Chapter 4
Scientific productivity and smart working. Evidence from researchers' perception

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ABSTRACT
In March 2020, in the first months of the emergency caused by the COVID 19 pandemic, the Italian government adopted smart working for companies and public organisations, and it was stated as mandatory by Decree-Law n. 18/2020, with the name of "Agile Working". In the following months, the adoption of smart working in public firms and public organisations was immediate and massive. Millions of public workers experienced a profound change in their professional and life habits. Smart working was a real shock for its characteristics but represented a unique opportunity for understanding the potential effect of a more sustainable labour organisation, to build a more resilient society. The impact of this work transformation in Public Research Organizations (PROs) should have been less shocking than in other sectors because of researchers' and technologists' skills and tasks, but we still know little about the changes that have taken place in terms of productivity. To provide an answer to this question, this chapter presents and describes the results of a survey administrated to researchers and technologists in Italian PROs, aimed at investigating the perception of their productivity with agile working during the pandemic time.

KEYWORDS: smart working, agile working, working from home, Public Research Organisations, productivity.

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1. INTRODUCTION

The COVID 19 pandemic, which started in January 2020 and spread across the globe, heavily influenced several aspects of human life. In many countries, a great number of social distancing measures were introduced to prevent the spread of the virus, up to the adoption of lockdown. The restrictive stay at home orders in Italy also influenced the working habits. Decree-Law n. 18, adopted in March 2020, provided mandatory smart working for public organizations, and recommended its use also for private companies. According to Law 81/2017, smart working (namely Agile Working) is a method of execution of the employment relationship established by agreement between the parties, also with forms of organization by phases, cycles and objectives, and without precise constraints of time or place of work, with the possible use of technological tools for the work performance. The work can be performed partly inside a company and partly outside, without a fixed location, within the limits of the maximum duration of daily and weekly working hours, deriving from the law and from the collective bargaining. In general terms, smart working can be included into the wide family of the Working from Home schemes (WFH from now on). During the COVID 19 pandemic, agile working became the usual practice for millions of workers. The change which occurred suddenly and unexpectedly led to an initial phase of difficulty and disorientation for workers and employers, which was followed by a gradual adjustment of working practices. This phenomenon has also occurred in the field of the public research sector, which had to deal with these changes and adapt its working habits to them. Now that the post-pandemic restart is being planned, it is relevant to ask what lessons can be retained from the widest social experiment of all time (Lebow, 2020). In this context, it is interesting to understand how smart working has changed the working practices and how it has affected the productivity. We can do that by trying to answer some questions, such as: Has researchers' and technologists' productivity increased? Can we identify specific characteristics that affected the productivity? Which scientific activities are most difficult to carry out in agile working?

It is plausible to ask whether the productivity in agile working in the research field is comparable to the productivity carried out in presence or not. To give a correct answer we cannot ignore the differences between the different tasks, for example, some tasks are difficult to be carried out at a distance because they involve the physical presence of the operator (laboratory analysis for instance). Instead, what happens for all the other activities that can be carried out in any place at any time? The present study tries to answer all these question by analysing the perception of some Italian Public Research Organisations' (PRO) workers about their productivity under the smart working scheme during the pandemic.

In the socio-economic literature, the topic of smart working has a significant relevance, and it is treated from different points of view. The pandemic, and the consequent development of this way of working, has greatly increased the production of papers about the subject. To compose a theoretical framework on the productivity of the research under the WFH scheme, it is useful to put together different strands of socioeconomic literature. Two issues emerge as predominant. The first issue concerns the characteristics that make a job remotely executable (Dingel & Neiman, 2020; Hensvik et al., 2020; Mongey et al., 2020; Garrote Sanchez et al., 2021). In particular, Dingel & Neiman (2020), in a study on the United States, have classified the different professions according to the possibility of carrying them out remotely, and claim that professions that are better paid are more executable at a distance. Workers in high-skilled occupations such as management, business, financial, and professional occupations, work more hours at home than workers in less-skilled occupations, except for the farmers (Hensvik et al., 2020). Considering different production sectors, except agriculture, the broad industries with the most hours worked at home are information, financial activities, and professional and business services, while industries with the least smart working hours are transportation and utilities, and leisure and hospitality (Hensvik et al., 2020). Occupations and workers' characteristics are both important determinants for smart working ability (Gottlieb, 2020).

