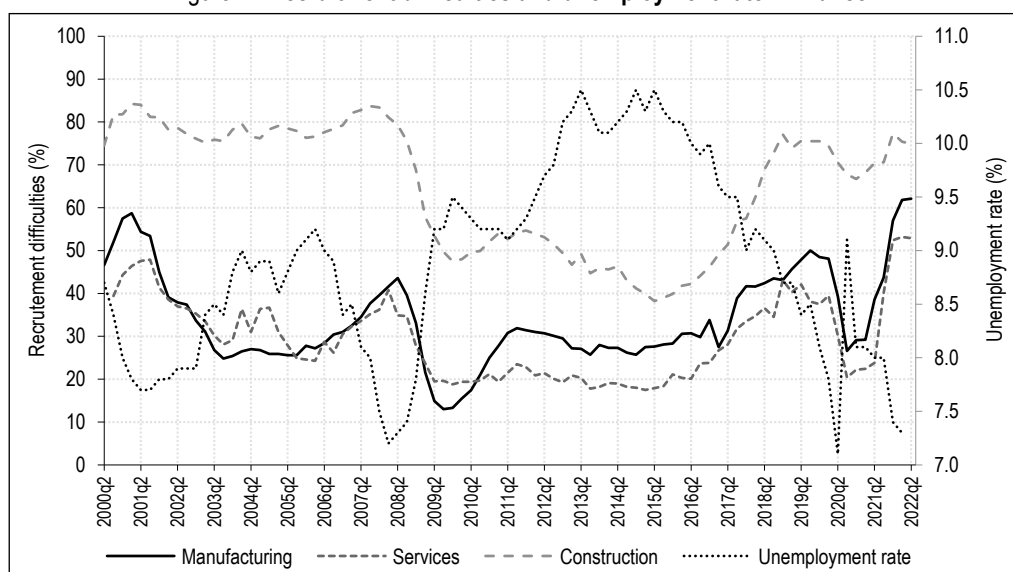
Recruitment difficulties experienced by companies are examined on the basis of a quarterly European Commission survey carried out in France by INSEE since the early 1990s as part of its *Enquête trimestrielle de conjoncture* (Quarterly Business Survey). The proportion of companies reporting recruitment difficulties has been on the rise in France in manufacturing industry, services and construction since mid-2015, a time when the unemployment rate was experiencing a downward trend (Figure 1). This proportion reached very high levels in late 2019, just before the COVID-19 pandemic, with around 50% of companies in industry reporting difficulties, 40% in services and 75% in construction. These levels had not been seen

since the early 2000s in industry and since the mid-2000s in services and construction. It then fell in 2020, with the emergence of the COVID crisis, before rising again at the end of 2020 (in industry) and in early 2021 (in services and construction). The levels reached in the third quarter of 2021 are similar to the high levels seen before the COVID crisis.

The Banque de France *Enquête mensuelle de conjoncture* (Monthly Business Survey), which, in 2021, asked companies about their recruitment difficulties, confirms this high tension level, with 48% of companies stating at the start of August that they experienced recruitment difficulties compared with 44% in June.

The other measure used to assess the difficulties in achieving a balance on the labour market is the vacancy rate. This rate has been measured quarterly by DARES since 2003 using the *Enquête sur l'activité et les conditions d'emploi de la main-d'œuvre* (ACEMO, Labour force activity and employment conditions survey). This survey considers the number of vacancies in relation to potential employment, which is total employment plus vacancies. The vacancy rate may change in a different way from the proportion of companies stating recruitment difficulties for multiple reasons, including the following three. Firstly, the sources of the two indicators are not the same. Secondly, recruitment difficulties do not necessarily mean immediate vacancies. Finally, if a company experiencing recruitment difficulties has the same weighting in the INSEE indicator described above, whatever the extent of those difficulties, it may have a different impact on the DARES

Figure 1 – Recruitment difficulties and unemployment rate in France



Source : INSEE, *enquête de conjoncture*.

indicator depending on the number of actual vacant positions.

The vacancy rate in France and the proportion of companies reporting recruitment difficulties have seen a sharp rise since 2015 and a downward trend in the unemployment rate (Figure II). At the start of the COVID-19 crisis in 2020, it fell in industry and services, while stabilising in construction, before starting to rise again and reaching historic peaks in the first quarter of 2021, at 1.2% in manufacturing industry, 1.4% in services and 1.7% in construction.

2.2. Labour Market Tensions: France Compared to Four Other EU Countries

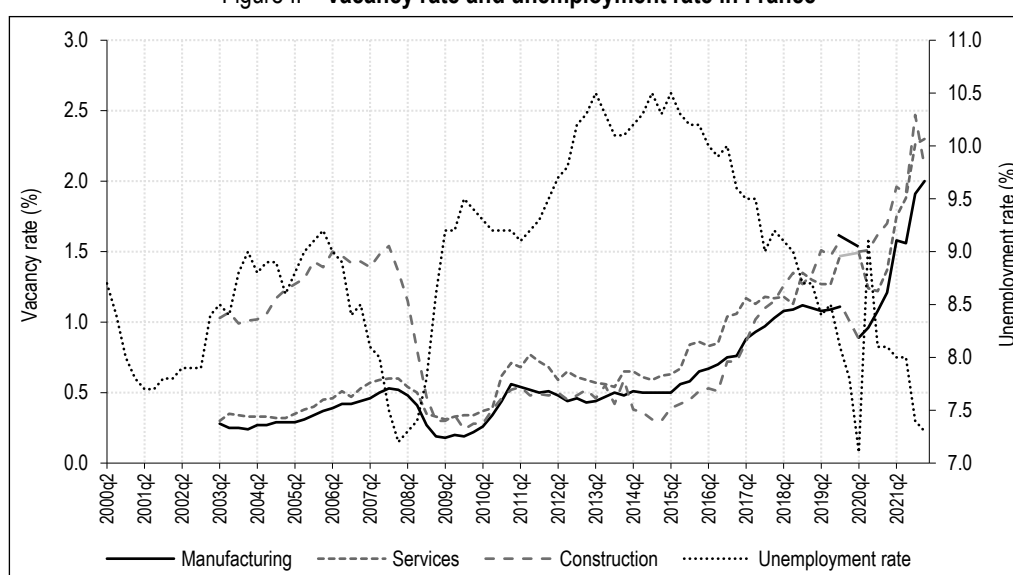
The two types of indicator show high tensions on the French labour market both before the COVID crisis and following the lockdown measures over the most recent quarters. Such a situation may be worrying if these tensions hinder the economic activity recovery over the next few years. To better understand these fears, INSEE also asks the companies, in its *Enquête trimestrielle de conjoncture*, whether the lack of labour is limiting their capacity to supply their goods or services. The proportion of industrial companies answering this question affirmatively changes relatively similarly to the question about recruitment difficulties, but at significantly lower levels as the question is more restrictive. After a fall at the start of the COVID crisis, this proportion has risen over the last few quarters, reaching 11.4% in the third quarter of 2021, which is a historically high level and just 3 percentage points below the historic peak seen in the first quarter of 2020 (Figure III). Among

the four other large countries of the euro zone, it appears that in the third quarter of 2021, this proportion was significantly lower in France than in Germany and the Netherlands (26% in both) but much higher than in Italy (3.3%) and Spain (5%).

