

# Recruitment Difficulties Anticipated by Companies: What Are the Explanatory Factors in France?

Thomas Bézy, Catherine Bruneau, Cédric Crofils, Étienne Lavenant and Dimitris Mavridis

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## S1 – Additional Descriptive Statistics

Table S1-1 – Anticipated recruitment difficulties by employment size range

Size of the establishment in 8 slices	Number of establishments	Percentage who express difficulties	Total number of recruitment projects	Percentage of difficult projects by establishment
0 employees	1,213	51	5,344	47
1-4 employees	18,000	63	44,165	60
5-9 employees	15,823	68	39,898	65
10-19 employees	15,670	69	57,362	64
20-49 employees	20,645	67	134,985	61
50-99 employees	8,235	64	102,509	55
100-199 employees	5,532	63	105,378	50
More than 200 employees	4,021	61	189,148	45

Reading note: Our final sample includes 15,670 establishments with 10 to 19 employees and which have a recruitment project. Of these, 69% anticipated that at least one recruitment would be difficult. The total number of recruitment projects was 57,362, 64% of which were deemed difficult.

Table S1-2 – Anticipated recruitment difficulties by year of creation

Year of creation of the establishment	Number of establishments	Percentage who express difficulties	Total number of recruitment projects	Percentage of difficult projects by establishment
Before 1999	48,381	66	420,043	60
2000-2003	9,650	64	74,702	59
2004-2007	12,137	66	77,589	63
2008-2011	11,343	67	67,409	61
2012-2015	7,628	65	38,876	61

Reading note: Our final sample includes 48,381 establishments whose associated company was created before 1999 and which have a recruitment project. Of these, 66% anticipated that at least one recruitment would be difficult. The total number of recruitment projects was 420,043, 60% of which were deemed difficult.

Table S1-3 – Anticipated recruitment difficulties by revenue deciles

Revenues (deciles) in thousands of euros	Number of establishments	Percentage who express difficulties	Total number of recruitment projects	Percentage of difficult projects by establishment
0 - 261	8,914	63	19,078	61
261 - 481	8,914	68	23,733	66
481 - 810	8,915	71	30,772	69
810 - 1,335	8,913	73	34,096	69
1,335 - 2,256	8,914	70	40,138	67
2,256 - 4,152	8,914	69	57,611	64
4,152 - 9,300	8,915	68	74,363	63
9,300 - 29,141	8,913	65	93,641	57
29,141 - 163,993	8,915	60	149,799	50
163,993 - ∞	8,912	50	155,558	41

Reading note: Our final sample includes 8,914 establishments whose associated company has annual sales of less than € 261,000 and which have a recruitment project. Of these, 63% anticipated that at least one recruitment would be difficult. The total number of recruitment projects was 19,078, 61% of which were deemed difficult.

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**Table S1-4 – Anticipated recruitment difficulties by sector of activity**

Sectors of activity in 10 modalities	Number of establishments	Percentage who express difficulties	Total number of recruitment projects	Percentage of difficult projects by institution
Manufacturing, mining and other industries	16,459	70	139,745	62
Construction	12,375	77	46,261	74
Trade, transport, accommodation and catering	36,562	61	261,010	55
Information and communication	2,202	64	28,005	59
Real estate activities	1,287	57	4,619	54
Professional, scientific and technical activities, administrative and support services	12,176	64	135,495	60
Public administration, education, health and social activities	4,564	71	39,808	65
Other service activities	3,514	67	23,846	65

Reading note: Our final sample includes 12,375 establishments in the Construction sector that have a recruitment project. Of these, 77% anticipated that at least one recruitment would be difficult. The total number of recruitment projects was 46,261, 74% of which were deemed difficult.