The second relevant issue concerns the advantages and disadvantages of smart working (Ipsen et al., 2021; Rubin et al., 2020). Ipsen et al. (2021), using data from 29 European countries on the experiences of knowledge workers, showed that most people had a more positive, rather than negative, experience of working from home during the lockdown period. Three factors represent the main advantages:

i. work-life balance;
ii. improved work efficiency;
iii. greater work control.

The main disadvantages were:

iv. home office constraints;
v. work uncertainties;
vi. inadequate tools.

By comparing the gender, the number of children at home, the age and the type of profession, they provided insights into the differential impact of WFH on people's lives.

All these reflections must obviously be considered in the reasoning on smart working productivity (Bloom, 2014; Angelici & Profeta, 2020; Bao et al, 2020). The topic has been widely studied both in the context of private companies (Bloom, 2015; Morikawa, 2021; Etheridge et al., 2020; Barrero et al., 2021) and of public companies (Battiston, 2021; Kunze et al., 2020; Arkesteijn et al., 2021). However, the emerging evidence on productivity is controversial. Morikava (2021), surveying Japanese workers, found that for the vast majority of employees the productivity in smart working is lower than the productivity at headquarters. Etheridge et al. (2020), whose study is based on a survey of individuals in the United Kingdom, show that, on average, productivity in smart working is not significantly different from that of workplace, but it varies depending on individuals' socio-economic status, industry, and occupation. Barrero et al. (2021), based on a survey of individuals in the United States, indicate that the majority of respondents who have adopted smart working practice, report higher productivity than what they expected before the start of the pandemic.

Empirical studies investigating the productivity of working from home, under COVID-19, from the employer side have been rare. An exception are Bartik et al. (2020), who use data collected from a survey of small-and medium-sized firms in the United States during the period from March to April 2020, that reported a decrease in productivity of about 20% on average. Battiston et al. (2021), using a natural experiment on a public sector organisation in the United Kingdom in charge of answering emergency calls, showed that productivity is higher when teammates are in the same room, and that the effect is stronger for urgent and complex tasks. Kurze et al. (2020), in their survey about German employees, found that, in terms of commitment and productivity, employees' self-assessments suggest that smart working may increase the job satisfaction and lead to similar performance levels as company-based work.

Another line of study concerns the productivity of the research and its determinants. Research productivity, in particular scientific publications, are related to personal, academic, and departmental factors (Zainab, 1999). Among personal factors, gender, age and family background are the most frequently analysed. Many studies identify a gender gap between men and women in scientific productivity (Larivière et al., 2013; Huang et al., 2020; Holman et al., 2018), even if this difference is reducing over time (Frietsch et al., 2009; Abramo et al., 2009; Leahey, 2006); age is also often cited as a factor, although the results of such studies are controversial. While Creswell (1985) affirms that the age has little predictive influence on performance, Bonaccorsi & Daraio (2003) state that the scientific productivity decreases with the average age of researchers.

Family background has also an influence on scientific productivity, but even in this case the literature does not agree. Cole & Zuckerman (1987) indicated that the American natural and social scientists who were married with children have a higher scientific productivity than the unmarried female researchers. Kyvik (1990), in a Norwegian sample, found that women who have children under 10 years of age published less than their male colleagues (with similar aged children) and other female academics with older children.

Literature on productivity in the research field during COVID 19 pandemic are still little but is growing quickly. Many studies measure scientific productivity by using submission or publication of scientific papers (Cushman, 2020; Seyyed Hosseini & Basirian Jahromi, 2021; Squazzoni et al., 2021) while others focus on more dimensions by making use of perceived productivity (Meehan et al., 2021; Sawert & Keil, 2021). Our study belongs to the second group and analyses the perceived scientific productivity of researchers and technologist in Agile Working during the COVID-19 pandemic emergency.

2. Dimensions of interest and methods

The goal of our study is to determine the change in productivity that has occurred since the introduction of the agile working, through researchers' perception.

Data were collected through a questionnaire administered to 2,921 respondents, of which 388 units from INAF and 2,533 units from CNR-IRCrES, between February and March 2021 (Fabrizio et al., 2021). The aim of the study is to answer to three research questions: has researchers' and technologists' productivity increased? Can we identify specific characteristics that affect the productivity? Which scientific activities are most difficult to carry out in agile working?

To carry out the study, we analysed several sections of the questionnaire (see the Annex of this book). In particular, we introduced personal variables, such as:

(A1) The professional role in the PROs;
(C1) The gender, that has been analysed as a dummy variable, and that imposes the loss of 37 observations (missing values) in the regression model;
(C2) The age (four groups);
(C5) The approximate size (Sqm) of the house, where the agile working is mainly carried out;
(C6) The number of cohabitants in the same home;
(C7, C8, C9, C10) The specific number of cohabitants, both adults and minor children;
(C15) CUN Scientific disciplinary areas (starting from these 14 areas, we created a dummy variable based on STEM- Science, technology, engineering, and mathematic disciplines- and non-STEM).

