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TELEWORKING IN SPAIN

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## ABSTRACT

As a result of the boost given to teleworking by the current crisis, this article analyses the potential of this form of work in Spain and the capacity of different socio-demographic groups to benefit from it. According to the Spanish Labour Force Survey, the percentage of the employed who, at least occasionally, work from home amounted to 8.3% in 2019, up 2.4 percentage points (pp) from 2009. By occupation type, remote working is more frequent among the self-employed, small companies and skilled occupations. Furthermore, this form of work is still infrequently used in certain sectors of activity which could have been bolstered by new technological developments, such as manufacturing, public administration, transportation and storage, administrative activities, wholesale and retail trade and other service activities. The types of workers, having taken into account the characteristics of their jobs, who work remotely are usually individuals aged between 35 and 65 and those with university studies. An analysis of the intrinsic characteristics of each occupation estimates that about 30% of persons employed could telework, at least occasionally, and, consequently, there is considerable room for improvement in the application of these working arrangements. However, this potential increase is asymmetrical and not all workers are going to be able to take advantage of these arrangements since those with a lower level of educational attainment will find it difficult to be able to benefit from them.

**Keywords:** teleworking, occupations, COVID-19.

**JEL classification:** J81, J22, O30.

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### Introduction

In order to reduce movement of the population against the backdrop of the battle against COVID-19, on 29 March all the activity of professionals and workers who are not considered essential or who cannot work from their principal residence<sup>1</sup> was halted. Therefore, the only way of continuing to perform a non-key activity is to work from home. Similarly, in the current phase of easing of lockdown, telework may contribute to a gradual return to work which makes activity compatible with social distancing and limiting possible outbreaks. Consequently, it is not surprising that in a recent Banco de España survey of a group of companies, virtually 80% of the sample increased teleworking so that their activity is affected as little as possible in the current situation.<sup>2</sup> In this setting, first, the article analyses the degree to which remote working has spread in Spain from an international perspective over the last ten years. Evidently, not all tasks can be performed from workers' main residences and, consequently, the second objective of the article is to analyse, in the case of Spain, which groups of workers and companies currently use teleworking, to a greater or lesser extent, in their usual activity. Lastly, despite the recent boom in teleworking following the crisis that began in 2008, the speed at which confinement was declared probably prevented many activities which could be performed at home, from actually being undertaken remotely straight away. Teleworking requires some investment in computer and technological equipment and needs workers to have a certain level of training. Additionally, it is possible that in certain cases working practices are being adapted to an extraordinary situation and that some tasks, which under normal circumstances it would be desirable to perform in the workplace, are being performed from home. Accordingly, the third objective of the article is to estimate with the highest degree of breakdown possible, which jobs could be done in workers' homes, according to the characteristics of each occupation. The purpose of this is to determine, for each population group, the room for improvement in this dimension by type of job currently performed.

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1 Many companies which were able to keep their workers economically active at home began to favour this type of practices from the closure of educational centres (11 March in the region of Madrid, Rioja and Álava; 13 March in Catalonia, Galicia, Castile-La Mancha, the Canary Islands and the remainder of the Basque Country, and on 16 March in the rest of the country) or from the declaration of the state of alert on 14 March (see RD 463/2020 of 14 March 2020). Finally, the closure of all non-key activity which could not be performed at home was approved on 29 March (RDL 10/2020).

2 See Box 1, "Business survey on the impact of the COVID-19 crisis", of the "Reference macroeconomic scenarios for the Spanish economy after COVID-19", Analytical Articles, *Economic Bulletin*, 2/2020, Banco de España.

Aside from teleworking as a solution to cushion the negative effects of the current confinement, there are studies which show other characteristics of this method of working. For example, Bloom et al. (2015) analysed the results, in terms of productivity, of a Chinese travel agency which randomly assigned teleworking to volunteers from a group of call centre employees for nine months from 6 December 2010. In that period productivity increased by 13%, more hours were worked and more calls were made per minute. By contrast, there are studies which indicate that this increase in productivity may depend on the type of tasks performed; it is positive for creative jobs but may be negative for urgent and complex tasks [Battiston et al. (2017) and Dutcher (2012)]. This negative effect on productivity may be exacerbated in a situation, such as at present, where teleworking has been imposed by circumstances. Workers have not had the opportunity to invest suitably in equipment for working at home or in training [Morikawa (2020)].

The paper by Bloom et al. (2015) also showed that workers felt satisfied with the possibility of teleworking. In general, the findings of different surveys show that teleworkers usually take a particularly positive view of the flexibility of organising their working day and performing their tasks in different places and of not wasting time in commuting. However, in contrast, they usually underline as negative aspects communication problems with colleagues, loneliness and greater difficulties in disconnecting from work.<sup>3</sup> Certain analyses have also pointed out the disadvantages of teleworking for workers' health such as a greater propensity to suffer stress or depression.<sup>4</sup> Accordingly, some authors defend promoting teleworking but not continuously, rather alternating between working from home and being physically present at the place of work. There are analyses which suggest that remote working could be a good option for extending workers' working lives since flexible hours are highly valued by individuals approaching retirement age [see Hudomiet et al. (2019)]. Lastly, these working arrangements pose some challenges (distribution of investment needed between company and workers or adaptation of the protocols on hours, working conditions, health and safety) which will require properly structured regulations. Improving teleworking capacity involves investment in equipment, software (for example, laptop devices, videoconferencing systems, cybersecurity, file storage and sharing solutions, etc.) and the training of workers.