**Table S1-5 – Anticipated recruitment difficulties by region**

Region	Number of establishments	Percentage who express difficulties	Total number of recruitment projects	Percentage of difficult projects by establishment
Guadeloupe	597	53	2,177	47
Martinique	656	53	2,326	49
Guyane	340	56	1,136	52
La Réunion	1,054	54	5,446	47
Île-de-France	11,785	60	102,765	55
Centre-Val de Loire	4,066	68	35,246	62
Bourgogne-Franche-Comté	4,515	70	28,704	65
Normandie	5,383	64	42,389	59
Hauts-de-France	6,184	63	48,958	58
Grand Est	7,632	69	50,888	64
Pays de la Loire	6,806	71	56,670	66
Bretagne	6,145	71	43,253	66
Nouvelle-Aquitaine	9,482	69	80,159	63
Occitanie	8,863	62	61,499	57
Auvergne-Rhône-Alpes	10,857	70	78,258	64
Provence-Alpes-Côte d'Azur	4,774	61	38,915	56

Reading note: Our final sample includes 597 establishments in Guadeloupe that have a recruitment project. Of these, 53% anticipated that at least one recruitment would be difficult. The total number of recruitment projects was 2,177, 47% of which were deemed difficult.

**Table S1-6 – Anticipated recruitment difficulties by group affiliation**

Belongs to a group	Number of establishments	Percentage who express difficulties	Total number of recruitment projects	Percentage of difficult projects by establishment
No	41,990	69	154,846	66
Yes	47,149	63	523,943	56

Reading note: Our final sample includes 47,149 establishments belonging to a group that have a recruitment project. Of these, 63% anticipated that at least one recruitment would be difficult. The total number of recruitment projects was 523,943, 56% of which were deemed difficult.

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**Table S1-7 – Anticipated recruitment difficulties by pay gap (in deciles)**

Pay gap (in deciles)	Number of establishments	Percentage who express difficulties	Total number of recruitment projects	Percentage of difficult projects by establishment
1 <sup>st</sup> decile	8,914	63	77,441	59
2 <sup>nd</sup> decile	8,914	63	93,301	58
3 <sup>rd</sup> decile	8,914	63	80,506	58
4 <sup>th</sup> decile	8,914	65	73,639	60
5 <sup>th</sup> decile	8,914	66	70,805	60
6 <sup>th</sup> decile	8,914	67	62,516	62
7 <sup>th</sup> decile	8,914	69	58,046	64
8 <sup>th</sup> decile	8,914	69	56,847	64
9 <sup>th</sup> decile	8,914	69	54,977	63
10 <sup>th</sup> decile	8,913	65	50,711	60

Reading note: Our final sample includes 8,914 establishments in the first decile of pay gap that have a recruitment project. Of these, 63% anticipated that at least one recruitment would be difficult. The total number of recruitment projects was 77,441, 59% of which were deemed difficult.

**Table S1-8 – Anticipated recruitment difficulties by unemployment rate (in deciles)**

Unemployment rate (in deciles)	Number of establishments	Percentage who express difficulties	Total number of recruitment projects	Percentage of difficult projects by establishment
1 <sup>st</sup> decile	8,914	66	52,537	63
2 <sup>nd</sup> decile	8,921	68	45,011	62
3 <sup>rd</sup> decile	8,930	71	72,390	62
4 <sup>th</sup> decile	8,897	64	79,473	58
5 <sup>th</sup> decile	9,028	63	90,816	57
6 <sup>th</sup> decile	8,920	67	77,844	61
7 <sup>th</sup> decile	8,841	67	64,812	63
8 <sup>th</sup> decile	8,870	67	70,821	63
9 <sup>th</sup> decile	8,927	64	65,377	60
10 <sup>th</sup> decile	8,891	61	59,708	58

Reading note: Our final sample includes 8,914 establishments in the first decile of unemployment rate that have a recruitment project. Of these, 66% anticipated that at least one recruitment would be difficult. The total number of recruitment projects was 52,537, 63% of which were deemed difficult.

**Table S1-9 – Anticipated recruitment difficulties by turnover (in deciles)**

Turnover (in deciles)	Number of establishments	Percentage who express difficulties	Total number of recruitment projects	Percentage of difficult projects by establishment
1 <sup>st</sup> decile	9,009	66	21,831	64
2 <sup>nd</sup> decile	8,819	69	67,509	62
3 <sup>rd</sup> decile	9,192	69	61,944	64
4 <sup>th</sup> decile	10,248	69	65,396	64
5 <sup>th</sup> decile	7,385	68	51,958	62
6 <sup>th</sup> decile	11,356	66	68,211	62
7 <sup>th</sup> decile	6,403	65	60,246	58
8 <sup>th</sup> decile	9,008	63	69,983	58
9 <sup>th</sup> decile	8,806	61	97,618	57
10 <sup>th</sup> decile	8,913	60	114,093	56

Reading note: Our final sample includes 9,009 establishments in the first decile of turnover that have a recruitment project. Of these, 66% anticipated that at least one recruitment would be difficult. The total number of recruitment projects was 21,831, 64% of which were deemed difficult.