Section D concerns the well-being dimension. Below, we will describe some questions followed by the proposed answering mode.

(D13): how much do you consider that the following activities changed from the "pre-COVID-19" period to the "COVID-19 emergency" period?
Writing of papers or scientific monographs;
Study of the scientific literature;
Participation in conferences (including web conferences);
In presence or virtual meetings related to research projects;
Scientific dissemination through seminars, lectures, or webinars;
Peer review for scientific journals.

D13 has been used to build the three indexes presented in our contribution:

i. The Global Productivity Index (GPI) is given by the row-sum of these dummies, assuming the value of six if the perceived productivity increases or remains stable in all aspects, while the value of zero if the respondents indicate a decline in productivity in all aspects.

ii. High Global Productivity Index: dummy for identifying the respondents with high or stable productivity in all listed aspects.
iii. High Perceived Efficiency: the dummy assumes a value of one if the respondent declares to be able to efficiently carry out his own tasks working from home.

In order to collect information on the effectiveness of working from home, we detect the perceived researchers' intention on continuing agile working after pandemic, and we created a dummy named

iv. Agile working in the future.

We have also built an indicator defining the intensity of potential use, in term of agile working days desired:

v. days of agile working in the future.

Finally, we have also asked questions about:

(E1) The internet connection mainly used when working from home;
(G2) The time spent for the usual commute from home to work to home (in minutes).

2.1. Empirical model

Concerning methods, we will describe, through different econometric models, the relationship between the five indicators of productivity of the agile working, considering personal and job characteristics like gender, age, job qualification and distance time variables.

The following equation represents the general estimated model, where the perceived productivity assumes alternatively the previously defined variables from i to v:

$$Perceived\ Productivity_k = \beta Y_k + \mu F_k + \delta Z_k + \varepsilon_k \qquad k = 1, \dots K$$

As described before, the *perceived productivity* variable identifies one of the five different measures of productivity/efficiency or future intention to adopt agile working. In the case of a continuous variable (i and v), we adopt a standard regression model with robust standard errors, while in the case of the dummies (ii, iii, iv), we run probit models, and all the reported coefficients are referred to marginal effects computed at the mean.

Y_k represents a vector collecting the available personal information of the respondent k, to isolate some specific characteristics able to influence the perceived productivity/efficiency or the future adoption of agile working. We include a dummy for the gender (that is active if the respondent is a female), the number of family members, the number of young sons, and a dummy for the presence of old parents in the family.

The vector F_k collects job-specific controls referred to the k worker. We identify if the respondent is a director or a technician (two dedicated dummies), and the main research area, (STEM vs non-STEM, a dummy).

Z_k collects respondent-level information on house-specific variables referred to the dimension of the house (in square meters), the distance from the workplace (in km) and the presence of an ADSL connection (a dummy).

Finally, ε_k represents the idiosyncratic error component.

3. RESULTS AND DISCUSSION

3.1. Descriptive statistics

We decided to condense the relevant information on the perceived personal productivity encountered during the agile working phase, as well as the information on the future availability of working, according to the agile configuration.

We defined three different indicators of productivity and two indicators on the intention of running agile working in the future.

Firstly, we created a composite (*Global Productivity Index)* build using six specific questions on the perceived productivity, according to different aspects of the research work: the elaboration and writing and of scientific papers, review of the literature, participation in workshops and conferences, meetings for research projects, seminars or lessons or webinars, and peer-reviewing. Each of these aspects has been defined as a dummy, equal to one in the case the respondents argue that their productivity remained stable or has grown with the agile working. The resulting Global productivity Index is given by the row-sum of these dummies that assume the value of six if the perceived productivity increases or remains stable in all aspects, and the value of zero if there are cases of reported productivity decreases in all aspects.

Secondly, we defined a dummy for the identification of the respondents who declared a very high or stable productivity performance (*High Global Productivity Index*) in all the aspects listed. Third, we created a dummy based on the perceived efficiency during agile working, defined as the ability of running all job tasks from home. The dummy, named (*High Perceived Efficiency),* assumes a value of one if the subject argues that all his job tasks can be efficiently done with smart working.

