



# **Mutual Learning Programme**

DG Employment, Social Affairs and Inclusion

**Host Country Discussion Paper - France**

## **Measuring labour market tightness to improve the balance between labour demand and supply (work in progress)**

**Peer Review on "Measuring labour market tightness to improve employment policies and reduce skills mismatches"**

**France, 15-16 October 2018**

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## **Executive summary**

Measuring and examining labour market tightness helps to identify and understand some causes of unemployment through the analysis of the determinants of the mismatch between labour supply and labour demand.

Ensuring a good balance between labour supply and demand is a complex challenge for countries to address. In this context, France used to publish labour market tightness indices (ratio of the number of job vacancies published by Pôle emploi - the French Public Employment Services (PES) - per registered unemployed person) until mid-2017. This publication was suspended due to insufficient coverage of the job vacancies data, which focussed only on PES job vacancies, and thus missing a large proportion of non-PES vacancies. Moreover, it did not take into account the "hidden" labour market.

To overcome the existing limitations of measuring labour market tightness, this paper presents alternative data sources and potential indicators that are relevant to assessing different aspects of labour market tightness. A Principal Component Analysis (PCA) clarifies the links between these various tightness indicators. The key feature of this method is that labour market tightness can be analysed through two principal axes: the first axis relates to tightness due to an excess of labour demand (e.g. employees in hotel/restaurants), while the second axis focuses on the insufficiency of the labour supply (e.g. IT engineers and sales representatives). Robustness checks and links with working conditions provide coherent results. The key findings are as follows:

- Some occupations may be considered tight due to an excess of labour demand. The corresponding occupations are generally low-skilled ones, for which firms are expecting to hire a lot in the future and for which the PES job vacancies are numerous. These occupations are characterised by a higher share of short term contracts, high turnover of staff and seasonal work. Firms' hiring difficulties are not necessarily due to the lack of available labour supply and skills shortages, but more likely relate to difficult working conditions decreasing workers' willingness to work in those occupations (e.g. hotel/restaurants).
- Other occupations face tight labour markets due to insufficient labour supply. The corresponding occupations are mostly high-skilled ones where employers anticipate difficulties to recruit employees despite the good working conditions offered (permanent and long-term contracts). Linked with technological change, these occupations face chronic skills shortages and recruiters struggle to find adequate candidates. IT engineers and programmers, sales representatives, highly-skilled workers and technicians in the construction and automotive repair sectors are examples of occupations that suffer from insufficient labour supply.

## **1 Introduction**

Measuring and examining labour market tightness helps to identify and understand some causes of unemployment through the analysis of the determinants of the mismatch between labour supply and labour demand.

Ensuring a good balance between labour supply and demand is a complex challenge for countries to address. In this context, France used to publish labour market tightness indices (ratio of the number of job vacancies published by Pôle emploi - the French Public Employment Services (PES) - per registered unemployed person) until mid-2017. This publication was suspended due to insufficient coverage of the job vacancies data, which focussed only on PES job vacancies, and thus missing a large proportion of non-PES vacancies. Moreover, it did not take into account the "hidden" labour market.

This discussion paper aims to describe and analyse France's experiences with measuring labour market tightness, including specific measurement issues. The paper is organised as follows: firstly, the main determinants of labour market tightness are explored; secondly, several data sources that can be used to study labour market tightness in France are examined; thirdly, a multivariate analysis describing the relationships between various indicators obtained from these data sources is presented; and finally, some concluding remarks are provided.

## 2 Determinants of labour market tightness and measurement issues

### 2.1 Determinants of labour market tightness

Labour market tightness is a form of mismatch between labour supply and demand where **labour demand of firms exceeds the labour supply provided by workers**, or put differently where the number of job vacancies for a given occupation exceeds the number of individuals looking for work in that occupation.

Labour market tightness can be identified either **by occupations** to be filled (the indicator therefore represents the ratio between supply and demand for a given occupation in a given time period) or according to the **skills** required by recruiters and available on the labour market.

Three main sets of reasons can explain this discrepancy between the jobs offered by firms and the skills provided by workers:

- Mismatch between labour supply and labour demand
  - **Skills mismatch:** is defined as the gap between an individual's job skills and the demands of the labour market; this misalignment between the composition of labour demand for skills and labour supply for skills has become a central challenge in Europe and beyond, affecting all layers of society but particularly young people and the low skilled. Skills mismatches can relate to many forms of labour market frictions including vertical mismatches (usually measured in terms of over-education, under-education, over-skilling and under-skilling), skills gaps, skills shortages, field of study (horizontal) mismatches and skills obsolescences (see McGuinness et al. (2017) for a complete literature review on skills mismatches). Each one of these frictions may lead to labour market tightness.
  - **Geographical mismatch:** In France, as well as in many other countries, the matching of labour supply and labour demand also includes a spatial dimension. Indeed, in some areas, and in particular large cities, the available skills (households) are simply not physically located in the same area as the needs for these skills (firms), which can further reinforce skills mismatches (see Roulet (2018) for a literature review of the geographical dimension of the mismatch between labour supply and demand). In this respect, Adalet, McGowan and Andrews (2015) show that skills mismatches are lower in countries where housing policy (such as housing taxation, land use and rental regulations and social housing policies) is not a barrier to residential mobility. According to Andrews et al. (2011), France has (along with Belgium) the highest transaction costs on real estate acquisitions, which might lower geographical mobility and increase geographical mismatches.
  - **Inadequate working conditions:** Labour market tightness may also arise due to a mismatch between the working status/employment/wage conditions proposed by firms and the expectations of workers. For example, unusual working schedules (flexible working hours, night work, work on Sundays, etc.) may be an obstacle to recruitment in the hotel and restaurant sector.
- Structural evolutions of labour markets that can create labour market tightness
  - **Demographic causes:** The demographic structure of the current labour supply can also induce future labour market tightness. Indeed, the forthcoming retirements of cohorts are not distributed evenly across occupations and sectors. The occupations that will be the most affected in France in the next decades include: maintainers, care providers, teachers,



administrative budgetary and programme managers as well as care assistants. This demographic effect will significantly change the nature of the labour supply in the coming years, which can lead to labour market tightness depending on two other factors: the evolution of labour demand by firms, as well as the supply of labour provided by new entrants in the labour market. An analysis of the demographic dynamics of occupations helps anticipate potential future labour market tightness.