The proportion of industrial companies whose service offer is limited due to a lack of labour in the euro zone reveals a hierarchy that seems to be consistent with that seen in relation to the rate of unemployment which, in recent times, has been significantly lower in Germany and the Netherlands than in France, where it is in turn lower than in Italy and Spain. To illustrate this relationship more accurately and compare these countries, we have calculated Beveridge curves.

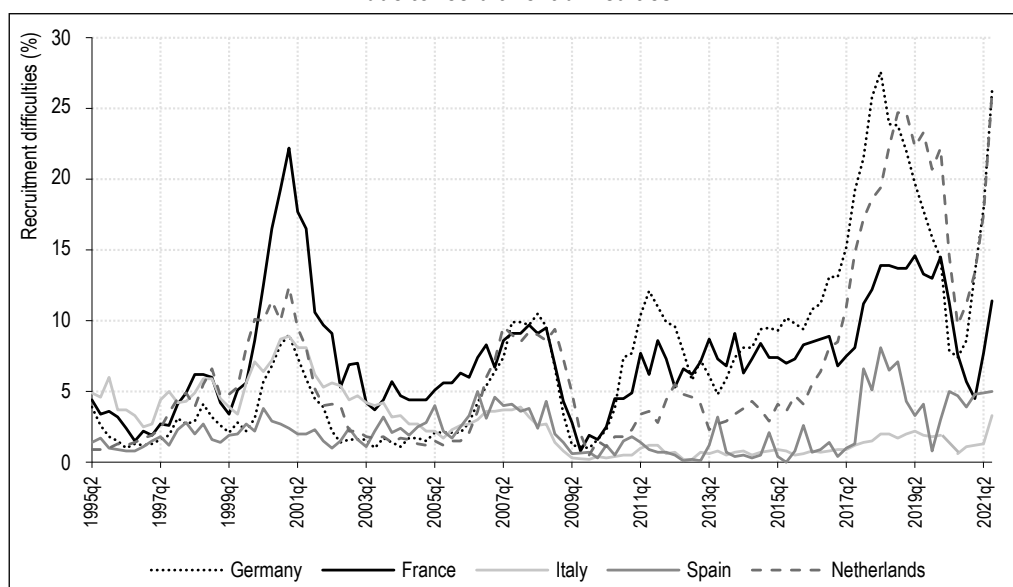
Deriving its name from the English economist William Beveridge (1879-1963), the Beveridge curve represents, on one quadrant, the vacancy rate and the unemployment rate. It is normally a downward curve: the higher the unemployment rate, the lower the vacancy rate. A movement of this curve along the bisector provides information on the change in how the labour market is functioning. For example, an upward movement along the bisector shows a deterioration in the balance between the labour supply and demand: the same employment rate is associated with a higher vacancy rate. Conversely, a downward movement along this bisector shows an improvement in the balance: the same employment rate is associated with a lower vacancy rate. One of the aims of structural labour market reforms is therefore to move the Beveridge curve towards the bottom of the bisector and to improve the

Figure II – Vacancy rate and unemployment rate in France



Sources: DARES, ACEMO survey.

Figure III – Proportion of industrial companies (in %) reporting supply restrictions due to recruitment difficulties



Sources: European Commission, Quarterly Business Survey.

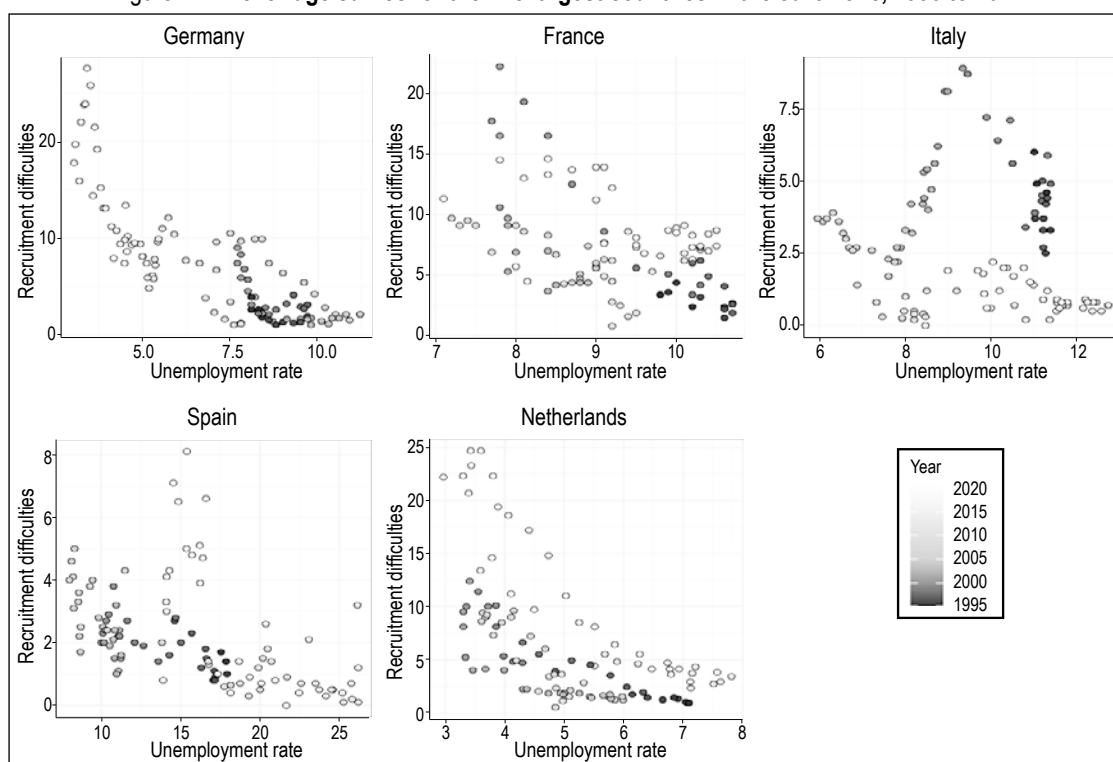
match between the labour supply and demand and thereby the quality of the functioning of the labour market. Figure IV shows the Beveridge curves for the five largest countries in the euro zone for each quarter since 1995. The unemployment rate is measured in the meaning of the ILO and the vacancy rate here is replaced by the number of industrial companies whose service offer is limited due to recruitment difficulties. The most recent points of these curves (from the second quarter of 2020 onwards) are weakened by an unemployment rate measurement affected by transitional changes in working behaviour in the context of the COVID crisis, especially during the lockdown periods.