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**Table S1-10 – Anticipated recruitment challenges by attraction area ranges**

Attraction area ranges	Number of establishments	Percentage who express difficulties	Total number of recruitment projects	Percentage of difficult projects by institution
Out of the city's attraction	6,342	69	39,641	64
Area with less than 10,000 inhabitants	2,390	67	19,627	62
Area of 10,000 to less than 20,000 inhabitants	3,768	68	24,989	63
20,000 to 30,000 inhabitants	2,560	67	18,199	61
30,000 to 50,000 inhabitants	5,002	69	34,571	64
50,000 to 75,000 inhabitants	4,879	67	32,885	62
75,000 to 100,000 inhabitants	2,234	65	14,690	60
100,000 to 125,000 inhabitants	2,140	68	15,945	63
125,000 to 150,000 inhabitants	3,365	66	21,085	61
150,000 to 200,000 inhabitants	4,595	67	34,430	62
200,000 to 300,000 inhabitants	5,992	68	45,557	63
300,000 to 400,000 inhabitants	6,761	62	47,583	58
400,000 to 500,000 inhabitants	5,323	66	42,204	61
500,000 to 700,000 inhabitants	3,348	64	26,946	58
700,000 to 1,000,000 inhabitants	7,224	68	57,616	64
1,000,000 inhabitants or more (excluding Paris)	10,514	65	92,619	60
Paris area	12,702	60	110,202	56

Reading note: Our final sample includes 2,390 establishments operating in an area of less than 10,000 inhabitants that have a recruitment project. Of these, 67% anticipated that at least one recruitment would be difficult. The total number of recruitment projects was 19,627, 62% of which were deemed difficult. The table uses the attraction area zoning 2020.

**Table S1-11 – Occupations for which recruitment is considered the most difficult**

Occupations with the highest level of anticipated hiring difficulties	Share of difficult projects (in %)
Skilled metal removal workers	84
Home helpers and housekeepers	81
Skilled automotive repair workers	81
Skilled workers in building shell	81
Skilled workers in building trade	78
Technicians and supervisors in mechanical industries	76
Skilled metal forming workers	76
Physicians	75
Qualified mechanical workers	75
Technicians and supervisors in the building and public works sector	75

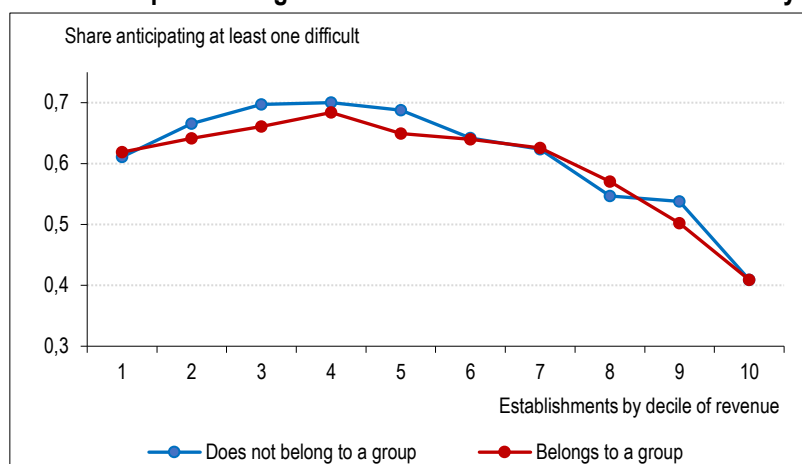
Note: This list is based on the classification of 82 occupational family categories. The "Skilled metal removal workers" job family is the one with the most recruitment projects deemed difficult in our sample