- **Technological progress:** Technological change is a source of great opportunity but it also changing the job market, with some workers being displaced. OECD (2018) finds that technological change is more clearly correlated with the decline in the manufacturing sector and labour market polarisation than globalisation. Indeed, technological change shifts employment from manufacturing to services and causes polarisation within sectors.
- **Increase in short-term contracts:** The increase in employee turnover in recent years (as in France, with the significant rise in short-term contracts due both to structural and cyclical reasons<sup>1</sup>) also means that firms have to recruit more frequently. This rise in the turnover rate of employees has an impact on firms' perception of recruitment difficulties, increases the number of job vacancies which might in turn artificially create labour market tightness.
- Stakeholder behaviour can create or increase labour market tensions
  - **Difficulties for firms to define their needs:** Some articles, including Davis et al. (2012), argue that the efforts invested in recruitment by employers<sup>2</sup> has declined since the start of the global economic crisis, affecting perceived hiring difficulties, even though there are no fewer candidates than before in reality. In fact, business surveys on the "hiring difficulties"<sup>3</sup> of employers should be interpreted with caution. Davis et al. (2012) explain that the shift in the Beveridge curve<sup>4</sup> in recent years (which indicates that, at the same vacancy rate, the unemployment rate is higher today) is not due to skills mismatches but rather the perception of firms.
  - **Difficulties for companies to train their employees, especially for small and medium-size businesses (SMEs):** Skills development is ensured not only by the education system, but also from firms' behaviours in terms of professional training, re-skilling and up-skilling, motivation of employees, hiring processes, etc. Skills mismatches are thus also the result of a market process. Surveys of student skills in the United States do not seem to point at a skills gap problem among young people entering the labour market (Cappelli, 2015). By contrast, firms tend to have too specific or even hyper-specialised requirements, for which they rely on the initial training system, rather than their own "on-the-job" training. This is detrimental to young people entering the labour market as firms will tend to favour workers with more years of experience, reinforcing the demographic effect mentioned above.
  - **Recruitment practices and employer representations:** Fondeur et al. (2012) analyse how corporate recruitment practices have an impact on the

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<sup>1</sup> The development of short-term and part-time contracts is the result of a growing demand for flexibility from firms. This increase since the 1990s has been further enhanced with the global financial crisis.

<sup>2</sup> "Recruiting intensity" is shorthand for the other instruments employers use to influence the pace of new hires: advertising expenditures, screening methods, hiring standards, and the attractiveness of compensation packages.

<sup>3</sup> Seven out of ten firms report hiring difficulties in France.

<sup>4</sup> The Beveridge curve is a graphical representation of the relationship between unemployment and the job vacancy rate, the number of unfilled jobs expressed as a proportion of the labour force.

selection of new hires. The way recruiters select candidates might not always be based on objective criteria. Corporate hiring practices (recruitment governance; recruitment channels; evaluation and selection criteria; discrimination, exclusion, and diversity) may thus result in crowding out part of the labour supply, limiting the pool of potential candidates. For example, selecting specific distribution channels for the publication of job vacancies *de facto* restricts the number of potential candidates, leading to recruitment of similar profiles. Recruitment practices which are insufficiently diversified or too limited could thus emphasise possible labour market tightness.

## 2.2 Previous estimates of labour market tightness and measurement issues

Labour market tightness is usually measured by comparing the labour demand and labour supply available in the market. In this respect, it is commonly assumed in matching model literature that labour market tightness can be measured by the ratio of the number of job vacancies per unemployed (generally noted  $\theta$  in the literature), considered as an indicator of the excess of demand over supply in the labour market:

$$\theta = \frac{V}{U} = \frac{Nb \text{ Job vacancies}}{Nb \text{ Unemployed}}$$

Until the second quarter of 2017, DARES<sup>5</sup> published quarterly statistics on labour market tightness so as to monitor mismatches between labour supply and labour demand by occupation (Bergeat, 2017). In particular, labour market tightness was analysed through the ratio of the number of job vacancies and the number of jobseekers registered by the PES, allowing the identification of excess labour supply and/ or insufficient labour demand. This ratio was measured by occupation, according to the French classification of "professional families" (FAP)<sup>6</sup>, which is very similar to the International Standard Classification of Occupations (ISCO).

However, this indicator only took into account job vacancies available through the PES (on Pôle emploi's website), to measure the labour demand of firms. The labour market considered was therefore incomplete. Indeed, not all anticipated hiring projects give rise to the publication of a job vacancy (Bergeat and Remy, 2017), and not all job vacancies are posted on Pôle emploi's website. Indeed, in recent years, the number of websites offering online job vacancies has increased significantly, making it less likely that job vacancies collected by the PES are fully representative of firms' labour demand. Therefore, the relevance of the statistical analysis based on only PES vacancies is insufficient (Fondeur, 2016). Finally, the Pôle emploi's share of all job vacancies is subject to cyclical variations and exogenous shocks. For example, between the last quarter of 2016 and the first quarter of 2017, a sharp rise in the number of PES vacancies was observed by DARES, apparently leading to greater tightness in the job market, for most occupations. This rise can, at least in part, be explained by a change in the business model of another website (Leboncoin), which, at the time and with the exception of Pôle emploi, was the largest site allowing recruiters to publish job vacancies online for free. Leboncoin decided to charge firms for vacancies publication at the end of 2016, which is likely to have led to a substitution effect of vacancies from Leboncoin to the Pole emploi's website, artificially increasing the measures of labour market tightness. This phenomenon is illustrated in Figure 1.