Germany is characterised by a relatively stable Beveridge curve over this period, with the situations observed shifting from high unemployment rates and low recruitment difficulties at the start of the period to situations of low unemployment and high recruitment difficulties. This shift on the relatively stable Beveridge curve occurred from the mid-2000s and was brought about as a result of the Hartz reforms on the labour market (for a literature review and analysis of the Hartz reforms, see for example Bouvard *et al.* 2013). Although blurred by considerable fluctuations in recruitment difficulties, the Beveridge curve also seems relatively stable in France, although it sits higher on the bisector than in Germany (the same unemployment rate being associated with greater recruitment difficulties), which suggests a labour market functioning less efficiently. The curve in Spain also seems to be relatively stable, although also

relatively blurred by considerable fluctuations in the unemployment rate and consistently minor recruitment difficulties. In the Netherlands, the curve shifted sharply towards the top of the bisector after 2010, which suggests a deterioration in the functioning of the labour market in this country (the same unemployment rate associated with more significant recruitment difficulties at the end of the period than at the start). Conversely, the Beveridge curve for Italy moved sharply towards the bottom of the bisector after 2000, even though the country maintained consistently minor recruitment difficulties, which here suggests an improvement in the functioning of the labour market (the same unemployment rate here is associated with less significant recruitment difficulties at the end of the period than at the start).

The situation in France, compared with the other large euro zone countries, is characterised by levels of recruitment difficulties that seem high given the relatively high unemployment rate. The analysis carried out by Niang & Vroylandt (2020) of the tensions on the French labour market before the COVID crisis shows that, in addition to the short-term imbalances in an economy where employment experienced significant growth, these tensions relate to two types of professions. Firstly, more qualified professions, for example in industry. The tensions here result from a structural lack of labour supply for business needs and reflect a lack of training and suitability of this labour supply. Secondly, less qualified professions, for example home help, or even in hotels, cafés and

Figure IV – Beveridge curves for the five largest countries in the euro zone, 1995 to 2021



Note: Each point represents, for a given quarter, the unemployment rate and the proportion of companies whose service offer is limited by recruitment difficulties.

Reading Note: In France, in the first quarter of 2005, the unemployment rate was 8.7% and 4.4% of companies reported recruitment difficulties.

Sources: INSEE.

restaurants. For this second type of profession, the tensions reflect a lack of attractiveness in a country that still has a high unemployment rate, such as France.

Finally, the *Enquête Besoins en main-d'œuvre* (Labour force needs survey) carried out by Pôle emploi makes it possible to measure the geographic heterogeneity of the labour market balance difficulties. Figure V, based on the 2019 survey, shows significant geographic variation that is negatively correlated to the variation in the unemployment rate, with greater recruitment difficulties in the departments with a lower unemployment rate.

The findings from the responses given to the survey on production factors conducted among industrial companies by Banque de France in September 2019, in which several questions were added to ask about recruitment difficulties, can be used to improve this diagnosis.

3. Data and Indicators

In this section, we begin by describing the construction of the database and the variables available in relation to recruitment difficulties before providing greater detail on the indicators used in the analysis.

3.1. The Database

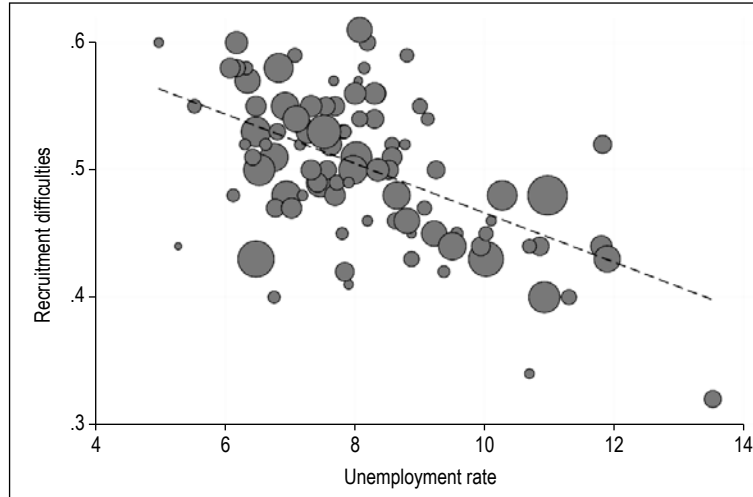
This analysis uses two very extensive databases: the FiBEn data and the responses to a survey carried out in September 2019³ on the use of production factors and recruitment difficulties (UFP). These two databases have been developed by Banque de France.

FiBEn contains annual accounting data for companies with turnover of over €750,000 or loans of over €380,000. These data cover around 200,000 companies. They provide information on the characteristics of the companies, such as their sector of activity and staff numbers, as well as on numerous accounting elements, and make it possible to conduct an annual estimation of labour productivity, capital stock, total factor productivity for labour and capital, their profitability, etc.

The UFP database comes from a survey carried out each September since 1989 and provides information on the use of the capital and labour production factors. It is conducted among

3. The survey uses the first week of September (in which all days fall within September) as the reference week. For 2019, the establishments were invited to answer the questions using the week from 2 to 8 September as the reference week, but were permitted to choose another week within this month if they did not deem the week specified to be suitable.

Figure V – Unemployment rate and proportion of planned recruitments that were difficult in 2019



Note: Each point represents a department of metropolitan France and its size is proportional to its population. The equation of the linear regression is as follows: $\text{Unemployment rate} = (-16.7 * \text{Recruitment difficulty}) + 16.59$ ($R^2=0.32$).
Sources: Pôle emploi, Enquête Besoins en main-d'œuvre 2019.

establishments in the manufacturing industry (excluding oil industry and extraction) with at least 20 employees. This original survey asks the establishments about their staff numbers, their production capacity utilisation rate, their use of shift work, the working time of their employees, and the variations in the utilisation of their equipment. Since 2015, a new section of the survey relates to a specific subject each year. In 2019, it focused on recruitment difficulties, and 1,369 complete responses were received by Banque de France.