Finally, we asked about intention of continue using agile working in the future. We defined a dummy named (*Agile working in the future)* that assumes a value of one in case of a positive intention of using agile working in the future. Moreover, we define the intensity in its usage by the number of days that the researchers indicate as potentially suitable for performing agile working in the future.

The following tables report some descriptive statistics (averages) for the five indicators created according to some interesting information available in the survey, for what concerns the personal and working characteristics of the respondents.

Table 4.1 shows interesting differences according to the gender: female researchers seem more positive about their experience of agile working, with a higher perception of average productivity (column 2), both in general and in terms of very high productivity (column 3). However, females seem less confident on the idea that all their job tasks could be done online, while they are in line with men on the idea of adopting agile working in the future, but with a lower intensity.

Table 4.1. Perceived productivity, efficiency & future intentions, by gender. Source: Own elaboration on survey data

Gender	Global Productivity Index	High Global Productivity Index (d)	High Perceived Efficiency (d)	Agile working in future (d)	Days of future agile working
Male	4,881	0,399	0,460	0,831	2,673
Female	5,061	0,466	0,368	0,830	2,411
Total	4,969	0,432	0,415	0,830	2,545

Table 4.2 shows some unexpected evidence on the perceived productivity, with the 55-64 years old class characterized by a higher efficiency from the adoption of agile working, with the

older and the younger classes below the average. However, the 55-64 class is also the one with lower confidence on the possibility of doing all job tasks from home (column 3). On the contrary, younger researchers have a greater propensity to continue with the agile working modality in the future, but they claim a lower intensity in comparison to older researchers.

Table 4.2. Perceived productivity, efficiency & future intention, by age class

Age class	Global productivity Index	High Global Productivity Index (d)	High Perceived Efficiency (d)	Agile working in future (d)	Days of future agile working
-44 Y	4,945	0,410	0,416	0,891	2,456
45-54 Y	4,982	0,433	0,429	0,838	2,534
55-64 Y	4,995	0,462	0,392	0,756	2,671
65 +	4,682	0,341	0,477	0,705	2,806
Total	4,969	0,432	0,415	0,830	2,545

Table 4.3, according to some characteristics of the research job, shows the distribution of global productivity, the efficiency, and the future intentions with agile working. In particular, the perceived productivity during the COVID-19 pandemic seems higher for technicians, with an inverse relationship between productivity and research responsibilities. Surprisingly, also in the case of job-task technicians, they seem able to run all their activity online, without the need of a physical presence into offices; on the contrary researchers and directors highlight the necessity of coming back to offices for some activities. The intentions for the future usage of agile working are coherent with those pieces of evidence, with a larger fraction of technicians who argue a frequent and intense usage of agile working.

For what concerns the main area of research, the presence of a large physical laboratory reduces the general propensity of STEM areas to agile working, with regard to productivity, efficiency, and the intensity of working agile in the future.

Table 4.3. Perceived productivity, efficiency & future intention, by job qualification

Job qualification	Global productivity Index	High Global Productivity Index (d)	High Perceived Efficiency (d)	Agile working in future (d)	Days of future agile working
Director	4,794	0,294	0,353	0,559	2,421
Researcher	4,927	0,414	0,392	0,826	2,505
Technician	5,270	0,570	0,579	0,882	2,816
Research Area					
NO STEM	5,090	0,476	0,674	0,837	3,167
STEM	4,958	0,428	0,392	0,829	2,490
Total	4,969	0,432	0,415	0,830	2,545

The last angle of preliminary descriptive analysis is focused on the physical distance between home and workplace. Table 4.4 shows something expected: the perceived level of productivity, both measured as a continuous variable or as a dummy, tends to rise with the physical distance (of course the same evidence is confirmed in case of distance defined according to time) between home and workplace.

Also, for what concerns the capacity of running all the job-tasks from home, this probability tends to increase with the distance, and the same will happen with the future adoption of the agile working.

Table 4.4. Perceived productivity, efficiency & future intention, by distance from the job place

Distance (time)	Global productivity Index	High Global Productivity Index (d)	High Perceived Efficiency (d)	Agile working in future (d)	Days of future agile working
0 - 20 min	4,850	0,384	0,365	0,752	2,304
21- 40 min	4,958	0,441	0,391	0,812	2,576
41- 60 min	5,039	0,454	0,426	0,871	2,568
+ 60 min	5,090	0,472	0,501	0,925	2,772
Total	4,969	0,432	0,415	0,830	2,545

3.1.1. Results for general productivity

After providing descriptive evidence on the five indicators proposed, we investigate with more details on their multivariate relationship with individual level aspects. Table 4.5 reports all the results from the estimation of the model in (1), and the computed coefficients for all control variables.