In view of the shortcomings of data sources used by DARES to measure labour market tightness, the quarterly publication co-authored by DARES and Pôle emploi was

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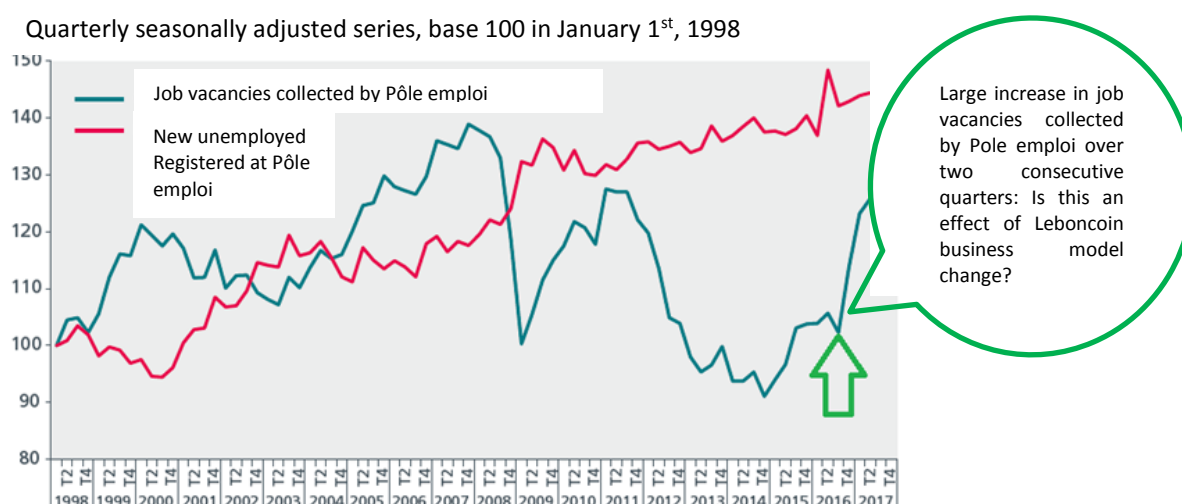
<sup>5</sup> The French Statistical Office for Labour and Employment.

<sup>6</sup> The FAP identifies 22 occupational areas, divided into 87 occupational groups, sub-divided into 225 detailed occupational categories.

discontinued in August 2017. In parallel, a working group aimed at discussing the measurement of labour market tightness was set up. The objectives of this working group are to:

- study the determinants of tightness according to the academic literature (see a short summary in previous section) and to analyse international experiences in the measurement of labour market tightness (including through this Peer Review);
- review the available data sources to estimate labour market tightness in a wider perspective and identify potential indicators;
- analyse the correlation between these various indicators; and
- present recommendations on how to improve the measurement of labour market tightness in France in the forthcoming quarterly publications.

Figure 1. Job vacancies collected by Pôle emploi and the change in Leboncoin's business model



Source: Dares-Pôle emploi, Data from the PES labour market statistics (STMT), calculation by DARES.

### 3 Available data sources, potential new indicators and their limitations

#### 3.1 Available data sources

In France, various data sources are available for the analysis of labour market tightness. In particular:

- Statistical surveys:
  - Job vacancy surveys (*Acemo – Activité et conditions d'emploi de la main d'oeuvre* - Activity and employment conditions of the workforce);
  - Surveys on labour needs by firms (*BMO*);
  - Monthly business and consumer surveys (*enquêtes de conjoncture*) which includes questions about hiring difficulties.
- Administrative data:
  - All-employee dataset (DADS). The annual declaration of social data (DADS) is a declaration procedure which must be completed by all firms that employ staff, for each of their employee. In this document, which serves both fiscal and social administrative purposes, employers provide certain information pertaining to their establishments (number of employees, etc.) and employees (wage, hours worked, etc.), annually and for every establishment. DARES also make use of the employee panel derived from DADS;
  - Data on hiring flows (*DPAE – Déclarations préalables à l'embauche*). This pre-employment declaration provides information on employer establishment, employee's individual characteristics, and main characteristics of the contract: starting date, type of contract (fixed-term/permanent), end date of fixed-term contract if applicable;
  - Data from the *DSN (Déclarations Sociales Nominatives)*, France's new unified social welfare data reporting system.<sup>7</sup> Unfortunately, the verification process is still ongoing, and DARES do not yet have access to microdata;
  - Data from the PES labour market statistics (STMT): provides data on job vacancies posted by Pôle emploi and jobseekers registered at Pôle emploi. This source of data was previously the only source used by DARES to study labour market tightness.
- Data on online job vacancies, including:
  - Data on all the job vacancies distributed by Pôle emploi, including the "partner vacancies" (posted on partner websites and published on Pôle emploi website through a gateway);
  - Data on job vacancies available online and collected by scraping.

Further information about each of these datasets is presented in Table 1. This overview highlights the possible granularity for which the broader concept of labour market tightness can be measured.

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<sup>7</sup> Until 2016, firms had to report payroll data separately to several social welfare agencies (social welfare, health insurance, pension and other related public and private agencies that collect taxes), via separate forms, often in different formats, with a variety of deadlines. Once the DSN system is fully implemented, firms will only have to carry out one administrative obligation on a monthly basis to meet most of the reporting requirements. DSN will ultimately replace DADS with more precise information and will be available monthly.

