REMOTE WORKING AND NEW FORMS OF WORK: EVIDENCE FROM INAPP-PLUS

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Abstract. When the pandemic hit in the spring of 2020, many private companies and public administrations had to resort to working-from-home (WFH) arrangements for their employees. While remote working was rather uncommon before the pandemic, this became the prevalent work arrangement for a large fraction of the working population. Aim of the analysis is to investigate the workers transition to teleworking evaluating the impact of demographic and jobs' characteristics on the probability of having worked from home, partially or totally, during the second wave of the pandemic. The data used in this study are from the last Ninth Survey on Labour Participation and Unemployment (PLUS), thus a sample survey on the Italian labour market supply developed and administered by the National Institute for the Analysis of Public Policies (INAPP). Remote working experience is considered positive by 55% of workers and less than 10% believe it was negative. Fitting a logistic regression model, it is possible to estimate the different attitudes among workers more accurately. The probability to work from home is slightly higher for males, older workers, white-collar, high-skilled, well-educated, industrial and service sector employees. There is also a clear disadvantage for those who have a low-medium education level and for low-skilled workers. Moreover, many respondents would choose new ways of working such as from small village and from countryside/mountain.

1. Introduction

The outbreak of the COVID-19 Pandemic at the beginning of 2020 led to radical changes in many aspects of individuals' lives. Social policies, based on limiting contacts and physical distancing, implied suspension, reduction and converting several activities to remote mode, including work.

The COVID-19 crisis has caused far-reaching changes in a very short time-period. Public health measures designed to stem the spread of COVID-19 have included active encouragement of homeworking for those in a position to do so. With many workplaces in enforced closure from spring 2020, remote working became the

customary mode of working for many employees with previously limited or no experience of working in this way[1].

When the pandemic hit in the spring of 2020, many private companies and public administrations had to resort to working-from-home (WFH) arrangements for their employees.

In the effort to identify the negative effects of social distancing measures and mobility restrictions, the recent literature has focused on *jobs that can be performed at home*.

Predictions that remote working would become a dominant mode of work date as far back as the 1980s and the beginnings of the information revolution (Toffler, 1980).

While remote working was rather uncommon before the pandemic (according to data from the 2018 European Labour Force Survey, roughly 10% of employees and 30% of self-employed used to work from home at least sometimes), this became the prevalent work arrangement for a large fraction of the working population during the pandemic: the Eurofound (2020) survey suggests that 48% of employees worked remotely at least some time in 2020. This shift did not take place homogeneously: the extent to which each firm adopted this strategy depends on the type of industry (Barbieri et al., 2020; Dingel and Neiman, 2020).

Moreover, in a cross-country study, Boeri et al. (2020) report that the percentage of jobs that can be performed remotely differs among European countries, from 23.95% in Italy to 31.38% in UK. These jobs are mainly concentrated in services: professors, engineers, lawyers, architects are just some examples of the occupations included in this category.

Adams-Prassl *et al.* (2020) show how working from home protected workers not only from the health risks of the COVID-19 pandemic, but also from the economic shock caused by the pandemic. They show how the "food preparation and serving" sector appears to be the least suitable for smart working, and how this sector was the one that suffered closures and multiple interruptions of work during the pandemic, causing the closure of many activities and the loss of jobs by its workers.

The evidence on the wide variations in the numbers of workers who were able to work from home were also studied and confirmed by Felstead and Reuschke (2020).

Depalo and Giorgi (2020) highlight how the increase of smart working was heterogeneous among sectors: those characterized by greater teleworkability and which actually worked remotely in 2020 are the information-communication and financial-insurance activities sectors. On the contrary, smart working in the hotel and

[1] In this analysis, the terms “teleworking” and “working from home” are used interchangeably. An appropriate definition of teleworking is “the remote provision of labour that would otherwise be carried out within company premises” (European Commission, 2020).

restaurant sector, where teleworkability is extremely limited, was below 2%, remaining at the low levels of 2019, before the pandemic.

It also emerged from the Smart Working Observatory[2] (Crespi, 2018), that the main reasons that induce workers to work-from-home are the improvement of well-being and work-life balance.