In general, we find significant gender heterogeneities in our estimates. Female researchers report higher productivity during the pandemic agile working, arguing that working from home helps with balancing work and family needs during the emergency phase, but it cannot be a structural solution given that females are less available to work from home in the future (in terms of days per week) in comparison to males. Surprisingly, females encounter more often difficulties on doing well all their job-tasks from home and, in general, suggest maintaining a more limited number of working-home days in the future, in comparison to male researchers.

The number of family members has a general negative effect on productivity indicators and it is also negative, significant and strong when the indicator measures the high perceived efficiency of doing all job tasks, connected to the availability of working agile in the future and of the intensity of agile working in the future. On the contrary, the presence of minors (sons or daughters) increases the perceived efficiency, as well as the preferences of working agile in the future, both in the extensive and intensive variable.

When considering job-level variables, we find a clear and positive evidence on all indicators for the subgroup of technologist: they report more positive effects of agile working on all aspects considered, in comparison to researchers and directors. In addition to this, researchers and technologists from STEM areas have perceived lower efficiency during agile working, and they would basically like to work lesser days in smart working in the future.

For what concern the remaining aspects, the evidence on the issue of distance is strongly confirmed; the higher is the job-home distance the higher is the expected positive effect on productivity, on efficiency, and on the availability of adopting agile working in the future for researchers. On the contrary, we find no evidence on the relationship between house dimension and productivity, without any kind of effect nor on perceived productivity neither on the future availability of working from home. The ADSL connection seems an important driver for the perception of being able to do all job task, and for the propensity of working smart in the future.

Table 4.5. Perceived productivity, efficiency & future intention, by distance to the job place

	Dependent Variables				
	(1) Global productivity Index (n)	(2) High Global Productivity Index (d)	(3) High Perceived Efficiency (d)	(4) Agile working in future (d)	(5) Days of future agile working (n)
Female (d)	0.183***	0.0663***	-0.106***	0.00105	-0.238***
	(0.0425)	(0.0187)	(0.0187)	(0.0136)	(0.0500)
Family members (n)	-0.00836	-0.00402	-0.0240**	-0.0188***	-0.0595**
	(0.0236)	(0.0101)	(0.0103)	(0.00720)	(0.0288)
Young son (n)	-0.0548	-0.0224	0.0496*	0.0954***	0.195**
	(0.0634)	(0.0278)	(0.0282)	(0.0194)	(0.0782)
Parents (d)	0.00446	0.00817	-0.00136	0.0264	0.0225
	(0.112)	(0.0481)	(0.0498)	(0.0321)	(0.138)
STEM area (d)	-0.0616	-0.0232	-0.282***	0.00111	-0.542***
	(0.0732)	(0.0346)	(0.0327)	(0.0258)	(0.1000)
Directors (d)	-0.0959	-0.110	-0.123	-0.240***	-0.891***
	(0.192)	(0.0832)	(0.0811)	(0.0863)	(0.253)
Technologists (d)	0.336***	0.155***	0.173***	0.0542***	0.367***
	(0.0602)	(0.0279)	(0.0284)	(0.0180)	(0.0745)
House dimension (sq)	-8.84e-05	0.000183	0.000224	-4.42e-05	0.000733
	(0.000579)	(0.000217)	(0.000218)	(0.000162)	(0.000628)
Distance to job (km)	0.00198***	0.000602***	0.00104***	0.00158***	0.00647***
	(0.000432)	(0.000199)	(0.000198)	(0.000208)	(0.000519)
Adsl connection (d)	0.0636	-0.00116	0.0630***	0.0296	0.165***
	(0.0580)	(0.0243)	(0.0240)	(0.0188)	(0.0639)
Constant	4.796***				2.210***
	(0.106)				(0.136)
Observations	2,884	2,884	2,884	2,884	2,884
R-squared	0.024				0.087

Robust SE in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Marginal effects computed at the mean (2) (3) (4).

4. Discussion and conclusions

The measure of the perceived productivity of researchers and technologists offers the possibility of identifying in advance some critical issues. This is particularly useful in a period of strong change, such as that triggered by the COVID-19 pandemic, which has made it possible to massively experiment the use of smart working in the scientific production process.