## Teleworking: a European comparison

Working from home has been gaining momentum worldwide for a decade and countries in the European Union (EU) are not an exception. In 2018, the last year that uniform information was available, 13.5% of persons employed aged between 15 and 64 worked remotely in EU-28 (Eurostat). Chart 1 shows considerable cross-

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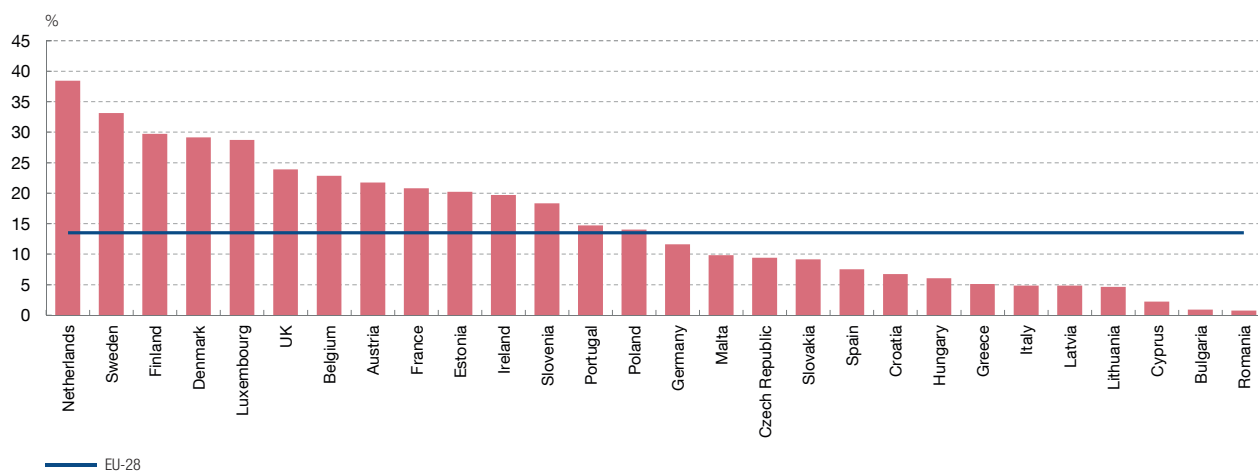
<sup>3</sup> See [State of Remote 2020](#).

<sup>4</sup> See [Tavares \(2017\)](#).

Chart 1

**PERCENTAGE OF PERSONS EMPLOYED AGED 15 TO 64 WHO TELEWORK (2018)**

Teleworking is more established in north European countries, whereas in southern and eastern Europe it is used less frequently.



SOURCE: Eurostat (Labour Force Survey, 2018).



country heterogeneity. Teleworking is generally more established in north European countries, whereas in southern and eastern Europe this practice is less frequent. For instance, in the Netherlands and Sweden, more than 30% of total workers work remotely, at the same time as these working arrangements are virtually non-existent in Cyprus, Bulgaria and Romania. Spain (7.5%) is 6 percentage points (pp) below the European average and clearly some way off from the figures of other large countries, such as France (20.8%) or Germany (11.6%).

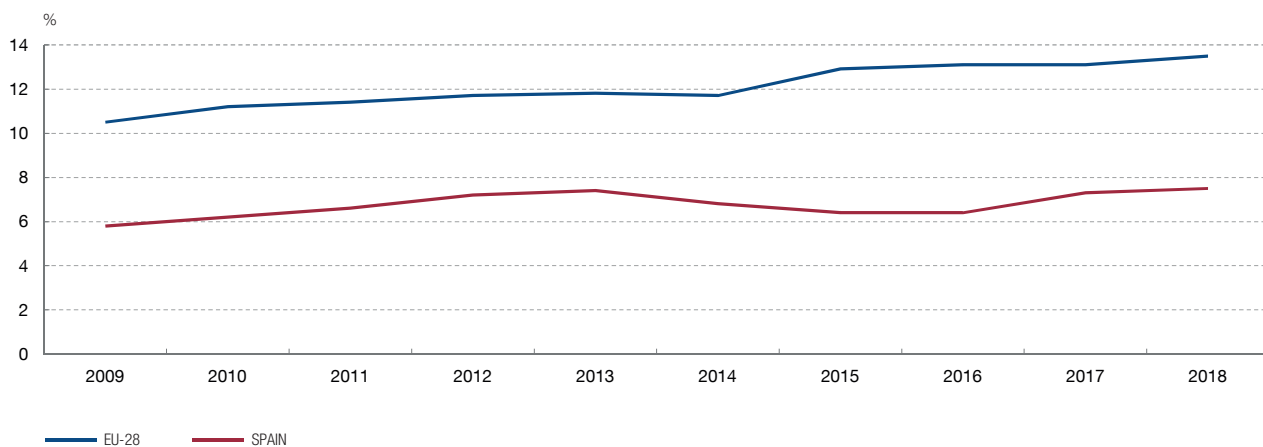
Teleworking has increased in most European countries in the last ten years. On average, the percentage of remote workers increased by 3 pp between 2009 and 2018. This working practice has grown most in the Netherlands, Sweden and Estonia, rising by at least 10 pp. Spain has not been an exception, although its growth was much more limited (1.7 pp), slightly lower than in France, where it rose by 2.2 pp, and slightly more than in Germany, where it decreased by 1.3 pp (see Chart 2).

Eurostat's public data provides more information on the characteristics of teleworkers in Europe. Specifically, on average, the difference between the percentage of remote workers by gender in the countries in the region overall is virtually zero, although remote working is slightly more prevalent among men than women. However, by country, there are more notable differences between genders. Habitually, in many euro area countries, men slightly dominate these statistics (for example in Ireland 21.6% of men in employment work from home, compared with 17.6 % of women; in Finland this proportion is 31.6% for men and 27.8% for women). However, in eastern Europe the majority of teleworkers are women (for example, in Slovenia, 16.7% of employed men telework, compared with 20.1% of women).

Chart 2

**WORKERS AGED 15 TO 64 WHO TELEWORK. A COMPARISON OF SPAIN AND THE EU-28**

In the last ten years the percentage of workers who telework has increased on average in the EU-28. In Spain growth has been much more limited.



SOURCE: Eurostat (Labour Force Survey).