If the effects of remote working on productivity are not yet clear how explained by the OECD (2020), smart workers have a higher level of gratitude for the company that allows them to use this way of work and they reciprocate by working more (Falk and Kosfeld, 2006). In other words, they work more efficiently because they feel an obligation towards the company or too much because there is no clear separation work-life balance.

Aim of this study is to evaluate the impact of jobs' characteristics on the probability of having worked from home (partially or totally) during the second wave of the pandemic.

2. Data and methods

The analysis is carried out using microdata from the last Ninth Survey on Labour Participation and Unemployment (PLUS), a sample survey on the Italian labour market supply developed and administered by the National Institute for the Analysis of Public Policies (INAPP)[3].

The primary objective of the INAPP-PLUS survey is to provide reliable statistics on phenomena rarely or marginally explored by other surveys on the Italian labour market. The questionnaire was submitted to a sample of residents aged between 18 and 74 years, according to a stratified random sampling over the Italian population[4]. The survey has been released in 2021 (March – July) on a sample of 46.282 individuals but note that in this research only respondents who work were analysed.

We therefore exclude those who are not employed, pensioners and students from our empirical analysis: this results in a sample of 19.025 observations.

Respondents are asked a series of questions to investigate work arrangement during the second wave of the pandemic.

[2] The Smart Working Observatory of the School of Management of the Politecnico di Milano, founded in 2012, represent the point of reference in Italy on digital innovation: https://www.osservatori.net.

[3] The INAPP-PLUS data are available by accessing to the section: https://inapp.org/it/dati/plus.

[4] The stratification of the INAPP-PLUS survey sample is based on population strata by NUTS-3 region of residence, urbanisation degree (i.e. metropolitan or non-metropolitan area), age group, sex, and employment status (i.e. employed, unemployed, student, retired, or other inactive).

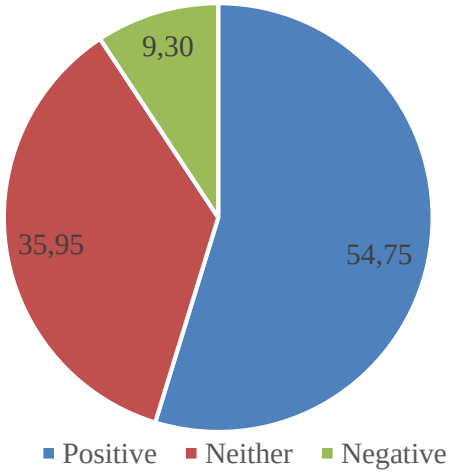
After a set of questions, *SM6* (questionnaire p.25) asks "*Nell'ultimo mese quanti giorni ha lavorato da remoto?*" ("*How many days have you worked remotely in the past month?*"), with two possible answers: "*Never*" or "*At least one day*".

3. Results

We first briefly present descriptive findings on the choice of remote work[5].

The working remotely experience is considered positive by 54,75% of workers and less than 10% (9,30%) believe it was negative (figure 1).

Figure 1 – *Opinion on remote work experience (% values).*



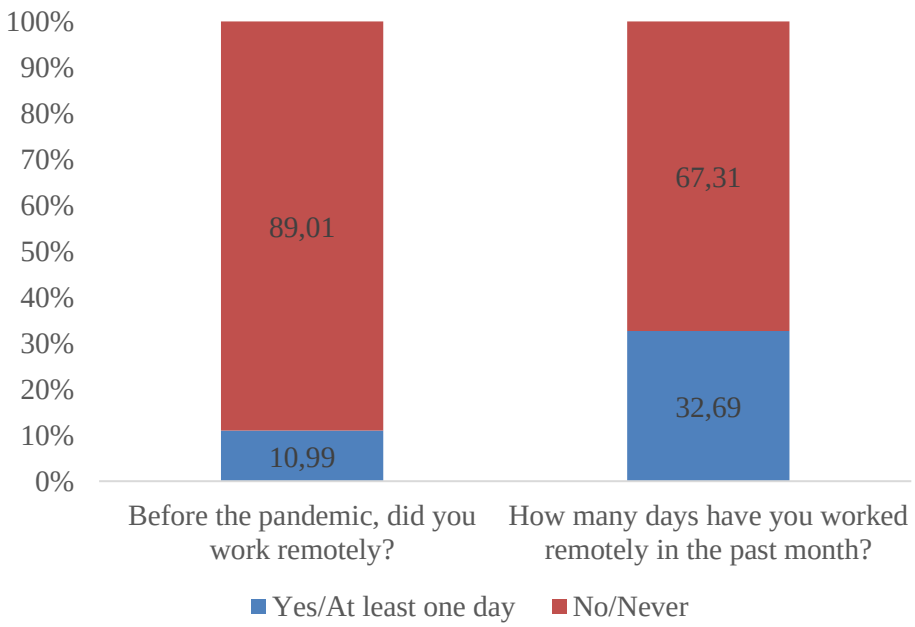
Source: own elaboration on Inapp-Plus 2021.
Note: Design weights are applied.