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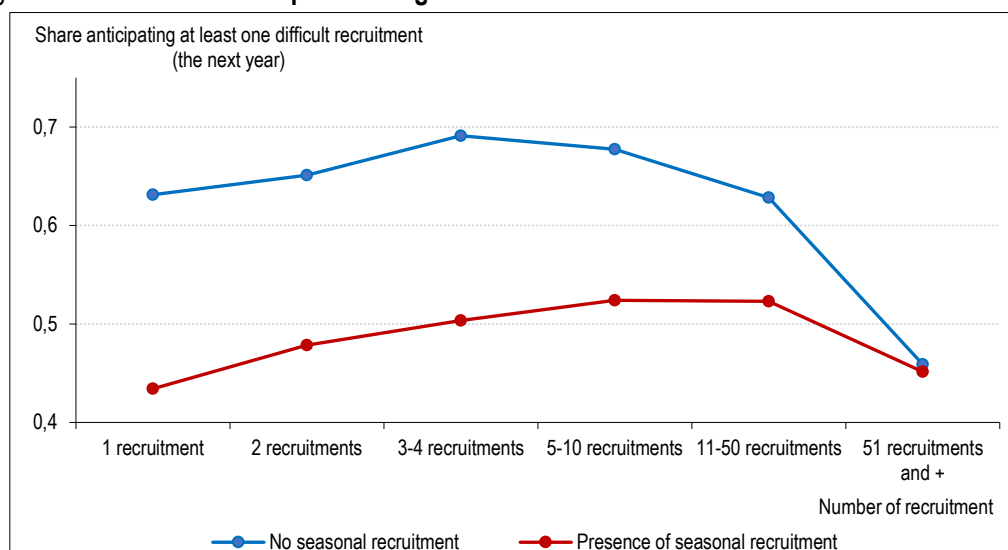
Figure S1-I – Share of anticipated hiring difficulties as a function of revenues and by group affiliation



Note: On the x-axis, establishments are grouped by revenues decile. Cf. Table S1-3 in the appendix for the amounts associated with each decile. On the ordinate we represent the average share of anticipated hiring difficulties. The red curve gathers establishments that belong to a group and the blue curve gathers those that do not belong to a group.

Interpretation: 62% of the 10% of establishments with the lowest sales belonging to a group anticipate at least one difficult recruitment, compared with 61% of those not belonging to a group.

Figure S1-II – Share of anticipated hiring difficulties as a function of the number of recruitments



Note: On the x-axis, establishments are grouped according to the number of recruitments they anticipate for the coming year. On the y-axis we represent the average share of anticipated hiring difficulties. The red curve gathers establishments that plan to recruit at least one seasonal worker and the blue curve gathers those that do not plan to recruit any seasonal workers.

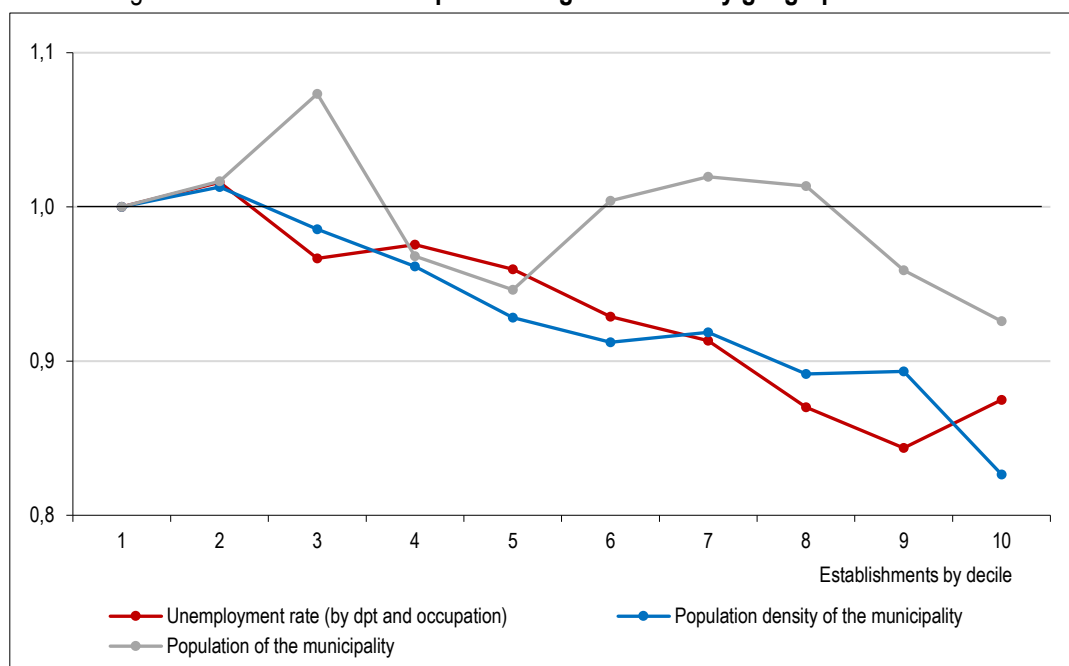
Interpretation: 62% of establishments planning a single non-seasonal recruitment judged it to be difficult, compared with 42% of those planning a single seasonal recruitment.