The 2019 edition of the UFP survey included questions on companies' vacant positions and recruitment difficulties. The four questions asked in the survey and used in the analysis are the following:

(i) How many positions are you currently seeking to fill?

(ii) For how many of these positions are you experiencing recruitment difficulties?⁴

(iii) Have your business activities been hampered by these potential recruitment difficulties?

(iv) Are the following factors [insignificant, minor, significant or major] recruitment obstacles?

- Lack of labour force with the required skills in the proximity of the establishment or company or on the local labour market or throughout the French territory;

- Low attractiveness of starting salaries;

- Difficult working conditions (physical strain, aggressive environment, repetitive tasks) or employment conditions (employment contract, restrictive working hours);

- Competition from other employers;
- Poor image of the establishment or company, business sector or position.

In order to reconcile the UFP database to the FiBEn database, we first reconstruct company data from the UFP database where multiple establishments had been surveyed. For each variable, this reconstruction uses weighted averages for which the weighting coefficients were the staff numbers of each establishment.

The two databases were merged using SIREN identifiers.⁵ The merged database underwent the usual clean-up in order to remove unusable observations, outliers or extreme values at the edge of the distribution.⁶ Once this clean-up was complete, the database covered 1,282 companies from the manufacturing industry and provided information on numerous economic variables about the companies for the period 2015-2019 as well as their production factor utilisation and recruitment difficulties for 2019 only. The estimations are generally made for a more limited number of companies, those for which all the variables, including control variables, are available.

4. The definition of a difficult-to-fill position is at the respondent's discretion.

5. The FiBEn database covers accounting data for all of a company's establishments, while the UFP survey provides information of the situation at an establishment. Merging the two databases assumes that establishments belonging to the same company are homogeneous in terms of accounting data. A large majority of the observations, however, relate to single-establishment companies.

6. The clean-up method is the same as that used on a comparable sample by Cette et al. (2021), which can be referred to for more details.

While the UFP survey relates to one company establishment, this is not the case for the FiBEN database, which covers the entire company (all establishments together). In the case of multi-establishment companies, we assume the company's establishments are homogeneous. As part of our analysis, we assign the company the recruitment patterns of the establishment responding to the survey.

Our sample relates to a restricted proportion of establishments in the manufacturing industry (excluding oil industry and extraction) with at least 20 employees. To make this representative of the reality in the manufacturing industry, it has been adjusted using weighting coefficients applied to each company. These individual weighting coefficients adjust the sample so that the weighting (in terms of number of employees⁷) of the four sectors by five company sizes considered here corresponds to that of the total population of companies. All the results presented in this article use this adjustment, which makes the descriptive statistics and the econometric estimations more easily transposable to the entire French manufacturing sector.

3.2. Construction of the Analysis Variables

The variables available in the UFP survey have been presented above. The accounting information from the FiBEN database makes it possible to calculate numerous indicators. The construction of these indicators is explained here for value added, productivity indicators and profitability indicators.

The volume of value added (Q) is the value added in nominal terms divided by a sector-based value added price index calculated at the NAF (French classification of business activities) division level and published by INSEE. The simplest measure of productivity, labour productivity (LP), compares the volume of value added (Q) to FTE staffing levels (L). We can therefore define the labour productivity for each company i :

$$LP_i = \frac{Q_i}{L_i}$$

This measure has the advantage of being conceptually simple, but it does not take into consideration differences in capital intensity between companies. We therefore use another measurement, total factor productivity (TFP):

$$PGF_i = \frac{Q_i}{K_i^{\alpha_K} H_i^{\alpha_L}}$$

where K is the productive capital stock and H is a measurement of human capital. The capital stock is calculated by adding the estimates

of the real value of capital stock in terms of buildings, transport equipment, other physical equipment and immaterial capital. These values are obtained using the gross value of property, plant and equipment for each asset class and an estimation of their age based on the amortised portion of the asset and on an assumption regarding the standard lifetime of that asset.⁸ To calculate the capital volume, the value of each asset is deflated using a national price index for each investment type.⁹ In this calculation, the price index of each asset class is set back by the average age of that asset. We approximate the human capital H using the sum of salaries and wages received by employees. The Online Appendix (see link at end of article) presents the results with different options for measuring these different quantities.

In order to estimate the parameters α_L and α_K , we estimate a production function by using the method put forward by Akerberg *et al.* (2015). As explained in Online Appendix S2, the TFP measurement obtained in this way is the one that we use in our primary results as the estimation methodology is more general than those often used elsewhere, specifically that used by Levinsohn & Petrin (2003). However, we have also included in the appendix the results obtained using the different TFP calculations, firstly using the method put forward by Levinsohn & Petrin (2003), then by calculating the α_L and α_K coefficients by assuming that α_L is equal to the share of the labour cost in value added, calculated on average for each sector and $\alpha_L = 1 - \alpha_K$ (assumption of constant returns to scale).

Our central TFP measurement is therefore that obtained by estimating a production function following Akerberg *et al.* (2015) using a value added approach (rather than a production-based approach) and approximating the human capital stock using the total salary level within the company (the alternative measures are briefly presented in Table S1-1 in the Online Appendix).

Different measures of company profitability are also calculated. Firstly, an indicator of the share of profits in value added, or the profit margin (MR), which corresponds to the residual part of value added once all labour-related expenses

7. These weightings are those provided by the survey; however, please note that they are affected by recruitment difficulties.

8. With an assumed average lifetime of 15 years for buildings, 5 years for transport material, 8 years for other equipment and 6 years for immaterial assets.

9. As for labour productivity, in the absence of a price index at company level, the TFP and labour productivity measurements that we develop include potential differences in price between the company and the sector average.

have been paid. In accounting terms, this is therefore equivalent to the share of the gross operating surplus in value added, or in other words, the unit minus the labour cost share. Secondly, a markup indicator (*markups*) for the labour cost, corresponding to the ratio of the value added to the labour cost, both considered in nominal terms. Finally, two profitability indicators: the economic profitability rate (*ERR*) and the financial profitability rate (*FRR*). The economic profitability rate compares the gross operating surplus to capital committed to production (equity and borrowed capital). The financial profitability rate compares the net profit (gross operating surplus minus interest charges, exceptional expenses and taxes) to the company's equity.

Finally, we construct different variables to be used as controls in the regression: the average number of hours worked per employee and the production capacity utilisation rate, both taken directly from the UFP survey, and a measure of the level of use of external staff calculated using FiBEn data by taking the ratio between expenditure for staff provided by a temporary staff agency and loaned staff, and the total wage bill (including external staff). These variables make it possible to measure the extent to which the company is over- or under-using its production capacity, which may be measured incorrectly in the productivity measurement that we use and could also change as a result of potential recruitment difficulties.