In Italy, before the pandemic, 2.458.210 employees (10,99%) worked remotely; in 2021 agile workers rose to 7.262.999 and the share of total employment rose to 32,69% (figure 2).

As shown in figure 2, during 2021 the share of remote workers tripled compared to the pre-pandemic period.

[5] Preliminary findings were presented at the Conference of the Italian Association for Population Studies (Demography Section of the Italian Statistical Society) "*Popdays 2023*" held in Roma Tre University (02/02/2023).

Figure 2 – *Share of remote workers, before the pandemic and in 2021 (% values).*



Source: own elaboration on Inapp-Plus 2021. Note: Design weights are applied.

Moreover, the incidence of remote workers grows with the increase in the demographic size of the municipality, from 26,8 per cent in small villages to 48,3 per cent in metropolitan areas (table 1).

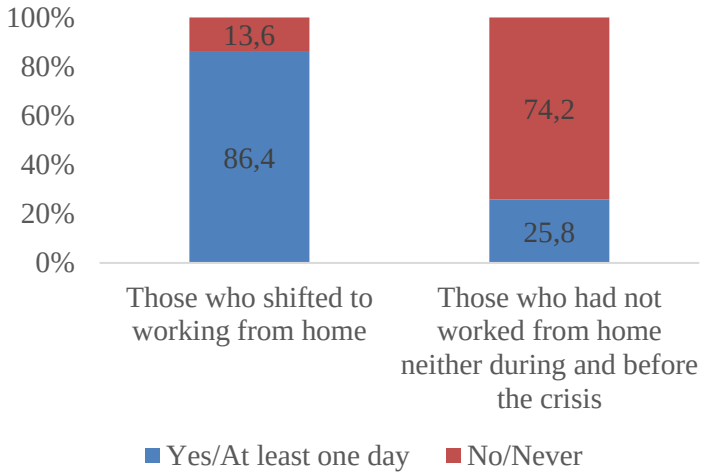
Table 1 - *Days worked remotely in 2021, by demographic size of municipalities (% values).*

How many days have you worked remotely in the past month?	Never	At least one day	Total
< 5˙000 inhabitants	73.23	26.77	100
5˙000 - 10˙000 inhabitants	72.45	27.55	100
10˙000 - 30˙000 inhabitants	72.07	27.93	100
30˙000 - 100˙000 inhabitants	66.85	33.15	100
100˙000 - 250˙000 inhabitants	61.84	38.16	100
> 250˙000 inhabitants	51.69	48.31	100

Source: own elaboration on Inapp-Plus 2021. Note: Design weights are applied.
Pearson chi2(5) = 545.5562; Pr = 0,000

Those who shifted to working from home (exclusively or partially) were very likely to indicate wanting to telework after the crisis (86,4%). Meanwhile, 74,2% of those respondents who had not worked from home neither during and before the crisis, indicated they would prefer never to telework (figure 3).

Figure 3 – *Share of workers that would like to work remotely (% values).*



Source: own elaboration on Inapp-Plus 2021. Note: Design weights are applied.

Finally, the increase in remote work has sparked a debate on worker relocation further away from large urban areas. The last two questions of the "remote working" section asks: "*If you could work remotely, would you move to a small village?*" and "*If you could work remotely, would you move to an isolated place in contact with nature (countryside, mountain, etc.)?*". Respectively 34,5% and 41,5% of respondents would choose these new ways of working.