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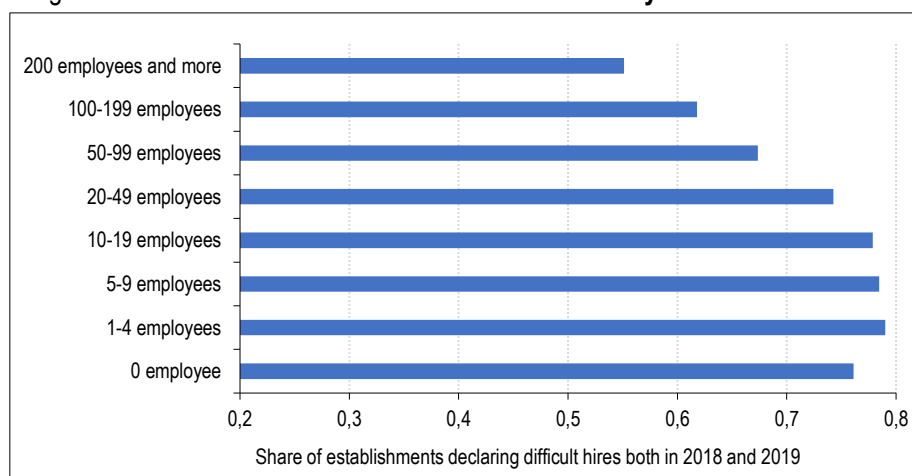
Figure S1-III – Share of anticipated hiring difficulties by geographic variables



Note: On the x-axis, establishments are grouped by deciles of municipal population (blue curve), by deciles population density by municipality (red curve) and by decile of unemployment rate (green curve). On the y-axis we represent the average share of anticipated hiring difficulties in the form of an index. The values are normalized so that the first decile corresponds to base 1.

Interpretation: The 10% of establishments located in high-density towns are 0.83 times less likely to anticipate recruitment difficulties than the 10% of establishments located in low-density towns.

Figure S1-IV – Persistence of recruitment difficulties by size of establishment



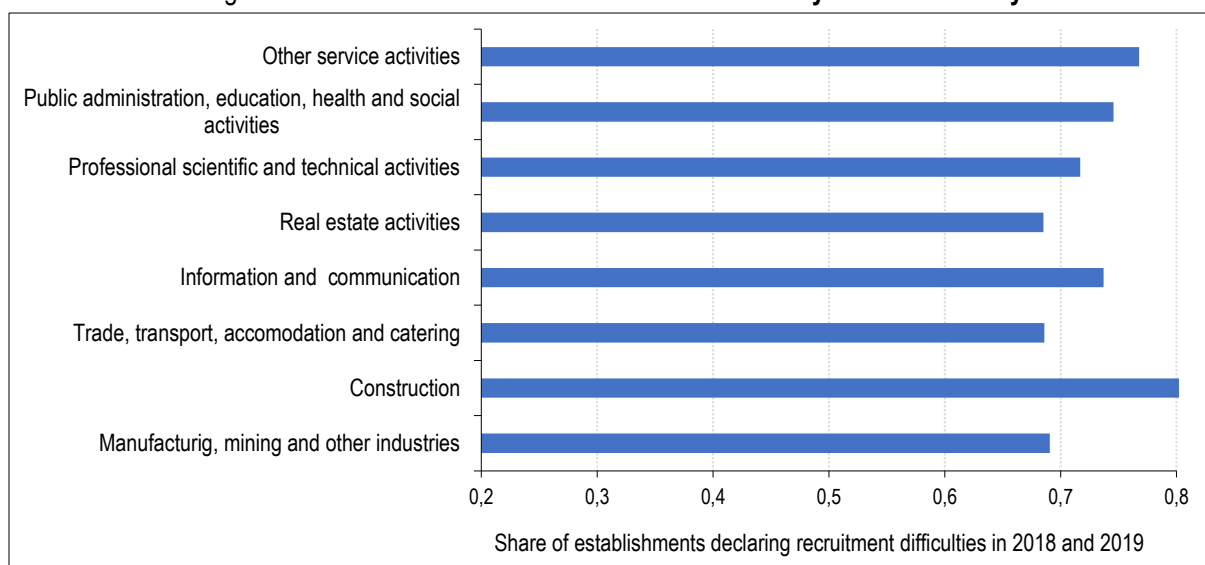
Note: On the x-axis is represented the share of establishments that reported hiring difficulties for at least one recruitment project during the two years (2018 and 2019). The sample considered is the one that includes establishments that answered the questionnaire for both years.