3.3. Descriptive Statistics

Table 1 describes the final database synthetically. Our study covers around 1,200 companies

operating in 2018 and 2019 and for which we can measure both total factor productivity and the level of recruitment difficulties.

Regarding behaviour in terms of recruitment, the vast majority (79%) of the establishments in this sample are looking to recruit employees irrespective of socio-professional category and a large proportion of them have difficulty in filling these positions (69% of the total or 87% of companies looking to recruit).

These proportions may seem high but should be qualified by the absence of establishments with fewer than 20 employees, which are less likely to recruit than larger establishments. As regards the high proportion of establishments facing recruitment difficulties, this can be explained by the average size of the establishments surveyed and by the broad definition of 'recruitment difficulties', which was left at the respondents' discretion.

However, recruitment difficulties are deemed to be significant in numerous analyses¹⁰ and have been on the rise since at least 2016 (INSEE, 2018; 2022), as shown also in Figure II using DARES figures. According to Niang & Vroyland (2020), 50.1% of planned recruitments in 2019 were deemed difficult by companies compared with 32.4% in 2015, across all sectors. This last figure is consistent with the DARES Ofer 2016 survey (DARES, 2016 and Lhommeau & Rémy,

10. The analyses and surveys adopt different definitions of the term 'recruitment difficulties'. This explains the wide differences in levels between the surveys, some of which refer to 'anticipated', 'experienced' or 'current' recruitment difficulties, with even the same term hiding, in some cases, more or less specific assumptions.

Table 1 – Descriptive statistics of the main variables of the working database

	Mean	Standard error	1 st quartile	3 rd quartile
Looking to recruit	0.79	0.41	1	1
Recruitment difficulties	0.69	0.46	0	1
Sales (in thousand euros)	127,154	1,901,620	6,775	45,172
Employment (number of employees)	265	1,525	38	182
LP (log)	4.13	0.44	3.88	4.40
PCU	0.77	0.16	0.70	0.90
RatOut	0.31	0.18	0.17	0.41
Average hours	36.2	3.15	35	38
Average salary (in thousand euros)	35.7	8.38	29.9	40.2
Number of observations	1,175			

Notes: The PCU variable measures the rate of production capacity utilisation (between 0 and 1) and the RatOut variable the cost of external personnel compared to the total labour cost (internal and external). The values given here are not adjusted for weighting. The average salary is calculated by comparing the ratio of salaries and wages on the company's balance sheet to the average employment for the year. Reading note: In 2019, 79% of companies were seeking to recruit and 69% experienced recruitment difficulties. Average sales were 127 million euro. Sources and coverage: Banque de France, UFP 2019 and FiBEn; companies in the manufacturing industry (excluding oil industry and extraction) with at least 20 employees, that were in operation in 2018 and 2019 and for which we can measure productivity and the presence of any recruitment difficulties.

2019) according to which 17% of recruitments made in 2015 were difficult. While the level of recruitment difficulties varies depending on sector or qualification level, it has been experiencing an upward trend across all sectors of the economy since 2015 (Niang & Vroyland, 2020). Nevertheless, a hierarchy remains, with some sectors worse affected than others, primarily industry, in which tensions are much higher than for the rest of the economy, with 20% of recruitments deemed to be difficult in 2015 (Lhommeau & Rémy, 2019). Regarding the dynamics, recruitment difficulties are rising sharply against a background of falling unemployment and are affecting the manufacturing sector in particular, which is seeing recruitment difficulties rise more quickly (from an already high level) than the other sectors of the French economy: indeed, as Figure I shows, recruitment difficulties have been constantly higher in industry than in services since 2010.

4. Analysis of Recruitment Difficulties in 2019

This section attempts to provide an explanation to answer the following question: are the companies that have experienced recruitment difficulties different from those that have not and to what extent do these differences inform on the reasons for these difficulties?

Unfortunately, the data we have do not enable us to implement an identification strategy based on the change in a company's status in terms of recruitment difficulties that we can monitor over time. In fact, we only have one snapshot, from 2019, of the sample of companies in the industrial sector. We therefore use a simple model that allows us to directly measure productivity differences between the group of companies experiencing recruitment difficulties and other companies, conditional upon a number of observables. These control variables play two distinct roles. Firstly, they allow us to compare companies based on size and sector; secondly, they allow us to check for a certain number of factors likely to impact the productivity level observed in 2019: average salary and intensity of production factor utilisation. To limit simultaneity problems, we use these different variables from 2018 where possible.¹¹

We therefore assume that the TFP level (in log form) for a company in 2019 is explained linearly by these control variables and introduce an order 1 autoregressive structure to better capture the inertia in changes in the TFP level. This model is therefore similar to that described

by Cahn & Saint-Guilhem (2010) and corresponds to the equation (1) below:

$$y_{i,2019} = \alpha \cdot y_{i,2018} + \beta \cdot D_i + X_i \cdot \gamma + v_{s(i)} + \varepsilon_i \quad (1)$$

in which y is our variable of interest (in log form), α is the coefficient of an autoregressive term and D is a variable measuring recruitment difficulties (1 if the company experienced difficulties in 2019, 0 if not). X is a vector of control variables from both the balance sheet data and the survey and which allow us to record any potential measurement errors associated with the use of production factors and size effects. Lastly, $v_{s(i)}$ is a sector-based fixed effect (NAF code level 2). We estimate this model by the generalised least squares method using a weighting matrix as described in the section above. The error vector ε is estimated so as to allow for a correlation within the same department-sector cell in order to take into account the existence of possible local shocks (clustering method).¹² In this model, the average TFP difference between the group of companies for which $D=0$ and the other group corresponds to the value of $\beta / (1 - \alpha)$.

4.1. Recruitment Difficulties and Productivity in Companies

While the variable of interest is productivity, the estimated value of β is the average productivity difference in percentage points in a company with recruitment difficulties depending on the control variables. For each model, we only use companies stating a desire to recruit in 2019 (79% of companies surveyed). This restriction does not have any significant impact on the estimation outcomes. Among these companies, only 13% did not state that they had experienced recruitment difficulties over the course of the year. These companies are therefore our control group ($D=0$). The results of this estimation are shown in Table 2.

The most complete model, which covers all the control variables (column 4), only includes companies that sought to recruit in 2019 (932 observations) and introduces sector-based fixed effects and controls for the production capacity utilisation (PCU) rate, average hours worked and the ratio between the costs of outsourced labour and the total wage bill. The coefficient β is estimated with an average value of 0.077, which suggests that, other things equal,

11. i.e. where we can obtain a measurement of these variables using the FIBEn master index. Where this variable comes from the master index of the UFP survey, which only covered recruitment difficulties in 2019, this time difference is not possible.