They are the *south-workers*, people that work mainly remotely for employers located elsewhere, in Northern Italy or abroad.

In this context, many workers are reconsidering their priorities and would like to be able to work from anywhere. This may represent a positive input for Southern economies, which could attract talent both among those who were part of the "brain drain" and among people who are not originally from the South.

Using a logistic regression model it was possible to estimate the different attitudes among workers towards remote working (partially or totally), during the second wave of the pandemic, more accurately (Liu, 2016).

The model includes socio-demographic characteristics (age, gender, education level) and work-related (work, type of work and Ateco[6]).

In order to achieve this goal, the dependent variable of this study is the "*Remote Working*": we recode respondents' answers (*SM6*, questionnaire p.25) into a binary outcome variable which receives a value of 1 if the respondent worked remotely at least one day and takes a value of 0 if the respondent does not worked remotely.

Concretely, in the study analyzed variables are:

- *Gender*. Categorical. Dummy variable: Female, Male (reference cat.).
- *Job*. Categorical. Nine values. 8-Elementary occupations (reference cat.); 1-Managers; 2-Professionals; 3-Technicians and associate professionals; 4-Clerical support workers; 5-Services and sales workers; 6-Skilled agricultural, forestry and fishery workers, Craft and related; 7-Plant and machine operators and assemblers; 9-Armed forces.
- *Age group*. Categorical. Six intervals. From 18 to 24 (reference cat.); 25 to 29; 30 to 39; 40 to 49; 50 to 64; 65 to 74.
- *Education*. Categorical. Four levels. Elementary School; Middle School; High School; University (reference cat.).
- *Work*. Categorical. Dummy variable: Public (reference cat.), Private.
- *ATECO*. Categorical. Twentyone values. A: Agriculture, Forestry and Fishing (reference cat.); B: Mining and Quarrying; C: Manufacturing; D: Electricity, Gas, Steam and Air Conditioning Supply; E: Water Supply; Sewerage, Waste Management and Remediation Activities; F: Construction; G: Wholesale and Retail Trade; Repair Of Motor Vehicles and Motorcycles; H: Transportation and Storage; I: Accommodation and Food Service Activities; J: Information and Communication; K: Financial and Insurance Activities; L: Real Estate Activities; M: Professional, Scientific and Technical Activities; N: Administrative and Support Service Activities; O: Public Administration and Defence; Compulsory Social Security; P: Education; Q: Human Health and Social Work Activities; R: Arts, Entertainment and Recreation; S: Other Service Activities; T: Activities of Households as Employers; Undifferentiated Goods-and Services-Producing Activities of Households for Own Use; U: Activities of Extraterritorial Organisations and Bodies.

Thus, we fit the logistic model which estimates the probability of having smart working or not, and includes all the above mentioned variables:

[6] ATECO is the classification of economic activities and it is the national version of the European nomenclature, Nace Rev. 2 (Statistical classification of economic activities in the European Community).

$$logit(p) = \alpha + \beta_1 Gender_i + \beta_2 Job_i + \beta_3 Age\ group_i + \beta_4 Education_i + \beta_5 Work_i + \beta_6 ATECO_i \quad (1)$$

Table 2 shows odds ratios of logistic model and this means that the coefficients (*Beta*, not showed) in logistic regression are in terms of the log odds because the coefficients can be expressed in odds by getting rid of the natural log[7].

Firstly, we test the goodness-of-fit using a postestimation tool, the Hosmer-Lemeshow statistic[8].

Logistic model for "*Smart Working*", goodness-of-fit test:
Number of groups = 10
Hosmer-Lemeshow chi2(8) = 10,88
Prob > chi2 = 0,2086

This fitted model says that, holding covariates at a fixed value, the odds of working-from-home for female over the odds of working-from-home for male (reference category) is 0,85. In terms of percent change, we can say that the odds for female are 15% lower than the odds for male. In other words, the chance to work from home is slightly higher for male rather than female.