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Figure S1-V – Persistence of recruitment difficulties by sector of activity



Note: On the x-axis is represented the share of establishments that reported hiring difficulties for at least one recruitment project during the two years (2018 and 2019). The sample considered is the one that includes establishments that answered the questionnaire for both years.

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## S2 – Additional Regression Tables

Table S2-1 – Estimation results – Including turnover squared

Dependent variable: presence of anticipated hiring difficulties		
	Without weighting (1)	With weighting (2)
<b>Establishment variables</b>		
Squared revenue	-0.00176*** (0.000202)	-0.00287*** (0.000250)
Revenue (Log)	0.0124** (0.00429)	0.0327*** (0.00521)
Belongs to a group	-0.0113** (0.00442)	-0.0170*** (0.00522)
Total number of hires	0.000183*** (8.12e-05)	0.000646*** (0.000114)
Turnover rate	-0.000617* (0.000340)	-0.000413 (0.000383)
Proportion of seasonal workers in the recruitment	-0.132*** (0.00477)	-0.139*** (0.00578)
Pay gap (by department and by occupation)	-0.000149 (0.00178)	-0.00118 (0.00240)
<b>Location variables</b>		
Population density	-0.0128*** (0.00106)	-0.0110*** (0.00130)
Unemployment rate (by department and by occupation)	-0.707*** (0.0334)	-0.696*** (0.0412)
<b>Indicator variables: size of establishment, sector of activity, occupations</b>		
Number of observations	89,139	89,139
Pseudo-R <sup>2</sup>	0.0629	0.0647

Note: The Probit regression covers all establishments that responded to the survey in 2018 or 2019. The explained variable is a binary variable equal to 1 if the establishment declares recruitment difficulties. The explanatory variables are separated into three categories: variables specific to each establishment, those specific to their location and indicator variables. The values shown correspond to the marginal effects. Robust standard deviations in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.



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Table S2-2 – Estimation results – Population of municipalities

Dependent variable: presence of anticipated hiring difficulties		
	Without weighting (1)	With weighting (2)
Establishment variables		
Revenue (Log)	-0.0243*** (0.000954)	-0.0233*** (0.00117)
Belongs to a group	-0.00246 (0.00429)	-0.00654 (0.00509)
Total number of hires	0.000206*** (8.13e-05)	0.000887*** (0.000115)
Turnover rate	-0.000599* (0.000332)	-0.000347 (0.000362)
Proportion of seasonal workers in the recruitment	-0.127*** (0.00474)	-0.136*** (0.00576)
Pay gap (by department and by occupation)	0.000308 (0.00186)	-0.000523 (0.00258)
Location variables		
Population of the municipality	-0.00929*** (0.00104)	-0.00889*** (0.00126)
Unemployment rate (by department and by occupation)	-0.700*** (0.0338)	-0.693*** (0.0414)
Indicator variables: size of establishment, sector of activity, occupations		
Number of observations	89,139	89,139
Pseudo-R <sup>2</sup>	0.0616	0.0629

Note: The explained variable is a binary variable equal to 1 if the establishment anticipates at least one difficult recruitment project. We separate the explanatory variables into three categories: those specific to each establishment, those specific to their location and the indicator variables. The values shown correspond to the marginal effects. Robust standard deviations in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