A general pattern across the EU is that in the older groups of workers the percentage of remote workers is higher. In particular, workers aged between 55 and 64 mostly work from home (15.4% of employed adults in this age group in the EU-27 on average), followed by workers aged between 25 and 54 (14.1% of employed adults in this age group in the EU-27 on average). Austria is worth noting, where this percentage stands at 30.5% for the 55-64 age group compared with 22.3% for the 25-54 age group.

Furthermore, another pattern of behaviour in Europe is the positive correlation between the number of children and the percentage of workers who work from home. Generally, the difference between the share of teleworkers who have a child and that of those who do not, is not substantial. However, this difference does increase if the proportion with two, three or more children is considered. In the EU in 2009, the difference, as a percentage of teleworkers, between those with two or more children and those with none was +2.1 pp and +4.5 pp, respectively, whereas in 2018 it stood at between +4.3 pp and +7 pp, indicating that in recent years the proportion of employed adults who telework in the group of workers with children has grown.

**Characteristics of teleworking in Spain**

In order to analyse the number of individuals in Spain who performed part of their job from home in 2019, a section of the Spanish Labour Force Survey (LFS) was used in which the following question was asked: “Did you work from home on any

Table 1

**CHANGES IN TELEWORKING**

The proportion of the employed who worked from home on more than half the days they worked or occasionally shows an upward trend in the period 2009-2019, which has not halted during the recovery.

Year	Teleworking					
	No		Yes, occasionally		Yes, more than half days worked	
	No. of workers	%	No. of workers	%	No. of workers	%
2009	17,862,431	94.1	488,639	2.6	637,556	3.4
2014	15,992,285	93.1	447,736	2.6	737,461	4.3
2019	17,933,285	91.6	688,671	3.5	951,783	4.9

**SOURCE:** INE (Labour Force Survey, microdata from the 2019 annual sub-sample).

**NOTE:** To identify teleworking, the question "Did you work from home on any day in the last four weeks?" was used (possibility envisaged in labour agreement). Possible responses are as follows: "yes, on more than half the days I worked", "yes, occasionally" or "no".

day in the last four weeks?" In reply, workers could indicate: "No", "yes, occasionally" or "yes, on more than half the days I worked".<sup>5, 6</sup>

Of the nearly 20 million persons employed in Spain in 2019, 1,640,000 (8.4%) indicated that they worked from home occasionally and 950,000 said that they did so for more than half the days they worked (see Table 1). These figures represent an increase in occasional remote working compared with the situation in 2009 when 6% of total workers replied that they worked at home occasionally. This upward trend did not come to a halt during the recovery since in 2014 the proportion of occasional work from home stood at 6.9%. However, the increase in the number of workers who indicated that they teleworked more than half the days they worked was much lower. Specifically, 3.4% of workers teleworked more than half the days they worked in 2009, only 1.1 pp lower than in 2019, while this figure remained virtually unchanged since 2014 (4.3% in 2014, as opposed to 4.9% at present).

In order to analyse which population groups work from home more, the employment and socio-demographic characteristics of the groups who telework are compared with those who do not (see Tables 2, 3 and 4). For example, if women represent 38% of the group of persons employed who telework occasionally, while they represent 45% of the group of individuals who do not work from home, the implication is that occasional teleworking is less frequent among women than men.

The possibility of working from home depends on job type and how prepared companies are to permit that activity to be performed at home, on the conditions of

5 The National Statistics Institute (INE by its Spanish abbreviation) provides this information for the annual sub-sample of the LFS.

6 A total of 1% of persons employed (205,574 individuals) replied "Don't know" to the question on working from home. The total employed who answered the question are analysed in this section and, for this reason, the total employed considered is slightly lower than the total employed in the LFS for 2019 (19,779,313 individuals).

Table 2

**CHARACTERISTICS OF EMPLOYMENT IN TELEWORKING**

The self-employed and workers at small companies work from home more frequently. There is high heterogeneity in the possibility of teleworking according to occupation and sector of activity.

	Teleworking					
	No		Yes, occasionally		Yes, more than half days worked	
	No. of workers	%	No. of workers	%	No. of workers	%
<b>Total</b>	<b>17,933,285</b>	<b>100.0</b>	<b>688,671</b>	<b>100.0</b>	<b>951,783</b>	<b>100.0</b>
<b>Employment status</b>						
Permanent wage and salaried workers	11,551,792	64.4	242,981	35.3	319,220	33.6
Experience: less than 1 year	753,354	6.5	13,543	5.6	13,795	4.3
Experience: 1-3 years	1,664,107	14.4	42,979	17.7	29,141	9.1
Experience: 3-7 years	2,095,773	18.1	40,941	16.8	36,551	11.5
Experience: more than 7 years	7,038,558	60.9	145,517	59.9	239,733	75.1
Temporary wage and salaried workers	4,215,613	23.5	42,969	6.2	94,442	9.9
Self-employed	2,164,444	12.1	402,721	58.5	537,604	56.5
<b>Company size</b>						
1-49 workers	11,719,350	70.3	541,452	80.0	751,326	80.8
50-249 workers	2,596,447	15.6	74,232	11.0	131,564	14.1
250 or more workers	2,346,502	14.1	61,381	9.1	47,002	5.1
<b>Occupation</b>						
Armed forces	107,995	0.6	328	0.0	1,674	0.2
Directors and managers	566,224	3.2	86,551	12.6	100,555	10.6
Professionals	2,715,910	15.1	275,717	40.0	494,249	51.9
Associate professionals	1,823,990	10.2	120,116	17.4	151,065	15.9
Accounting, clerical and other office workers	1,988,470	11.1	33,608	4.9	30,388	3.2
Restaurant, personal and protection service and sales workers	4,340,250	24.2	67,452	9.8	69,307	7.3
Skilled agricultural, forestry and fishery workers	398,459	2.2	30,228	4.4	23,234	2.4
Craft and skilled workers	2,058,185	11.5	57,886	8.4	60,195	6.3
Plant and machine operators	1,432,249	8.0	10,540	1.5	9,166	1.0
Elementary occupations	2,501,552	13.9	6,245	0.9	11,951	1.3
<b>Sector of activity</b>						
Agriculture, forestry and fishing	783,758	4.4	31,642	4.6	25,927	2.7
Manufacturing	2,315,950	12.9	62,141	9.0	54,243	5.7
Electricity, gas, steam and air conditioning supply	85,294	0.5	3,786	0.5	2,082	0.2
Water supply/sewerage/waste management activities	149,843	0.8	2,757	0.4	3,078	0.3
Construction	1,186,814	6.6	58,553	8.5	62,373	6.6
Wholesale and retail trade, repair of motor vehicles	2,817,005	15.7	94,948	13.8	109,515	11.5
Transportation and storage	954,499	5.3	18,444	2.7	14,716	1.5
Accommodation and food service activities	1,694,500	9.4	17,106	2.5	20,782	2.2
Information and communication	475,544	2.7	51,778	7.5	55,570	5.8
Financial and insurance activities	370,906	2.1	21,150	3.1	21,243	2.2
Real estate activities	113,877	0.6	13,866	2.0	22,171	2.3
Professional, scientific and technical activities	714,512	4.0	102,334	14.9	158,347	16.6
Administrative and support service activities	1,005,164	5.6	21,339	3.1	25,842	2.7
Public admin. and defence, compulsory social security	1,304,465	7.3	10,665	1.5	15,372	1.6
Education	929,455	5.2	121,358	17.6	275,356	28.9
Human health and social work activities	1,639,161	9.1	23,813	3.5	29,281	3.1
Arts, entertainment and recreation	377,642	2.1	19,655	2.9	24,760	2.6
Other service activities	415,966	2.3	13,339	1.9	18,646	2.0
Activities of households as employers of domestic personnel	597,902	3.3			12,478	1.3
Activities of extraterritorial organisations and bodies	1,028	0.0				