12. We use the UFP survey sector classification (4 sectors).

Table 2 – Total factor productivity (TFP) and recruitment difficulties

	(1)	(2)	(3)	(4)	(5)
TFP in 2018 (log)	0.714*** (0.089)	0.696*** (0.087)	0.685*** (0.087)	0.684*** (0.087)	
Recruitment difficulties	0.072** (0.035)	0.070** (0.035)	0.073** (0.034)	0.077** (0.034)	0.126** (0.063)
Employment in 2018 (log)		0.002 (0.008)	-0.001 (0.008)	-0.005 (0.008)	-0.005 (0.019)
Average salary in 2018 (log)		0.187*** (0.057)	0.197*** (0.057)	0.173*** (0.053)	0.287*** (0.079)
Average hours (log)			0.187*** (0.057)	0.177*** (0.055)	0.340*** (0.120)
PCU				0.032 (0.082)	0.110 (0.158)
RatOut				0.151*** (0.049)	0.165** (0.069)
Adjusted R^2	0.655	0.672	0.679	0.682	0.259
Number of observations ⁰⁾	935	935	935	932	947

⁰⁾ In the estimations presented in this and the following tables, the number of observations may change slightly from one estimation to the next as information for some variables is not always available.

Notes: Each column corresponds to an OLS regression of model (1) where the dependent variable is the TFP level (in log) calculated in 2019. Each line corresponds to an explanatory variable. The recruitment difficulty variable is valued at 1 if the company states that it has positions that are difficult to fill. The model includes a sector-based fixed effect (NAF code, level 2) and is weighted by using the weightings in the survey (cf. Section 3). The standard errors given in brackets are estimated by allowing an autocorrelation within the same sector of activity of the same department; ***, ** and * indicate a p -value of below 1%, 5% and 10%, respectively.

Sources and coverage: Banque de France, UFP 2019 and FiBE; companies in the manufacturing industry (excluding oil industry and extraction) with at least 20 employees, that were in operation in 2018 and 2019 and for which we can measure productivity and the presence of any recruitment difficulties.

a company experiencing recruitment difficulties is 7.7% more productive than a comparable company not experiencing such difficulties. The other columns in Table 2 show variations around this specification.

The introduction of control variables has little quantitative impact on the estimation of β (columns 1, 2, 3 then 4). The coefficients of control variables ‘average salary’, ‘PCU’ et ‘RatOut’ are positive and meaningful. In relation to average salary, this corresponds to an implicit inclusion of the average qualification level. In terms of the production capacity utilisation (PCU) rate, this corresponds to a direct inclusion of the intensity of utilisation of the production factors available within the company. Lastly, regarding the use of subcontracting (RatOut), this relates to a more indirect inclusion of factor utilisation, as this use of external resources may logically increase with the lack of internal production capacity. Including companies not seeking to recruit in the control group ($D = 0$) reduces the estimated value of the coefficient, which still remains statistically different from zero.

The productivity gap of companies encountering recruitment difficulties could indicate that those companies are more productive and therefore potentially focus more on seeking specific and rarer skills. However, it is also possible that these companies are also more restricted and therefore seek to maximise their production capacities to offset the lack of labour force, which could increase their productivity. In order to limit this bias, we control the estimations made using various measurements of production factor utilisation in the most complete models.

This only marginally affects the estimation results. There are also other elements that could bias the estimation of coefficient β . For example, local labour market conditions could be an omitted variable that explains both productivity levels and recruitment difficulties. Table S1-2 in the Online Appendix, however, shows that the outcomes are affected to only a minor extent by adding a department-based fixed effect to the model.¹³ In relation to potential measurement errors linked to the TFP calculation, Figure S1-I in the Online Appendix shows how the estimations of β are affected when the model presented in column 4 is estimated by changing the productivity measurement. In general, the average effect estimated lies between 5 and 10% and is significantly different from zero at the usual thresholds.

Using these estimation outcomes, we conducted an exercise to estimate the total factor productivity gains that could be obtained if there were no recruitment difficulties. This calculation corresponds to a comparative statics exercise and is based on very simplistic assumptions. Its sole value lies in the fact that it gives an idea of the consequences of recruitment difficulties on the average production performance of the French manufacturing industry. Two calculations are carried out. In the first one, we assume that recruitment difficulties disappear suddenly and that the companies affected find the personnel they require, without their productivity changing. This increases total employment, this increase

13. The estimation uses the same weightings as the other estimations presented in this article, although it should be noted that these weightings were not designed to guarantee representativeness at departmental level.

being equal to the number of positions with recruitment difficulty. In the second calculation, we assume that instant job transfers take place from companies without recruitment difficulties to those with recruitment difficulties, whereby total employment remains unchanged. In the two calculations, the average productivity of the manufacturing industry is increased as employment and production in companies experiencing recruitment difficulties, which have a higher average productivity level than those without recruitment difficulties, are increased.¹⁴ Based on the estimation outcomes given in Table 2, we assume that the average productivity gap between companies with and without recruitment difficulties is 7%. This simplistic calculation is also carried out on the recruitment difficulties reported by companies in 2019 in the Banque de France survey used here for the estimations. This exercise shows that the gain in average productivity in the manufacturing industry that would result from an instantaneous disappearance of recruitment difficulties would be between 0.10% and 0.15%. This does not put aside the important issue of recruitment difficulties, but this potential gain appears to be of limited scope.

4.2. Reasons for Recruitment Difficulties

To better characterise the sources of these recruitment difficulties, we estimate the extent to which the positive productivity gap of companies facing recruitment difficulties can be explained by one or another of the potential obstacles reported by the company. As explained in section 2, these obstacles may fall into five categories (not mutually exclusive): (1) lack of labour force; (2) unsatisfactory hiring conditions (salary, contract, etc.); (3) difficult working/employment conditions; (4) competition on the job market and (5) company image problem. We define a variable D_i^k with value 1 if obstacle $k = 1, \dots, 5$ is described as significant or major by

company i . It should be noted that almost all establishments give the reason of a lack of labour force, which assumes a lack of candidates, *a fortiori* candidates with suitable skills (Table 3). Establishments admit that their starting salaries may be too unattractive, but also point to the high level of competition with other employers. These results are consistent with those of other surveys. The DARES survey on successful recruitments for the entire French economy, indicate that 60% of employers report a lack of candidates or unsuitable candidates (Lhommeau & Rémy, 2019). Competition with other employers is cited by 29% of these companies, while 23% state an image problem for the establishment, the sector of activity or the position.