Regarding the job, the odds of working-from-home for the first four categories are higher over the odds of working-from-home for the "Elementary occupations" (reference category). In particular, the odds for "Professionals" are more than three times higher than the odds for "Elementary occupations" (OR=3,27) and the odds for "Managers", "Technicians and associate professionals" and "Clerical support workers" are double or more (OR=2,08, OR=2,29 and OR=1,99).

Table 2 - *Logistic regression model. (follows)*

Number of obs = 18.412 *LR chi2(39) = 4268,66* *Prob > chi2 = 0,0000*
Log likelihood = - 9937,0439 *Pseudo R2 = 0,1768*

		ODDS	S.E.	z	P>|z|
• Gender	Male	1 (base)			
	Female	0.85***	0.03	-4.58	0.000
• Job	Managers	2.08***	0.30	5.09	0.000
	Professionals	3.27***	0.35	11.17	0.000

[7] This is done by taking the exponential for both sides of the equation, because there is a direct relationship between the coefficients produced by logit and the odds ratios produced by logistic: a logit is defined as the natural log (base *e*) of the odds.

[8] This test follows a chi-square distribution with the degrees of freedom equal to the number of groups minus 2. A not significant *p-value* indicates that the model fits the data well since there is no significant difference between the observed and expected data. In this case, the Hosmer-Lemeshow chi-square test has a value of 10,88 with the degrees of freedom equal to 8. The associated *p-value* is 0,2086 which is not significant. Therefore, the model fits the data well.

Table 2 - *Logistic regression model. (continued).*

		ODDS	S.E.	z	P>|z|
	Technicians and associate professionals	2.29***	0.24	7.98	0.000
	Clerical support workers	1.99***	0.20	6.93	0.000
	Services and sales workers	1.03	0.12	0.28	0.782
	Skilled agricultural, forestry and fishery workers, Craft and rel.	0.57***	0.08	-3.81	0.000
	Plant and machine operators and assemblers	0.50***	0.11	-3.23	0.001
	Elementary occupations	1 (base)			
	Armed forces	0.75	0.18	-1.22	0.221
•Age group	18-24	1 (base)			
	25-29	1.93***	0.15	8.77	0.000
	30-39	2.67***	0.20	12.95	0.000
	40-49	3.59***	0.29	16.01	0.000
	50-64	3.18***	0.23	15.91	0.000
	65-74	2.93***	0.39	8.16	0.000
• Education	Elementary School	0.15*	0.16	-1.82	0.069
	Middle School	0.31***	0.03	-10.63	0.000
	High School	0.47***	0.02	-17.91	0.000
	University	1 (base)			
• Work	Public	1 (base)			
	Private	1.37***	0.10	4.44	0.000
• ATECO	A: Agriculture, Forestry and Fishing	1 (base)			
	B: Mining and Quarrying	1.93	0.79	1.60	0.109
	C: Manufacturing	1.24	0.19	1.42	0.157
	D: Electricity, Gas, Steam and Air Conditioning Supply	3.16***	0.60	6.07	0.000
	E: Water Supply; Sewerage, Waste Manag. & Remediation Acti.	4.68***	1.16	6.23	0.000
	F: Construction	1.81***	0.29	3.71	0.000
	G: Wholesale & Retail Trade; Repair Of Motor Vehicles & Mot.	1.18	0.19	1.06	0.288
	H: Transportation and Storage	1.61***	0.27	2.86	0.004
	I: Accommodation and Food Service Activities	0.78	0.14	-1.36	0.175
	J: Information and Communication	5.62***	0.87	11.14	0.000
	K: Financial and Insurance Activities	3.11***	0.48	7.31	0.000
	L: Real Estate Activities	1.41*	0.29	1.67	0.096
	M: Professional, Scientific and Technical Activities	1.91***	0.29	4.32	0.000
	N: Administrative and Support Service Activities	2.89***	0.63	4.83	0.000
	O: Public Administration & Defence; Compulsory Social Secur.	3.34***	0.56	7.24	0.000
	P: Education	2.17***	0.35	4.82	0.000