**SOURCE:** INE (Labour Force Survey, microdata from the 2019 annual sub-sample).

**NOTE:** To identify teleworking, the question "Did you work from home on any day in the last four weeks?" was used (possibility envisaged in labour agreement). Possible responses are as follows: "yes, on more than half the days I worked", "yes, occasionally" or "no".



Table 3

**SOCIO-DEMOGRAPHIC CHARACTERISTICS OF TELEWORKERS (2019)**

The prevalence of teleworking increases with age and educational attainment level. Teleworking is particularly significant among households with children.

	Teleworking					
	No		Yes, occasionally		Yes, more than half days worked	
	No. of workers	%	No. of workers	%	No. of workers	%
<b>Total</b>	<b>17,933,285</b>	<b>100.0</b>	<b>688,671</b>	<b>100.0</b>	<b>951,783</b>	<b>100.0</b>
<b>Sex</b>						
Male	9,689,392	54.0	424,712	61.7	522,996	54.9
Female	8,243,892	46.0	263,959	38.3	428,787	45.1
<b>Age</b>						
16-24	1,008,605	5.6	6,000	0.9	15,549	1.6
25-34	3,534,258	19.7	110,021	16.0	134,774	14.2
35-44	5,213,683	29.1	231,774	33.7	287,435	30.2
45-54	5,029,404	28.0	206,741	30.0	297,709	31.3
55-64	2,962,543	16.5	128,114	18.6	192,285	20.2
65 or over	184,792	1.0	6,020	0.9	24,032	2.5
<b>Education</b>						
Lower than secondary education	5,956,036	33.2	103,183	15.0	118,405	12.4
Secondary education	7,089,177	39.5	192,781	28.0	208,539	21.9
University and higher	4,888,071	27.3	392,707	57.0	624,839	65.6
<b>Household type</b>						
Household with 1 adult	1,762,935	9.8	79,661	11.6	127,150	13.4
Single-parent household with children	792,374	4.4	19,649	2.9	37,167	3.9
Household with 2 adults and no children	3,866,402	21.6	170,194	24.7	187,569	19.7
Household with 2 adults and 1 child	2,478,293	13.8	104,391	15.2	156,242	16.4
Household with 2 adults and more than 1 child	3,972,941	22.2	193,369	28.1	228,258	24.0
Other	5,060,339	28.2	121,407	17.6	215,396	22.6

**SOURCE:** INE (Labour Force Survey, microdata from the 2019 annual sub-sample).

**NOTE:** To identify teleworking, the question "Did you work from home on any day in the last four weeks?" was used (possibility envisaged in labour agreement). Possible responses are as follows: "yes, on more than half the days I worked", "yes, occasionally" or "no".

workers' main residences and their capacity to work remotely, as well as on the networks and infrastructure available in their area of residence. Consequently, certain characteristics provided by the LFS on these three aspects are analysed below.

By job type (see Table 2), it is not surprising that the self-employed work from home occasionally more frequently. In many cases, it is out of necessity since their principal residence is also their workplace. Among wage and salaried workers, working from home occasionally is more prevalent among workers with a permanent contract and, within this group, the predominance of remote working increases in tandem with the number of years of experience. This work method increased among both permanent and temporary wage and salaried workers during the years of the recovery. By

Table 4

**TELEWORKING BY REGION (2019)**

Working from home is notably prevalent in Asturias, the Balearic Islands, Ceuta and Melilla, and Aragon. By contrast, teleworking is used relatively less in Rioja, the Canary Islands, Navarre, Cantabria, Murcia, Castile-La Mancha, the Basque Country and Extremadura.