We therefore calculate model (1) (in the version given in column 3 of table 2) by replacing variable D with variable D^k for each k value. The estimation outcomes are shown in Table 4. Column 1 of Table 4 includes all the obstacles at the same time while columns 2 to 6 each correspond to a particular obstacle.

The coefficient associated with the salary reasons is positive but not significant in column 1 and significantly correlated to productivity in column 3. The result is the same when different productivity measures are used (see Online Appendix, figure S1-III). The coefficients associated with a lack of labour force are positively correlated to the lack of labour force when they are estimated in column 2, but are not accurately

14. If we take G1 and G2 as the average productivity gain for these two assumptions, we have:

$$G1 = EP \cdot [(Edif + Ndif) / (Edif + Endif + Ndif) - Edif / (Edif + Endif)] \text{ and } G2 = EP \cdot [Ndif / (Edif + Endif)],$$

where EP is the average productivity gap between companies with and without recruitment difficulties, Ndif is the number of positions affected by recruitment difficulties, Edif is the total employment of companies experiencing recruitment difficulties and Endif is the total employment of companies not experiencing recruitment difficulties. This necessarily gives $G2 > G1$. With the data used here, we have Edif = 69%, Endif = 31%, Ndif = 2%, as a percentage of total employment in the manufacturing industry.

Table 3 – Proportion of companies (%) reporting a 'significant' or 'major' obstacle to recruitment in 2019

Reason for recruitment difficulties	All companies	Companies with recruitment difficulties
Lack of labour force	83	94
Low attractiveness of starting salaries	48	54
Difficult working and employment conditions	27	31
Competition from other employers	59	67
Image problem for the company, sector or position	23	26
Recruitment difficulties	88	100

Notes: The results are weighted to more closely represent the reality in the French manufacturing sector. Only companies reporting that they attempted to recruit are included in the sample (934 observations). Several responses are possible at the same time. Sources and coverage: Banque de France, UFP 2019 and FiBen; companies in the manufacturing industry (excluding oil industry and extraction) with at least 20 employees, that were in operation in 2018 and 2019 and for which we can measure productivity and the presence of any recruitment difficulties.

Table 4 – Total factor productivity and recruitment difficulties for various reasons⁽ⁱ⁾

	(1)	(2)	(3)	(4)	(5)	(6)
TFP in 2018 (log)	0.692*** (0.085)	0.690*** (0.088)	0.697*** (0.088)	0.690*** (0.091)	0.690*** (0.091)	0.688*** (0.091)
Employment in 2018 (log)	-0.006 (0.008)	-0.005 (0.008)	-0.004 (0.008)	-0.003 (0.008)	-0.004 (0.008)	-0.004 (0.008)
Average salary in 2018 (log)	0.178*** (0.054)	0.173*** (0.054)	0.174*** (0.054)	0.175*** (0.052)	0.169*** (0.052)	0.168*** (0.053)
Average hours (log)	-0.019 (0.079)	-0.025 (0.082)	-0.026 (0.079)	-0.035 (0.080)	-0.035 (0.080)	-0.039 (0.080)
PCU	0.145** (0.058)	0.171*** (0.056)	0.162*** (0.057)	0.168*** (0.057)	0.173*** (0.057)	0.166*** (0.056)
RatOut	0.154*** (0.050)	0.151*** (0.049)	0.139*** (0.047)	0.146*** (0.048)	0.142*** (0.047)	0.144*** (0.048)
Reasons for difficulties						
Lack of labour force	0.054 (0.036)	0.051 (0.032)				
Wages	0.032 (0.021)		0.032* (0.018)			
Difficult conditions	0.007 (0.023)			0.020 (0.020)		
Competition	-0.017 (0.021)				0.004 (0.017)	
Image	-0.045** (0.022)					-0.028 (0.019)
Adjusted R ²	0.684	0.680	0.679	0.677	0.677	0.678
Number of observations	933	933	933	933	933	933

⁽ⁱ⁾ The estimated model is the same as in column 3 of Table 2.

Notes: Cf. Table 2.

Sources and coverage: Banque de France, UFP 2019 and FiBEn; companies in the manufacturing industry (excluding oil industry and extraction) with at least 20 employees, that were in operation in 2018 and 2019 and for which we can measure productivity and the presence of any recruitment difficulties.

estimated in column 1, although this depends on the productivity measurement used (see Online Appendix, figure S1-II). All reasons for recruitment difficulties seem to be associated with a productivity level that is greater than or similar to that of companies without difficulties, except for the reason of company or business activity image problems, which is linked to considerably lower productivity, which may be due to lower employee motivation in these companies, although the coefficient is not estimated very precisely.

4.3. Recruitment Difficulties and Salary

The findings above suggest that the productivity differences associated with recruitment

difficulties are at least partly the consequence of insufficiently attractive salary conditions. To attempt to explain these results, we recalculated model (1) by replacing the dependent variable with the logarithm of the average salary in the company.

The results in Table 5 confirm that companies with recruitment difficulties for salary reasons have, all other things being equal, an average salary that is on average 1.8% lower than other companies. Conversely, companies with recruitment difficulties associated with a lack of labour force have a 1.6% higher average salary. There may be multiple explanations for this outcome. Firstly, the fact that companies faced with a

Table 5 – Average salary and recruitment difficulties⁽ⁱ⁾

	(1)	(2)	(3)	(4)	(5)	(6)
Salary in 2018 (log)	0.890*** (0.029)	0.893*** (0.030)	0.888*** (0.030)	0.889*** (0.030)	0.894*** (0.030)	0.892*** (0.030)
Employment in 2018 (log)	0.004 (0.003)	0.005 (0.003)	0.005* (0.003)	0.005 (0.003)	0.005* (0.003)	0.005 (0.003)
Average hours (log)	-0.002 (0.040)	0.002 (0.043)	-0.007 (0.041)	0.002 (0.043)	0.002 (0.042)	0.001 (0.042)
PCU	0.024 (0.021)	0.024 (0.022)	0.028 (0.021)	0.025 (0.022)	0.017 (0.022)	0.023 (0.022)
RatOut	-0.010 (0.023)	-0.008 (0.025)	-0.011 (0.025)	-0.012 (0.026)	-0.012 (0.025)	-0.010 (0.025)
Reasons for difficulties						
Lack of labour force	0.030*** (0.009)	0.016* (0.008)				
Wages	-0.018* (0.009)		-0.018** (0.008)			
Difficult conditions	-0.007 (0.009)			-0.011 (0.009)		
Competition	-0.014 (0.009)				-0.013 (0.008)	
Image	0.004 (0.010)					-0.002 (0.010)
Adjusted R ²	0.912	0.910	0.911	0.910	0.910	0.910
Number of observations	1,004	1,004	1,004	1,004	1,004	1,004

⁽ⁱ⁾ The estimated model is the same as in column 3 of Table 2.