Table 2 - *Logistic regression model. (continued).*

	ODDS	S.E.	z	P>|z|
Q: Human Health and Social Work Activities	0.51***	0.08	-4.26	0.000
R: Arts, Entertainment and Recreation	1.50**	0.28	2.23	0.026
S: Other Service Activities	2.12***	0.32	5.00	0.000
T: Act. of HH as Empl.; Undiff. Goods-Serv.-Prod. Act. of HH	1.41	0.58	0.83	0.406
U: Activities of Extraterritorial Organisations and Bodies	4.63***	1.39	5.09	0.000
NA	0.08***	0.30	3.46	0.001
constant	1.22***	0.02	-12.80	0.008

*Source: own elaboration on Inapp-Plus 2021. Notes: ***p<0,01 **p<0,05 *p<0,1*

On the other side, the odds for "Skilled agricultural, forestry and fishery workers, Craft and related" and "Plant and machine operators and assemblers" are lower than the odds for "Elementary occupations". Please note that the odds for "Services and sales workers" are not significant (*p value* > 0,05). This is an important finding because the Italian National Institute of Statistics (ISTAT) considers categories 1, 2 and 3 as high-skilled workers; categories 4, 5 and 6 as medium-skilled workers; categories 7 and 8 as low-skilled workers (for this last group there is a clear disadvantage). The chance of working-from-home is lower for those who have a low-medium education level ("University" reference cat.). Moreover, the probability is higher for those working in the private sector than in the public administration (reference category): in terms of percent change, the odds for private sector (OR=1,37) are 37% higher than the odds for public administration. Older workers were more likely than prime-age (25–29 and 30-39) and younger employees (18-24, ref. cat.) to have worked from home. Lastly, the odds of working-from-home is higher for almost all Ateco sectors over the odds of working-from-home for "Agriculture, Forestry and Fishing" ("A" reference category).

4. Conclusions

This study contributes to the wider debate surrounding "the working-from-home revolution". In this paper we estimate probability of having worked from home (partially or totally) during the second wave of the pandemic. We exploit survey data where the workers were interviewed in 2021 (March – July), immediately after the second wave. When this second wave of pandemic hit in the spring of 2021, many private companies and public administrations had to resort to working-from-home (WFH) arrangements for 32,5% of their employees. This working remotely experience is considered positive by 55% of workers and less than 10% believe it

was negative. Employees living in cities and metropolitan areas were significantly more likely to report working from home than those in less populous settlement types. It now appears very likely that the experience of working from home during the COVID-19 crisis will lead to a growth in teleworking when the crisis abates. Interestingly, the preferences for teleworking expressed in the survey were very much shaped by whether or not individual employees had recourse to this type of work during the crisis. The more regular their experience of teleworking, the more likely they were to indicate a preference for teleworking post-crisis and at greater frequency (86,4% vs 25,8% for those who have never worked remotely). Which categories of employee respondents were more likely to telework during the crisis? In this regard, we also fit a logistic regression model and main findings suggest that those working from home were disproportionately male workers, olders, white-collar, high-skilled, well-educated, industrial and service sector employees. Moreover, a new phenomenon has emerged as result of these changes: *south-working*. An emerging form of remote work that allows employees to work from anywhere, so that the worker can choose to live in a preferred geographic location, in particular in internal or remote areas and the Southern regions of Italy, in which the educated face continuous pressure for internal migration from South to North. This prospect is also particularly relevant to intermediary cities, which are considered a good compromise between access to urban services, quality of life and affordability. South-workers are employees of companies that produce income in their city/region of work and spend their money in the territories where they choose to live or stay in the medium and long term. In this way, some internal and rural areas can benefit from south-working in terms of taxpayers and repopulation. This south-working phenomenon may have repercussions on the development strategy of internal or remote areas which will finally be able to repopulate with activities, projects and people. This could be a great opportunity for these territories. It is important to create the best conditions to be able to host and offer them everything they need to work and live in the area in the best possible way. It requires an amount of infrastructural investment, such as internet, roads, services (schools, hospitals, etc.). Despite its limitation, we hope this paper provides a first "lay of the land" of the history of south-working, although it is still an "early-stage" phenomenon. We also hope this study can open the door to a new discussion about the evidence on a new geography of jobs in italian regions, its consequences for territories development, wellbeing, opportunities, challenges and the policy responses from the institutions.

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