	Teleworking					
	No		Yes, occasionally		Yes, more than half days worked	
	No. of workers	%	No. of workers	%	No. of workers	%
<b>Total</b>	<b>17,933,285</b>	<b>100.0</b>	<b>688,671</b>	<b>100.0</b>	<b>951,783</b>	<b>100.0</b>
Andalusia	2,841,143	15.8	101,389	14.7	149,945	15.8
Aragon	525,453	2.9	28,545	4.1	28,945	3.0
Asturias	341,073	1.9	16,627	2.4	25,691	2.7
Balearic Islands	500,640	2.8	28,642	4.2	33,378	3.5
Canary Islands	836,362	4.7	20,163	2.9	36,040	3.8
Cantabria	224,229	1.3	6,041	0.9	11,209	1.2
Castile-Leon	896,966	5.0	37,047	5.4	47,452	5.0
Castile-La Mancha	756,009	4.2	24,649	3.6	36,917	3.9
Catalonia	3,115,477	17.4	136,987	19.9	157,847	16.6
Valencia	1,891,473	10.5	76,318	11.1	102,006	10.7
Extremadura	357,293	2.0	11,600	1.7	19,641	2.1
Galicia	986,869	5.5	36,857	5.4	59,897	6.3
Madrid	2,799,604	15.6	96,974	14.1	158,483	16.7
Murcia	560,064	3.1	20,720	3.0	24,833	2.6
Navarre	266,893	1.5	7,602	1.1	11,368	1.2
Basque Country	853,346	4.8	32,504	4.7	40,177	4.2
Rioja	130,311	0.7	3,371	0.5	5,107	0.5
Ceuta and Melilla	50,081	0.3	2,636	0.4	2,846	0.3

**SOURCE:** INE (Labour Force Survey, microdata from the 2019 annual sub-sample).

**NOTE:** To identify teleworking, the question "Did you work from home on any day in the last four weeks?" was used (possibility envisaged in labour agreement). Possible responses are as follows: "yes, on more than half the days I worked", "yes, occasionally" or "no".

company size, small companies are those who use teleworking most. This is partly related to self-employment. If the sample is restricted to wage and salaried workers, teleworking is more frequent at medium-sized firms (between 50 and 250 employees). However, in recent years larger companies have gradually increased their share of teleworking. According to the LFS data, in the period 2009-2019, the proportion of employees who teleworked at companies with more than 50 workers increased from 16% to almost 20%.

As could be expected, there is high heterogeneity in the possibility of teleworking according to occupation (see Table 2). Generally, directors, managers, professionals and associate professionals have been able to work from home occasionally. However, this has not been the case of the armed forces, accounting and clerical workers, restaurant, personal and protection service and sales workers, craft workers, plant and machine operators and low-skilled workers. By sector of

activity, working from home is especially significant in the provision of certain services which do not require physical contact between suppliers and customers, such as education; professional, scientific and technical activities; real estate activities; information and communication; arts, entertainment and recreation; and financial and insurance activities. By contrast, working from home is naturally quite limited in agriculture but also in industry and electricity and water supply, sewerage and waste management, where there would potentially be a considerable number of jobs which could be done remotely. Similarly, the use of remote working is limited in certain services which generally require physical contact with customers such as domestic help, accommodation and food service activities and human health activities. Furthermore, its use is also restricted in other services where there is more room for teleworking and which could benefit from new technologies (public administration, transportation and storage, administrative activities, wholesale and retail trade and other service activities). Finally, the prevalence of working from home in construction is similar to that observed in the population in general.

If employees' socio-demographic characteristics are considered (see Table 3), no large differences are observed by gender in the probability of workers occasionally working from their main residence, although men use these working arrangements somewhat more frequently. By age group, the frequency of teleworking increases as workers get older and is especially marked from age 55 and, particularly, for workers over 65. According to educational attainment level, there is a considerable difference between workers with university and higher studies, and the other groups, since the share of the former as a percentage of total remote workers is more than double than their share of the total employed who never work from home. There is no obvious relationship between working from home and household structure. The frequency of occasional remote working is especially significant among workers in households comprising two adults and more than one child.<sup>7</sup> Approximately 28% of employees who perform part of their job remotely live in households with a partner and more than one child, whereas this household type represents 22% of those who do not telework. Single-member households also habitually use these working arrangements since they represent 13.4% of the population who teleworks more than half the days they work, whereas they only account for 9.8% of the group which does not telework.

The differences between genders and educational attainment levels persist even when disparities in the type of work due to occupation, sector, company size and contract type are taken into account. However, certain distinctions among different age groups can be explained mainly by the type of activity performed. For instance, once occupation and sector of activity are taken into account, the groups aged

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<sup>7</sup> All individuals under 18 years of age or who are aged 18 or above but are under 25 and are inactive are considered children.

between 35 and 65 work more frequently from home, irrespective of the type of teleworking considered (occasional or more than 50%).<sup>8</sup>

By region (see Table 4), working from home occasionally is notably prevalent in Asturias, the Balearic Islands, Ceuta and Melilla, and Aragon.<sup>9</sup> By contrast, teleworking is used relatively less in Rioja, the Canary Islands, Navarre, Cantabria, Murcia, Castile-La Mancha, the Basque Country and Extremadura. If other characteristics of their population and productive system are considered, the Balearic Islands stand out, which continue to be the region where teleworking is relatively well established, whereas Navarre, Rioja, Extremadura, Cantabria and the Basque Country are prominent as regions with a lower incidence. The other regions do not show statistically significant differences. If a more restrictive measure of the frequency of teleworking is used, such as working more than half the days worked from home, the above order would remain the same. Specifically, the Balearic Islands and Asturias continue to stand out as the regions with the highest incidence of remote working, at the same time Rioja, Navarre, the Canary Islands, Murcia and the Basque Country are notable because it is used less. In this case, if other characteristics of the population and business sector are examined, the cross-regional differences become smaller and, statistically, Navarre and the Basque Country are the regions with a lower prevalence of working at home.

## Potential teleworking in Spain

The potential number of workers who could perform their tasks at home in Spain is estimated in this section. For this purpose, we use the methodology proposed in the paper by Dingel and Neiman (2020) which classifies the viability of working from home for occupations in the United States. To that end, these authors use the O\*NET (Occupational Information Network) survey which provides detailed information on the work context and generalised work activities performed in each occupation determined on a very highly disaggregated scale.