Notes: Cf. Table 2.

Sources and coverage: Banque de France, UFP 2019 and FiBEn; companies in the manufacturing industry (excluding oil industry and extraction) with at least 20 employees, that were in operation in 2018 and 2019 and for which we can measure productivity and the presence of any recruitment difficulties.

lack of labour force are seeking to retain their employees via higher salaries to a greater extent than other companies. Secondly, this may also be explained by the fact that these companies are more productive and their employees are, on average, more qualified, and therefore better paid than those in other companies.

These results highlight the fact that companies facing recruitment difficulties are different from those that are not and could be grouped into two categories. Firstly, companies paying too little for their labour force, and in particular less than other companies. As a result, these companies could suffer from problems attracting potential employees to their positions. Secondly, companies facing a lack of labour force, who may be looking to increase their attractiveness by paying higher salaries than those paid by other companies, on average.

4.4. Recruitment Difficulties and Profitability in Companies

The estimation results reported in Table 3 reveal that companies experiencing recruitment difficulties explained by salary level (among other obstacles) have a lower average salary than other companies. In this section, we illustrate this correlation by breaking it down by the reasons given by the company. One possibility is that these companies are subject to a higher level of competition preventing them from increasing their salaries. Another possibility is that these companies are not as productive and profitable. Finally, a third possibility is that these companies are limited in their capacity to increase starting salaries due to internal rigidities.

In terms of the first hypothesis, Table 6 presents the results of regressions similar to those

presented in Table 5 (column 3), i.e. on the salary-linked recruitment difficulty indicator, but using different company profitability measurements as the dependent variable: the markup rate, the profit rate (*MR*), the economic (*ERR*) and financial (*FRR*) profitability rates given in Section 3, as well as a final general profitability rate that combines financial and economic profitability and defined as the ratio between the gross operating surplus and financial revenue, and the sum of debt and equity (*GRR*).

The coefficient associated with recruitment difficulties linked to low salary attractiveness is negative, although it is not precisely estimated for the profit margin or markup rate. This suggests that companies facing recruitment difficulties that they attribute to low starting salaries are experiencing a less favourable financial situation than other companies also facing recruitment difficulties. These companies are therefore financially more restricted than other companies in strengthening their attractiveness. This restriction is the result of a more competitive environment. Table S1-3 in the Online Appendix also shows that these different profitability indicators are negatively associated with the level of competition.

* *
*

The analysis carried out here on a sample of around 1,000 French industrial companies enables us to characterise some of the specific features of companies facing recruitment difficulties compared with other companies.

Firstly, their productivity is significantly higher, with the gap being, on average and with

Table 6 – Profitability and recruitment difficulties linked to salaries⁽ⁱ⁾

Dependent variable	Markups (1)	MR (2)	ERR (3)	FRR (4)	GRR (5)
Dependent variable taken in 2018	0.829*** (0.048)	0.830*** (0.040)	0.800*** (0.038)	0.671*** (0.059)	0.787*** (0.060)
Employment in 2018 (log)	0.012 (0.010)	0.001 (0.005)	-0.001 (0.003)	0.000 (0.003)	0.002 (0.002)
Average salary in 2018 (log)	0.107 (0.066)	0.060* (0.034)	0.032 (0.022)	0.025 (0.016)	0.018 (0.013)
Average hours (log)	0.246 (0.173)	0.079 (0.066)	0.076 (0.063)	0.090* (0.051)	0.053 (0.044)
PCU	0.027 (0.075)	0.013 (0.036)	0.025 (0.024)	0.007 (0.023)	0.006 (0.019)
RatOut	0.289*** (0.104)	0.125*** (0.040)	0.116*** (0.039)	0.093*** (0.030)	0.079*** (0.027)
Recruitment difficulties linked to salaries	-0.044 (0.033)	-0.014 (0.014)	-0.021* (0.011)	-0.015* (0.009)	-0.015** (0.008)
Adjusted R ²	0.751	0.742	0.696	0.588	0.668
Number of observations	927	927	927	927	927

⁽ⁱ⁾ The estimated model is the same as in column 3 of Table 2.

Notes: Cf. Table 2.

Sources and coverage: Banque de France, UFP 2019 and FiBEn; companies in the manufacturing industry (excluding oil industry and extraction) with at least 20 employees, that were in operation in 2018 and 2019 and for which we can measure productivity and the presence of any recruitment difficulties.

all other things being equal, around 7%. This finding suggests that recruitment difficulties are likely to lead to a misallocation of production factors, at a global level, in companies that are efficient in terms of productivity and that may be hindered in their growth by these recruitment difficulties. Based on very simplified assumptions, an exercise carried out shows that the recruitment difficulties could lead to an average productivity loss in the manufacturing industry of around 0.10% to 0.15%. Secondly, an insufficient starting salary seems to be the reason for recruitment difficulties in some companies. In these companies, the average salary is, on average, around 2% lower than that seen in other companies. Conversely, in companies identifying competition from other companies as the reason for their recruitment difficulties, the average salary is around 1.5% higher than in other companies. Furthermore, among the companies experiencing recruitment difficulties, those that attribute their difficulties to insufficient starting salaries have a considerably lower profitability than other companies. They are therefore in a sort of trap: they have difficulties in hiring due to their low salaries and at the same

time are prevented from increasing their salaries due to their insufficient profitability.

As productivity is higher in companies experiencing recruitment difficulties, other things equal, than in other companies, these difficulties may lead to a misallocation of the factors, which are not seen as a priority by the most efficient companies. One response to these difficulties is certainly better training of the labour supply. However, the salary reason also appears frequently, and the companies giving this response pay their employees less but suffer from lower profitability than other companies experiencing recruitment difficulties. Therefore, one response to this difficulty may be to increase the labour income without increasing company costs. The increase in the *prime d'activité* (an employment bonus to increase purchasing power), such as that decided at the start of 2019, is in line with this logic. Furthermore, these findings reinforce the need to look at the distance between transfer revenue (unemployment, income support) and business activity revenue, as this distance sometimes seems too small to motivate the labour supply. □

Link to the Online Appendix:

www.insee.fr/en/statistiques/fichier/6530562/ES534-35_Bergeaud-Cette_Online-Appendix.pdf

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