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Table S2-3 – Estimation results – Attraction area ranges

Dependent variable: presence of anticipated hiring difficulties		
	Without weighting (1)	With weighting (2)
Establishment variables: revenues, group membership, total number of hires, turnover rate, proportion of seasonal hires, and pay gap		
Location variables (variable omitted for attraction area ranges: cities outside of attraction areas)		
Unemployment rate	-0.732*** (0.0348)	-0.723*** (0.0425)
Area with less than 10,000 inhabitants	-0.0108 (0.0116)	-0.0265* (0.0140)
20,000 to 30,000 inhabitants	-0.0194* (0.0114)	-0.0282** (0.0138)
75,000 to 100,000 inhabitants	-0.0356*** (0.0119)	-0.0419*** (0.0144)
300,000 to 400,000 inhabitants	-0.0359*** (0.00865)	-0.0379*** (0.0104)
1,000,000 inhabitants or more	-0.0337*** (0.00790)	-0.0332*** (0.00961)
Paris area	-0.0799*** (0.00766)	-0.0767*** (0.00938)
Indicator variables: size of establishment, sector of activity, occupations		
Number of observations	89,139	89,139
Pseudo-R <sup>2</sup>	0.0621	0.0628

Note: The explained variable is a binary variable equal to 1 if the establishment anticipates at least one difficult recruitment project. Indicator variables are included for attraction area brackets. All attraction areas ranges are included in the regression, but only some of the coefficients are shown in the table. Explanatory variables are separated into three categories: those specific to each establishment, those specific to their location and the indicator variables. The values shown correspond to the marginal effects. Robust standard deviations in parentheses.  
\*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

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Table S2-4 – Estimation results – Establishment size indicator variables from Table 1

Dependent variable: presence of anticipated hiring difficulties		
	Without weighting (1)	With weighting (2)
Establishment variables: revenues, group membership, total number of hires, turnover rate, proportion of seasonal hires, and pay gap		
Indicator variables: size of establishment, sector of activity, occupations		
Establishment sizes (variable omitted: establishments with 0 employees)		
1-4 employees	0.0781*** (0.0140)	0.0902*** (0.0157)
5-9 employees	0.139*** (0.0141)	0.148*** (0.0158)
10-19 employees	0.167*** (0.0142)	0.178*** (0.0160)
20-49 employees	0.164*** (0.0142)	0.169*** (0.0161)
50-99 employees	0.162*** (0.0151)	0.165*** (0.0172)
100-199 employees	0.162*** (0.0157)	0.161*** (0.0181)
more than 200 employees	0.176*** (0.0168)	0.155*** (0.0195)

Note: The coefficients displayed are those associated with the indicator variables in Table 1. The explained variable is a binary variable equal to 1 if the establishment anticipates at least one difficult recruitment project. The values shown correspond to the marginal effects. Robust standard deviations in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

Table S2-5 – Estimation results - Industry indicator variables from Table 1

Dependent variable: presence of anticipated hiring difficulties		
	Without weighting (1)	With weighting (2)
Establishment variables: revenues, group membership, total number of hires, turnover rate, proportion of seasonal hires, and pay gap		
Indicator variables: size of establishment, sector of activity, occupations		
Sectors of activity (omitted variable: Information and communication)		
Manufacturing, mining and other industries	-0.00753 (0.00597)	-0.00149 (0.00746)
Construction	0.0146 (0.00959)	0.0201** (0.0113)
Trade, transport, accommodation and catering	-0.0344** (0.0143)	-0.0107 (0.0168)
Real estate activities	-0.0190 (0.0137)	0.00302 (0.0162)
Professional, scientific and technical activities, administrative and support services	-0.0275*** (0.00653)	-0.0137* (0.00760)
Public administration, education, health and social activities.	0.0194** (0.00981)	-0.00291 (0.0116)
Other service activities	-0.00383 (0.0108)	0.00633 (0.0127)

Note: The coefficients displayed are those associated with the indicator variables in Table 1. The explained variable is a binary variable equal to 1 if the establishment anticipates at least one difficult recruitment project. The values shown correspond to the the marginal effects. Robust standard deviations in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.