The above-mentioned paper determines an occupation as unable to be performed at home if it meets at least one of the work context characteristics identified as difficult to reproduce in workers' main residences. These characteristics include, most notably, for example, spending a majority of time walking or running, using email less than once per month, working outdoors every day or being exposed to

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8 This conclusion is the result of estimating the probability of teleworking, where the dependent variable is a dummy variable which takes the value of 1 if individuals telework and the value of 0 if they do not. The explanatory variables are as follows: sex, age group, educational attainment level, company size, occupational group, sector of activity and dummy variables of the regions.

9 Note that this happens when comparing the proportion of persons employed who telework with that who does not. If only the percentage of teleworkers by region is taken into account, the most salient regions are those with the highest population (Catalonia, the region of Madrid or Andalusia).

diseases or infection at least once a week.<sup>10</sup> Those occupations with generalised work activities that cannot be done easily at home, such as general physical activities, handling, controlling, moving or inspecting machinery or working directly with the public<sup>11</sup> are added to this list of occupations. Based on the responses to this type of questions, the authors construct a teleworking indicator for all occupations which takes the value of 1, if the occupation can be performed at home, and 0, if it cannot.

In this article the teleworking indicator is applied to the National Classification of Occupations (CNO-2011 by its Spanish abbreviation) to three digits. This is slightly more aggregated than the six-digit Standard Occupational Classification (SOC) used by Dingel and Neiman (2020) to determine their working at home indicator. In order to understand the importance of greater or lesser detail, we can take the example of university lecturers within the group of education professionals. Thus, in the three-digit CNO-2011, for example, there would only be aggregated information on all university lecturers, whereas in the six-digit SOC a distinction is drawn between post-secondary teachers by subject. This requires obtaining a simple average of Dingel and Neiman's teleworking indicator for all those six-digit SOC occupations which are included in each of the three-digit CNO-2011 occupations. For the above example, an average of the teleworking index of all university lecturers, irrespective of their specialist area,<sup>12</sup> would be calculated. In addition to the aggregation problems arising from the above, note that an important limit on the exercise is that the description of the characteristics of tasks performed in an occupation in the United States is being used, where it is possible that the same occupation is not performed in the same way in Spain. Unfortunately, we are unaware whether there is a dictionary of tasks like O\*NET for Spain which can be used to better adjust the results to the reality in our country.

The LFS provides the percentage of workers in each occupation in CNO-2011. Using the above-mentioned teleworking indicator and applying it to these percentages, Table 5 shows the proportion of jobs which could be done at home according to the CNO-2011 main occupational groups. The calculations show that approximately 30.6% of all jobs could be done at home. This figure is slightly lower than that

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10 Specifically, it is considered that the job cannot be performed at home based on the work context if most of the respondents in a particular occupation indicate one of the following contexts: they use email less than once per month; they work outdoors every day; they deal with violent people at least once a week; they spend a majority of time using specialized protective or safety equipment; they spend a majority of time walking or running; they are exposed to minor burns, cuts, bites or stings at least once a week.

11 Specifically, it is considered that the job cannot be performed at home based on the generalised work activity, if most of the respondents in a particular occupation indicate that at least one of the following tasks is very important: performing general physical activities; handling and moving objects; controlling machines and processes (not computers nor vehicles); operating vehicles, mechanized devices or equipment; performing for or working directly with the public; repairing and maintaining mechanical equipment; repairing and maintaining electronic equipment; inspecting equipment, structures or materials.

12 Since the CNO-2011 is not mapped to the SOC classification, first it is necessary to map the CNO 2011 to the International Standard Classification of Occupations (ISCO-08). The latter is directly mapped to the SOC used in O\*NET. This has already been undertaken in other papers which use O\*NET data for Spain [see Anghel et al. (2014) for a review of cases in this connection].

Table 5

**PROPORTION OF JOBS WHICH COULD BE DONE AT HOME BY OCCUPATIONAL GROUP**

The estimation of the potential number of jobs which could be done at home shows that approximately 60% of the jobs in the skilled occupational groups could be performed remotely.

CNO-2011 to 1 digit	CNO-2011 to 1 digit	%
2	Professionals	58.9
1	Directors and managers	56.2
3	Associate professionals	53.2
4	Accounting, clerical and other office workers	45.3
8	Plant and machine operators, and assemblers	26.0
5	Restaurant, personal and protection service and sales workers	17.5
6	Skilled agricultural, forestry and fishery workers	8.3
9	Elementary occupations	7.3
7	Craft and skilled manufacturing and construction workers (except plant and machine operators)	1.6
0	Armed forces occupations	0.0
<b>Total</b>		<b>30.6</b>

**SOURCE:** INE (Labour Force Survey, microdata from the 2019 annual sub-sample).

obtained by Dingel and Neiman (2020) for the United States (34%), which could be due to the differences in the structure by occupation of workers in each country. By occupational group, approximately 60% of the tasks of “associate professionals”, “directors and managers” or “professionals” and 45% of those in the “accounting, clerical and other office workers” group could be done at home. At the other extreme, activities included in armed forces occupations; elementary occupations; craft and skilled work in manufacturing; and in construction are difficult to perform at home.

Next, the above indicator is applied to the occupation of all workers in the LFS to compare, by characteristics, the real proportion of workers who occasionally work from home and those who could perform their job at home. Table 6 shows both the total number of persons employed who telework according to both definitions and the share of each group in the table as a percentage of the total employed. To determine the groups which would have room for improvement in terms of teleworking, the difference between the actual percentage of teleworkers as a proportion of the total employed and the estimated proportion of workers who could perform their tasks at home must be calculated.

In Spain the share of workers who could work from home (30.6%) is 22.3 pp higher than the share that currently performs part of their work at home. Most of the groups analysed would have room for improvement, although, as will be seen below, there are some groups in which the difference is particularly significant and others where this improvement poses difficulties.