Table 1. Available data sources to analyse labour market tightness

Source	Type of source	Number observations per year	Available since	Frequency	Unit of study	Scope	Sector available?	Occupation available?	Potential indicators
<b>Acemo</b> (Job vacancy surveys )	Survey	~200 000	2003	Quarterly	- Establishment (quarterly survey) - Firm level (annual survey)	Private sector excluding agriculture	Yes	No	- Share of vacant jobs - Wage analysis
<b>BMO</b> (o Surveys on Labour Needs by firms )	Survey	~400 000	2002	Annual	Establishment	All private employers except public firms and public administration	Yes	Yes	- Number of potential future hirings - Share of potential future hirings anticipated difficult
Business surveys	Survey	~50 000	2001	Quarterly	Firm	Sectors of construction, manufacturing and services (70 % of salaried employment), excluding trade sector	Yes	No	- Firms with hiring difficulties - Firms with employment-related barriers in recruiting
<b>DADS</b>	Administrative data			Annual	Salaried employee		Yes	Yes	- Wage analysis
Pre-employment <b>DPAE</b>	Administrative data	~40 millions	2000	Quarterly	Recruitment	All private activities (except temporary employment agencies and civil servants)	Yes	No	- Number of planned hiring - Structure of planned hirings by contract type
<b>DSN*</b> (new unified social welfare data reporting system)	Administrative data	~20 millions de salariés couverts	2017	Continuou s, monthly analysis	Recruitment	Employers of the general and agricultural Social Security regimes, public sector as of 2020	Yes	Yes	- Hiring flows - Structure of hirings by contract type - share of temporary work agencies contracts - Wage analysis
<b>STMT</b> (Data from the PES labour market statistics )	Administrative data	~8 millions (job vacancies) ~90 millions (registered unemployed)	1998	Monthly	- Unemployed - Job vacancy	Job vacancies collected by Pôle emploi and unemployed registered at the PES	Yes	Yes	- Job vacancies collected by PES - Nunmber of registered unemployed - Previous tightness indicator (as in previous Dares publications)

### 3.2 Potential new future indicators

The recently established working group directed by DARES and including members from Pôle emploi and some regional statistical agencies, aims at providing new insights for the development of these indicators and the coordination of the different sources. The next step as regards to how these indicators will be used to increase the labour market intelligence and improve the supply-demand process, will take into account feedback received from this peer review as well as from a seminar, entitled "From labour market tightness to skills needs", that will be organised by DARES in Paris (France) on 18 December 2018.

In terms of improving the measures for labour market tightness, it will be possible in a few months to extend the range of job vacancies included in the analysis. For example, one option would be to consider all the vacancies available on Pôle emploi website and not only the PES ones. Indeed, as part of the "Labour Market Transparency" initiative (*TMT – Transparence du Marché du Travail*) initiated by Pôle emploi in 2012, the PES operator wants to re-centralise on its website the maximum number of job offers available online in order to provide information that is as complete as possible to jobseekers. In this context, partnerships have been concluded between Pôle emploi and around 140 job placement websites. These are re-published on the Pôle emploi website as partner offers. In the fourth quarter of 2017, 55% of the vacancies published on the Pôle emploi website were "partner offers" and thus not collected directly by Pôle emploi (Vroylandt, 2018).

Another option would be to recover the raw data on sites publishing job offers, by automatic data collection (scraping). In particular, DARES initiated exploratory work aimed at structuring job vacancies data automatically retrieved online, notably to code the occupation from the texts on titles and the vacancy descriptions (Andrey and

Bergeat, 2018). However, further methodological work is still needed before DARES can mobilise this data for empirical analysis. These two alternative sources of data on job postings on the internet have not used for the below analysis of labour market tightness (Section 4.2).

DARES has also tried to take a step backwards and get a broader picture of the concept of labour market tightness. This has highlighted potential alternative concepts related to labour market tightness, analysing the issue from different points of views (hiring difficulties felt by recruiters, contract types, wage dynamics, etc). For each concept, potential indicators were identified across the sources mentioned above, depending in particular on whether the variables of sector of activity and/or occupation were available in the data (so as to provide measures at the sectorial/occupational levels).

Different indicators were constructed from the above data sources (Table 1), covering various issues potentially related to labour market tightness.

- First, indicators related to the **demand side of labour**:
  - *Recruitment needs*. Firms' needs can be analysed through anticipated recruitment, as measured through the BMO survey or by considering the number of vacancies available (Acemo surveys). In addition, it is possible to look at the number of available job offers collected by Pôle emploi (source STMT).
  - *Actual recruitment flows*, as measured with the DPAEs or using DSN data.
  - *Difficult recruitments* can be analysed using the BMO survey (measuring the number or proportion of recruitments anticipated as potentially difficult for the coming year).
- Then, indicators related to the **supply side of labour** available on the market can be derived from the PES data on labour statistics (STMT), for example, by considering the job seekers by desired occupation.
- Finally, to analyse the matching between labour supply and labour demand, the **quality of the jobs offered** can be examined. This can involve the analysis of different types of contracts (with DPAE or STMT data) and/ or wages (DSN, DADS or Acemo surveys). Here, the wages can be considered as the "price" of the match between labour supply and labour demand.<sup>8</sup>

### 3.3 Data and indicators limitations

The data sources and indicators presented above also have several limitations, which is why it seems *a priori* complex to rely only on one source to study labour market tightness. The limitations of the data sources include:

- *Coverage problems*. This limitation concerns in particular job vacancies collected by Pôle emploi, which prompted the suspension of the quarterly publication DARES-Pôle emploi about the tightness in the labour market (Bergeat, 2017). It can also be noted that jobseekers registered at Pôle emploi only represent part of the labour supply looking for employment.
- *Problem of non-observable data*. Some sources measure only part of a phenomenon related to labour market tightness. In particular, the analysis of recruitment flows (for example DPAEs or DSNs) only provides information on successful recruitments. As a result, there is no information on unsuccessful

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<sup>8</sup> The underlying hypothesis is that firms could raise wages offered to new entrants so as to attract a limited labour supply. Therefore, relatively high wages of outsiders compared to insiders could reflect a significant need for work in this occupation and consequently labour market tightness.

recruitments due to insufficient adequate candidates available for recruitment, which is an important indication of tightness.