Table 6

**DESCRIPTION OF PERSONS EMPLOYED WHO TELEWORK AND THOSE WHO COULD TELEWORK. EMPLOYMENT CHARACTERISTICS (2019)**

Wage and salaried workers with a permanent contracts and employees working at companies with more than 50 workers would have the most margin to increase their teleworking potential. Similarly, skilled occupations and financial, information and communication or real estate activities have even more margin for improvement.

	Persons employed who telework to some extent (more than half days worked or occasionally) (a)		Persons employed who could telework (b)		Total employed
	No. of workers	% of total employed	No. of workers	% of total employed	No. of workers
<b>Total</b>	<b>1,640,454</b>	<b>8.3</b>	<b>6,044,671</b>	<b>30.6</b>	<b>19,779,313</b>
Employment status					
Permanent wage and salaried workers	562,201	4.6	3,770,643	30.7	12,268,627
Experience: less than 1 year	27,338	3.4	268,311	33.7	797,323
Experience: 1-3 years	72,121	4.1	513,742	29.2	1,759,422
Experience: 3-7 years	77,493	3.5	640,098	29.1	2,199,593
Experience: more than 7 years	385,250	5.1	2,348,492	31.3	7,512,289
Temporary wage and salaried workers	137,410	3.1	990,808	22.5	4,396,249
Self-employed	940,325	30.2	1,282,746	41.2	3,112,257
Company size					
1-49 workers	1,292,778	9.8	3,919,655	29.9	13,127,123
50-249 workers	205,796	7.3	973,304	34.3	2,838,255
250 or more workers	108,383	4.4	785,839	31.7	2,479,602
Occupation					
Armed forces	2,002	1.8	0	0.0	109,996
Directors and managers	187,106	24.1	436,359	56.2	776,495
Professionals	769,967	21.6	2,105,463	58.9	3,572,625
Associate professionals	271,181	12.6	1,141,821	53.2	2,146,262
Accounting, clerical and other office workers	63,995	3.1	938,170	45.3	2,069,809
Restaurant, personal and protection service and sales workers	136,759	3.0	784,955	17.5	4,486,335
Skilled agricultural, forestry and fishery workers	53,463	11.8	37,562	8.3	454,104
Craft and skilled workers	118,080	5.4	35,661	1.6	2,182,061
Plant and machine operators	19,706	1.4	379,709	26.0	1,458,925
Elementary occupations	18,196	0.7	184,969	7.3	2,522,699
Sector of activity					
Agriculture, forestry and fishing	57,569	6.8	69,289	8.2	845,366
Manufacturing	116,384	4.7	528,967	21.6	2,452,443
Electricity, gas, steam and air conditioning supply	5,868	6.4	40,188	43.5	92,381
Water supply/sewerage/waste management activities	5,836	3.7	46,817	30.0	156,124
Construction	120,926	9.2	169,022	12.9	1,314,888
Wholesale and retail trade, repair of motor vehicles	204,462	6.7	996,742	32.8	3,039,285
Transportation and storage	33,160	3.3	449,531	45.1	996,276
Accommodation and food service activities	37,887	2.2	234,347	13.5	1,736,916
Information and communication	107,348	17.8	406,898	67.3	604,202
Financial and insurance activities	42,392	10.0	259,293	61.0	424,845
Real estate activities	36,037	22.9	101,279	64.2	157,695
Professional, scientific and technical activities	260,681	26.1	597,786	59.9	998,135
Administrative and support service activities	47,181	4.5	201,427	19.0	1,058,018
Public admin. and defence, compulsory social security	26,037	1.9	458,997	34.3	1,339,820
Education	396,714	29.0	836,390	61.1	1,368,896
Human health and social work activities	53,095	3.1	284,328	16.7	1,702,081
Arts, entertainment and recreation	44,415	10.4	173,732	40.7	427,138
Other service activities	31,984	7.1	132,556	29.3	452,767
Activities of households as employers of domestic personnel	12,478	2.0	57,082	9.3	611,010
Activities of extraterritorial organisations and bodies	0	0.0	0	0.0	1,028

**SOURCE:** INE (Labour Force Survey, microdata from the 2019 annual sub-sample).

- a** To identify teleworking, the question "Did you work from home on any day in the last four weeks?" was used (possibility envisaged in labour agreement). Possible responses are as follows: "yes, on more than half the days I worked", "yes, occasionally" or "no".
- b** The methodology of Dingel and Neiman (2020) was used.

Table 7

**DESCRIPTION OF PERSONS EMPLOYED WHO TELEWORK AND THOSE WHO COULD TELEWORK. SOCIO-DEMOGRAPHIC CHARACTERISTICS (2019)**

Young people in the 16-24 age group and individuals over 65 have considerable room to improve teleworking. The percentage of individuals who telework in highly skilled group could increase to 51%.

	Persons employed who telework to some extent (more than half days worked or occasionally) (a)		Persons employed who could telework (b)		Total employed
	No. of workers	% of total employed	No. of workers	% of total employed	No. of workers
<b>Total</b>	<b>1,640,454</b>	<b>8.3</b>	<b>6,044,671</b>	<b>30.6</b>	<b>19,779,313</b>
Sex					
Male	947,708	8.8	3,256,860	30.3	10,745,617
Female	692,746	7.7	2,787,811	30.9	9,033,696
Age					
16-24	21,549	2.1	223,289	21.5	1,038,634
25-34	244,795	6.4	1,162,931	30.4	3,820,787
35-44	519,209	9.0	1,839,844	31.7	5,794,920
45-54	504,449	9.0	1,722,905	30.8	5,598,529
55-64	320,399	9.7	1,002,072	30.3	3,311,213
65 or over	30,052	14.0	93,629	43.5	215,230
Education					
Lower than secondary education	221,588	3.6	1,032,234	16.7	6,196,202
Secondary education	401,320	5.3	1,923,819	25.5	7,547,429
University and higher	1,017,545	16.9	3,088,618	51.2	6,035,681
Household type					
Household with 1 adult	206,811	10.4	665,109	33.6	1,980,430
Single-parent household with children	56,817	6.6	207,753	24.2	857,463
Household with 2 adults and no children	357,763	8.4	1,344,686	31.5	4,264,074
Household with 2 adults and 1 child	260,633	9.4	870,783	31.4	2,771,434
Household with 2 adults and more than 1 child	421,627	9.5	1,462,833	32.9	4,452,676
Other	336,802	6.2	1,493,506	27.4	5,453,236

**SOURCE:** INE (Labour Force Survey, microdata from the 2019 annual sub-sample).

- a** To identify teleworking, the question "Did you work from home on any day in the last four weeks?" was used (possibility envisaged in labour agreement). Possible responses are as follows: "yes, on more than half the days I worked", "yes, occasionally" or "no".
- b** The methodology of Dingel and Neiman (2020) was used.

By labour characteristics, wage and salaried workers with permanent contracts have the most margin to increase their teleworking potential: the estimated proportion of wage and salaried workers who could work at home is 31%, compared with the 5% observed. By company size, the groups of persons employed who telework at companies with more than 50 workers are those who could increase the share of their work performed remotely the most (around 27 pp in each group). By type of work, skilled activities – currently performed by around 80% of the total employed who undertake part of their job remotely – are those which also show the greatest room for improvement. Specifically, workers who telework in the occupations of associate professionals, accounting, clerical and other office workers could increase their share in the total number of employees of each of these occupations by more than 40 pp. The occupations included in the categories of directors and managers, and professionals could increase the percentage of workers who telework by 32 pp



Table 8

**DESCRIPTION OF PERSONS EMPLOYED WHO TELEWORK AND THOSE WHO COULD TELEWORK BY REGION (2019)**

The differences by region as regards the possibility of increasing the proportion of persons employed who telework are not so substantial, and there is a wide margin for improvement in all regions. The region of Madrid, the Basque Country and Catalonia would be the regions where the percentage of employees working from home could increase most.

	Persons employed who telework to some extent (more than half days worked or occasionally) (a)		Persons employed who could telework (b)		Total employed
	No. of workers	% of total employed	No. of workers	% of total employed	No. of workers
<b>Total</b>	<b>1,640,454</b>	<b>8.3</b>	<b>6,044,671</b>	<b>30.6</b>	<b>19,779,313</b>
Andalusia	251,334	8.1	858,924	27.5	3,119,737
Aragon	57,490	9.8	168,151	28.6	587,576
Asturias	42,318	10.9	124,059	32.1	387,031
Balearic Islands	62,021	10.9	150,458	26.3	571,170
Canary Islands	56,203	6.2	246,032	27.2	905,887
Cantabria	17,250	7.1	69,088	28.3	243,847
Castile-Leon	84,499	8.5	272,528	27.5	990,802
Castile-La Mancha	61,566	7.5	224,553	27.2	825,066
Catalonia	294,834	8.6	1,153,297	33.5	3,440,677
Valencia	178,324	8.5	609,091	29.2	2,087,257
Extremadura	31,241	8.0	106,950	27.4	390,692
Galicia	96,753	8.8	322,942	29.5	1,095,159
Madrid	255,457	8.2	1,112,220	35.9	3,098,947
Murcia	45,553	7.4	164,045	26.7	613,755
Navarre	18,970	6.6	86,452	29.9	288,883
Basque Country	72,681	7.8	319,835	34.2	936,121
Rioja	8,477	6.0	38,846	27.6	140,631
Ceuta and Melilla	5,482	9.8	17,200	30.7	56,074

**SOURCE:** INE (Labour Force Survey, microdata from the 2019 annual sub-sample).

**a** To identify teleworking, the question "Did you work from home on any day in the last four weeks?" was used (possibility envisaged in labour agreement). Possible responses are as follows: "yes, on more than half the days I worked", "yes, occasionally" or "no".

**b** The methodology of Dingel and Neiman (2020) was used.

and 37 pp, respectively. Lastly, plant and machine operators, workers in restaurant services and wholesale and retail trade, who currently virtually do not telework, could make significant progress in this direction and, possibly, take advantage of changes in their companies' business model. Conversely, in elementary occupations (which include domestic help; other cleaning staff; food preparation assistants; urban refuse collectors, street sellers and other elementary occupations in services; agricultural, forestry and fishery workers; construction, manufacturing and transportation) in which teleworking also represents a very small percentage, room for improvement, in any case, is limited.

The sectors of activity which would have more potential to increase their proportion of persons employed with teleworking comprise certain activities which are currently using these working arrangements more intensively, such as financial and insurance

activities (+51 pp), information and communication (+50 pp) or real estate activities (+41 pp). Similarly, remote working is almost non-existent in certain sectors which would have a very high potential for improvement, such as transportation and storage (+42 pp); electricity, gas, steam and air conditioning supply (+37 pp); public administration (+32 pp); wholesale and retail trade (+25 pp); other service activities (+22 pp); water supply, sewerage activities and waste management (+22 pp), and manufacturing (+17 pp). At the opposite end of the scale are sectors such as agriculture, construction, hotels and restaurants and domestic help in which the possibility of teleworking is limited.

These differences by job type are reflected in the population groups and in the regions. Thus, by age group, those over 65 would have a wide margin to improve in teleworking and virtually half of this group (43.5%) could work off site. Persons employed under the age of 24 could increase their use of teleworking by 20 pp. By educational attainment level, the estimated potential number of persons employed who telework shows that the highest-skilled group could increase the percentage of individuals who work from home by up to 51%. By contrast, the estimates show that the group of workers with the lowest educational attainment level does not have so much room for improvement in this area (its share in the total employed with this educational attainment level could increase by 13 pp), which is perhaps related to these individuals' occupations and sectors of activity.

Lastly, the differences by region as regards the possibility of increasing the proportion of persons employed who telework are not so substantial, and there is a wide margin for improvement in all regions. In any event, the region of Madrid (+28 pp), the Basque Country (+26 pp) and Catalonia (+25 pp) would be the regions where the percentage of employees working from home could increase most.

12.5.2020.

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