- *Heterogeneous understanding of vacancies.* Despite a harmonised definition at the European level, the concept of vacancies can be understood in various ways by respondents to the Acemo survey and other surveys (BMO).
- *Difficulties for firms to anticipate future recruitment needs.* Some concepts are inherently difficult to forecast, as for example with the BMO survey where recruiters are asked to anticipate hiring for the year  $n + 1$  as well as the proportion of difficult early recruitments.

In summary, it appears that various sources can be utilised to measure and analyse labour market tightness. Nevertheless, individual indicators/ data sources cannot on their own measure all determinants of labour market tightness. Moreover, some datasets (pre-employment DPAE, business surveys and job vacancy surveys Acemo) do not have a breakdown by occupation. As such, only a sectoral analysis would be feasible with such datasets. Similarly, some indicators would only be available for a limited number of years (for example, sectoral indicators are only available for the 2011-15 period). Consequently, the emphasis has been placed on the occupational analysis, leaving aside DPAE, business surveys and Acemo for the time being.



## 4 Multivariate analysis of different "tightness indicators"

### 4.1 Definition and basic comparison of around 10-15 indicators

In this section, the correlation between different indicators on labour market tightness are studied more closely.

At this stage, the analysis is performed only for indicators available at the occupational level. Three data sources are therefore used in the multivariate analysis presented in this section:

- Data from PES labour market statistics (STMT);
- Survey on companies' labour needs (BMO); and
- All-employee annual declaration of social data (DADS).

The following indicators are considered (see more details in Annex 1):

- **STMT** (jobseekers registered at Pôle emploi and vacancies collected by Pôle emploi).
  - *Tightness indicator in flow*: ratio between the flow of PES vacancies (over three months) and the number of entries of unemployed registered at Pôle emploi over the same period.
  - *Tightness indicator in stock*: same as previous tightness indicator but considering stocks instead of flows.
  - *Annual exit rate of jobseekers*: intensity of exits from unemployment. This measures labour market fluidity for jobseekers, and thus potential tightness from the point of view of jobseekers.
  - *Share of sustainable job vacancies*: proportion of permanent (CDI) and fixed-term contracts (CDD) of six months or more among the PES job vacancies. This indicator assesses the quality/ attractiveness of job vacancies.
  - *Number of vacancies per employee*: ratio of the number of PES vacancies in a given occupation to the average employment<sup>9</sup> in this occupation.
  - *Jobseekers per employee*: ratio between the number of jobseekers at the end of the quarter and the average employment by occupation. This indicator measures the importance of the available labour supply.
- **BMO Labour Needs Survey** (hiring intentions of firms):
  - *Potential future hires per employee*: ratio of the number of potential future hires for a given year, compared to the average employment by occupation.
  - *Non-seasonal potential future hires per employee*: Previous indicator restricted to all non-seasonal recruitments anticipated by employers.
  - *Potential future hires anticipated as difficult per employee*.
  - *Share of potential future hires anticipated as difficult in total hires anticipated*.
- DADS All-employee annual declaration of social data:
  - *Wage attractiveness*: ratio of wages on average age, by occupation.

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<sup>9</sup> For all indicators in this analysis, average employment is the number of persons employed (ILO definition) in metropolitan France. It is calculated by the average of three years (2014-16) of the INSEE Labour Force Survey.



## 4.2 Principal component analysis (PCA)

The analysis started with a simple correlation matrix (not presented here), which only considered correlations between two indicators at a time. Due to the substantial number of correlated variables, and in order to refine the analysis, a factor analysis was carried out to clarify the links between these various tightness indicators. The following analysis is based on a Principal Component Analysis (PCA) for the 11 tightness indicators presented above (nine were introduced as active variables and two as additional ones). The results of the PCA are presented for 2015 and covers 77 occupations.<sup>10</sup> The tightness indicators in flow and in stock (presented in Section 4.1) represents the additional variables.<sup>11</sup> The analysis is weighted: each individual, corresponding to an occupation, is weighted by the average employment in this occupation.

### 4.2.1 Main results of the PCA and interpretation

Figure 2 presents the projections of the PCA obtained in the factor model. This model, displaying the first two axes of the PCA, concentrates 63% of the total inertia.

- The **horizontal axis** differentiates occupations according to the labour demand by firms for those occupations. Indeed, it can be observed that on the right side of the axis are projected occupations for which both the anticipated recruitments and the number of PES vacancies collected by Pôle emploi<sup>12</sup> are relatively more important. By contrast, on the left side of the axis are projected occupations for which labour demand is lower. This axis could then be interpreted as **tightness due to an excess of labour demand** (for example, the hotel/restaurant sector).
- The **vertical axis** focuses on the insufficiency of the labour supply. Indeed, the occupations at the top of the axis are occupations for which there are few jobseekers. Moreover, the quality of the jobs proposed for these occupations seems better on average (more sustainable PES vacancies), and future hires are more often anticipated as difficult. This axis could be interpreted as **tightness due to insufficient labour supply** (for example, IT engineers, sales representatives).

Finally, both tightness indicators (in stock and in flow) linking labour supply and labour demand are also well represented on the vertical axis. The projection of the annual exit rate of jobseekers is closer to the supply side of tightness (illustrating quicker exits for unemployed in occupations affected by a shortage in labour supply). Interestingly, and perhaps unexpectedly, the PCA appears to show that a high rate of "wage attractiveness" is correlated with a strong labour supply. One hypothesis is that in occupations with insufficient labour supply available on the job market, firms tend to increase both wages of new entrants and of experienced workers, so as to retain the latter into employment and to avoid having to search for new ones. By contrast, in occupations with an excess of labour supply, the need for firms to increase wages of insiders is lower.

Notably, van Ruth (2012) presents a very similar graphical tool, called **labour market tension gauge**. Van Ruth plotted indicators of relative development of the supply and demand for additional labour against each other (different from our indicators), using their interaction to define labour market tension. His tension gauge provides four quadrants illustrating four states of the business cycle (decreasing tension, loose, increasing tension and high tension), and helps identifying labour market developments.

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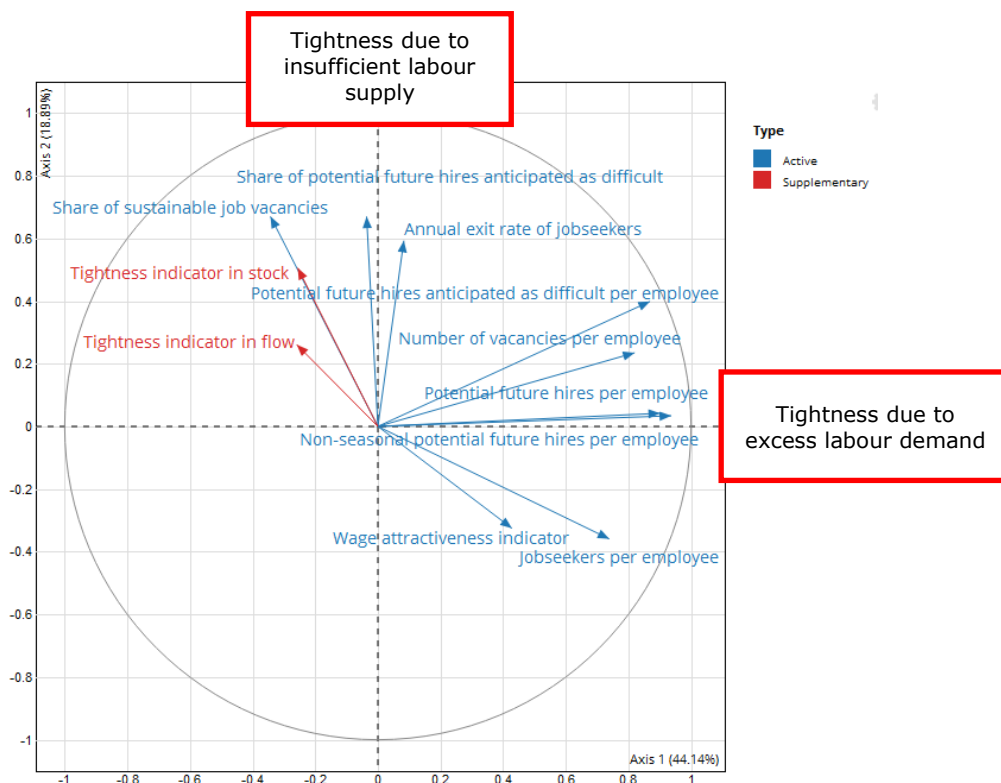
<sup>10</sup> Due to non-availability of specific indicators for some occupations and coverage problems in the STMT, we do not consider in the analysis the following sectors: A (Agriculture, hunting, forestry and fishing), P (Public administration, professions legal, military and police) and X (politics, religion). This represents 10 professional families out of 87.

<sup>11</sup> These indicators were those previously published and suffering limitations (see Section 2.2). This is to avoid the PCA being driven by the former indices in this preliminary exploratory work.

<sup>12</sup> Both variables in proportion of the average employment in his occupation (see Section 4.1).

He also discusses links with wage developments. His work helps identifying macroeconomic developments by analysing labour market tension from a business cycle point of view, while our work provides evidence of labour market tightness at a more micro level (by occupations).

Figure 2. Projections of active and additional variables in the factor model for 2015



#### 4.2.2 Robustness checks

Several robustness checks were tested:

- Indicators were calculated at different levels of granularity of the occupational classification (22 occupational areas, 87 occupational groups and 225 detailed occupational categories, respectively).
- The analysis was carried out for 2015 (each observation is then an occupation, with different tightness indicators for each occupation) and for the whole period of available data (2010-15, in this case, each observation in the PCA corresponds to an occupation × year). This provides a common understanding of the cyclical vs. more structural aspects of the determinants of labour market tightness. We observe a decrease in labour market tightness between 2010 and 2015, rather due to effects related to the demand side (increase in available labour supply). Nevertheless, the variations are much more important across occupations than the cyclical variations.
- Different sets of variables were tested to play the role of active and additional variables (in particular, labour market tightness in stock and in flow).
- Additional indicators on working conditions by occupation have been included in the analysis as additional variables to study the link between working conditions and labour tightness by occupation.

### **4.3 Link between tightness indicators and working conditions**

This section focuses on the links between the tightness indicators presented in above and working conditions. To carry out this exploratory analysis, data from the 2016 DARES survey on working conditions has been used to calculate working conditions indicators by occupation. These variables are then integrated as additional variables in the PCA presented above.<sup>13</sup> The working conditions indicators are as follows:

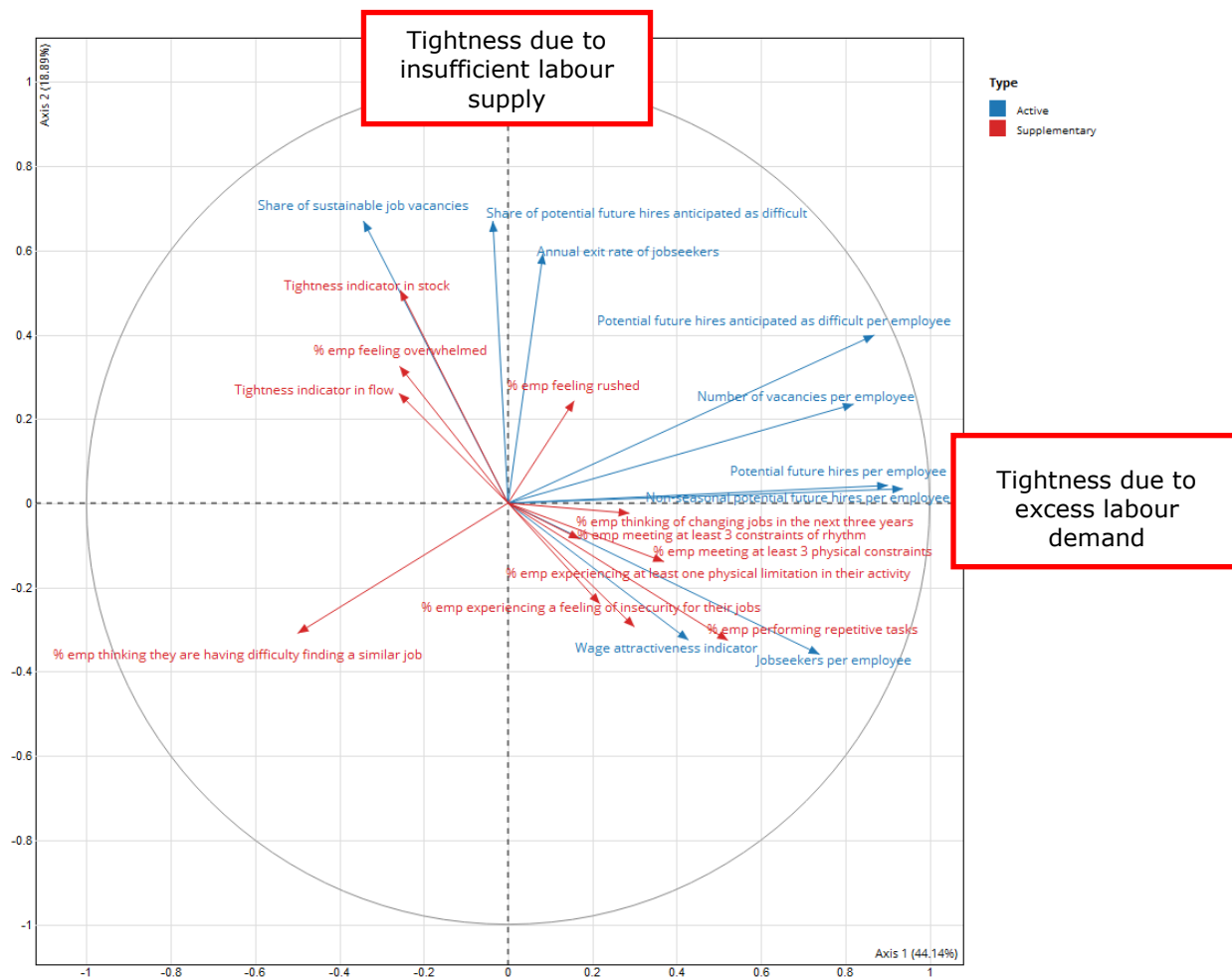
- Share of employees meeting at least three physical constraints;
- Share of employees meeting at least three constraints of rhythm;
- Share of employees performing repetitive tasks;
- Share of employees feeling rushed;
- Share of employees feeling overwhelmed;
- Share of employees experiencing a feeling of insecurity in their jobs;
- Share of employees experiencing at least one physical limitation in their activity;
- Share of employees thinking of changing jobs in the next three years; and
- Share of employees thinking they would struggle to find another job with a similar wage.

Results are shown in Figure 3, displaying the same factorial axes as in Figure 2, with additional variables on working conditions. Here again, the variables on working conditions tend to support the two major determinants of labour market tightness: labour tightness due to insufficient labour supply and labour tightness due to an excess of labour demand. In particular, the share of employees who think they would struggle to find similar wage conditions in another job is correlated with a lower labour demand (and therefore in particular the availability of job vacancies and potential future hires by firms). It also highlights more structural effects on the nature of occupations: in particular, the occupations with more physical constraints or repetitive tasks are also those where the labour supply is the most important (those are low-skilled occupations for which labour market tightness is low given the large labour supply available).

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<sup>13</sup> Labour market tightness indicators are for 2015.

Figure 3. Principal component analysis in 2015, including working condition variables as additional variables



## **5 Public policy implications**

The previously published indicator on labour market tightness was not been widely used in the policy making process of France. However, the regional and local measures of firms' labour demand were used to grant certain allowances (PES grants for retraining towards tight occupations) and for migration issues (local geographic areas allow work and residence permit to workers working in tight occupations). Nevertheless, such policies are largely insufficient to cope with labour market tightness.

Initial and continuous vocational training plays an important role in combatting both unemployment and labour market tightness, and much more can be done to match training funding with employers' needs, and foster the involvement of employers in skills development.

The French Government is launching several new initiatives to decrease unemployment. For example, the government will invest 13.8 billion euros from 2018 to 2022 in training. The Skills Investment Plan is aiming to train 1 million young low-skilled unemployed and 1 million long-term unemployed. Therefore, ensuring the adequacy between public investment in skills and employers' needs is crucial, and requires an in-depth diagnosis of occupations suffering from severe tightness.

Potential solutions to labour market tightness also include partnership development with the education sector and employers.

## **6 Conclusion**

This discussion paper shows that it may be interesting to distinguish between two determinants of labour market tightness related to two categories of indicators:

- First, some occupations may be considered as tight due to an excess of labour demand. The corresponding occupations are generally low-skilled ones, for which firms are expecting to hire a lot in the future and for which the PES job vacancies collected by Pôle emploi are numerous (for example, the hotel/restaurant sector). These occupations are characterised by a higher share of short term contracts, high turnover of staff, and seasonal work. Firms' hiring difficulties are not necessarily due to the lack of available labour supply and skills shortages, but more likely relate to difficult working conditions decreasing workers' willingness to work in those jobs. The high frequency of recruitment in these types of jobs also increases firms' perception of hiring difficulties.
- Second, some occupations face tight labour markets due to insufficient labour supply. The corresponding occupations are mostly high-skilled ones, where recruiters anticipate difficulties to recruit despite the good working conditions offered (permanent and long-term contracts). These occupations face chronic skills shortages and recruiters struggle to find adequate candidates. IT engineers and programmers, sales representatives, highly-skilled workers and technicians in the construction and automotive repair sectors are examples of occupations that suffer from insufficient labour supply.

It appears that employees have a rather coherent vision of the level of labour market tightness for their occupation, consistent both with their employers' perception of hiring difficulties and with the quantity of job vacancies and jobseekers available on the market. Indeed, in occupations with high available labour supply (large number of jobseekers) and few job vacancies (more often offering temporary contracts), employees more often fear for their jobs and consider that they would have to switch occupation to get back to work if dismissed.

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## Annex 1

The indicators presented in Section 4.1 are detailed below:

- **STMT** (jobseekers registered at Pôle emploi and vacancies collected by Pôle emploi). From this source, indicators related to the labour market tightness already discussed in Bergeat (2017) and other complementary indicators are calculated:
  - *Tightness indicator in flow*. This indicator is obtained from the ratio between the flow of vacancies collected by Pôle emploi (over three months) and the number of entries of unemployed (in categories A, B, C) registered at Pôle emploi over the same period. It can be interpreted as the number of vacancies available per jobseeker. Tightness is measured from the point of view of the employer:

$$\text{Tightness flows} = \frac{\text{New PES job vacancies over a quarter}}{\text{New registered unemployed over a quarter}}$$

- *Tightness indicator in stock*, same as previous tightness indicator but considering stocks instead of flows. It is measured by the ratio of the number of job vacancies in stock at the end of the quarter to the number of jobseekers registered (in categories A, B, C) at the end of the quarter.
- *Annual exit rate of jobseekers* measures the intensity of exits from unemployment (categories A, B, C): a high value of this indicator indicates that a large proportion of unemployed exited unemployment within a year. Each quarter, this indicator is calculated as follows:

$$\begin{aligned} & \text{Annual exit rate of jobseekers} \\ &= \frac{\sum \text{Outflows of unemployed over a year}}{\text{Stock unempl. one year before} + \sum \text{Entries of unemployed over a year}} \end{aligned}$$

- This aggregate can be interpreted as a measure of labour market fluidity for jobseekers, and thus of potential tightness measured from the point of view of jobseekers.
- *Share of sustainable job vacancies* is the proportion of permanent contracts (CDI) and fixed-term contracts (CDD) of six months or more among the PES job vacancies collected by Pôle emploi over a quarter. This indicator assesses the quality/ attractiveness of job vacancies.
- *Number of vacancies per employee* is the ratio of the number of PES vacancies in a given occupation (at the end of a quarter) to the average employment<sup>14</sup> in this occupation.
- This indicator can be interpreted as the number of PES job vacancies available per 1,000 employees.

$$\text{Vacancies per employee} = \frac{1000 * \text{Stock of vacancies}}{\text{Average number of employees}}$$

- *Jobseekers per employee*. This is the ratio between the number of jobseekers at the end of the quarter (categories A, B, C) and the average

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<sup>14</sup> For all indicators in this analysis, average employment is the number of persons employed (ILO definition) in metropolitan France. It is calculated by the average of three years (2014-16) of the INSEE Labour Force Survey.



employment by occupation. This indicator is *a priori* rather negatively correlated with labour market tightness as it measures the importance of the available labour supply.

- **Labour Needs Survey (BMO).** The purpose of the BMO survey is to better understand the hiring intentions of firms, to better anticipate and adapt the funding effort for Vocational Education and Training (VET) and to better inform jobseekers about occupations that are looking for candidates. From this survey, four indicators are calculated to assess the labour demand and the potential difficulties anticipated by recruiters:
  - *Potential future hires per employee* is the ratio of the number of potential future hires for a given year, compared to the average employment by occupation.
  - *Non-seasonal potential future hires per employee.* We restrict the previous indicator to all non-seasonal recruitments anticipated by employers.
  - *Potential future hires anticipated as difficult per employee.*
  - *Share of potential future hires anticipated as difficult on total hires anticipated.*
- **All-employee annual declaration of social data (DADS).** A wage attractiveness indicator is measured by the following ratio, by occupation:

$$\text{Wage attractiveness} = \frac{\text{Wages of recently recruited employees}}{\text{Average wage}}$$

The new hires are the employees present in the establishment for less than a year.

## Annex 2

The projection of occupations in the PCA factor model presented in Section 4.2 reinforces the interpretations proposed for the axes. The main occupations of each axis are represented in Figure 4. Four groups of occupations located in the four quadrants of the dial can be distinguished:

- Upper-left quadrant: The M2Z (computer engineers) and R2Z (sales commercials and representatives) occupations can be considered tight due to insufficient labour supply, implying severe skills shortages. These occupations are mostly high-skilled ones.
- Upper-right quadrant: Occupations such as V5Z (cultural, sports and supervisory professionals), S1Z (chefs) and S2Z (hotel and restaurant employees and supervisors) are occupations for which recruiters may find it difficult to hire because of an excess (and/or seasonal variability) of the labour demand. These are mostly low-skilled occupations.
- Lower-left quadrant: Some skilled occupations display a rather low labour demand; hence firms do not find it difficult to recruit. This is the case for example of E1Z (skilled workers of process industries) and J1Z (skilled workers in cargo handling).
- Lower-right quadrant: The T4Z (maintenance workers), L2Z (administrative employees), R0Z (cashiers, self-service employees), E0Z (unskilled workers in the process industries) and U1Z (arts and crafts professionals) occupations are projected in the quadrant where the supply of work is important. These non-tight occupations are mostly low-skilled.

Figure 4. Main occupations of supply and demand axes