The results of our study indicate that, in the perception of the researchers and the technologists interviewed, the scientific productivity remained stable or increased with smart working. Data also confirms a positive attitude towards the future use of smart working, even outside the pandemic emergency. Women feel to be more productive under the smart working scheme but feel less efficient and intend to use it for fewer days than man in the future. A potential explanation, already attested in other studies (Czymara et al., 2020; Fodor et al., 2020; Mohring et al., 2020; Cook et al., 2020), can be attributed to the fact that woman typically bears the burden of caring for other family members, in particular for children, but also in terms of home care. When more members of the family are simultaneously present in the house, the workload tends to increase (Craig et al., 2020; Krukowski, et al., 2021; Myers et al., 2020; Staniscuaski et al., 2020; Zoch et al., 2020). Our model confirms that the number of family members have a negative effect on the perceived scientific productivity, on the possibility to do agile working, and on the number of days they would like to work in agile working.

Our study proves that the perception of productivity is age-related, in fact, researchers between 55 and 64 years are those who declare a higher perceived productivity in smart working, but are the youngest (less than 44 years old) the ones to mostly declare that they would like to use this way of working in the future. This result seems to tell us that, despite the difficulty of smart working, especially if it means working from home in presence of children, smart working allows a better management in terms of flexibility and reconciliation of working and family-free time.

Our study also proves that the perception of an increased productivity is also related to the scientific sector. Researchers and technologists from STEM areas perceived lower efficiency during agile working, and they would like to work fewer days in smart working in the future. This result is likely to be due to the perception of a decrease in efficiency linked to the need to use laboratories and conduct experiments (Camerlink et al., 2021; Korbel & Stegle, 2020).

In conclusion, our survey confirms some of the main theories on scientific productivity and on efficiency during smart working, while highlighting how the pandemic may therefore exacerbate gender inequality, which is already an important concern in Academia (Andersen et al., 2020; Kibbe, 2020; Myers et al., 2020; King & Frederickson, 2021; Martucci, 2021; European Commission, 2019). Obviously, these results constitute a first partial answer to the set of research questions initially proposed. In fact, our study has some obvious limitations. The perception of productivity, although considered reliable in the literature, is however less trusted than a more objective measure of scientific productivity. For this reason, to consolidate the results obtained it would be appropriate to enlarge our study adding the analysis of data compared to high measurable and objective indicators of scientific productivity. In order to do that, it is necessary to wait for the review and for the publication processes of the journals that received scientific contributions during the period in which researchers and technologists were mostly working from home, due to the COVID-19 pandemic.

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6. Appendix

Table 4.1. Perceived productivity, efficiency & future intention, by Academic disciplines (CUN areas)

Academic disciplines (Italian definition)	Global productivity Index	High Global Productivity Index (d)	High Percieved Efficiency (d)	Agile working in future (d)	Days of future agile working
Area 1 – Scienze matematiche	4,988	0,439	0,746	0,873	3,119
Area 2 – Scienze fisiche	4,823	0,375	0,462	0,868	2,610
Area 3 – Scienze chimiche	4,928	0,401	0,170	0,787	2,068
Area 4 – Scienze della terra	5,052	0,438	0,472	0,856	2,595
Area 5 – Scienze biologiche	5,165	0,525	0,259	0,788	2,166
Area 6 – Scienze mediche	5,350	0,625	0,350	0,800	2,389
Area 7 – Scienze agrarie e veterinarie	5,023	0,453	0,285	0,756	2,396
Area 8 – Ingegneria civile e architettura	5,104	0,583	0,458	0,750	2,861
Area 9 – Ingegneria industriale	4,669	0,314	0,429	0,854	2,590
Area 10 – Scienze dell'antichità	4,814	0,400	0,686	0,814	3,289
Area 11 – Scienze storiche, filosofia	4,946	0,393	0,661	0,804	3,178
Area 12 – Scienze giuridiche	5,469	0,625	0,688	0,844	3,074
Area 13 – Scienze economiche e statistiche	5,476	0,667	0,667	0,857	3,111
Area 14 – Scienze politiche e sociali	5,061	0,394	0,667	0,909	3,067
Total	4,969	0,432	0,415	0,830	2,545

Table 4.2. Perceived productivity, efficiency & future intention, by connection quality

Connection quality	Global productivity Index	High Global Productivity Index (d)	High Perceived Efficiency (d)	Agile working in future (d)	Days of future agile working
No ADSL	4,936	0,439	0,373	0,818	2,470
ADSL	4,976	0,430	0,425	0,833	2,562
Total	4,969	0,432	0,415	0,830	2,545

Table 3. Perceived productivity in the research-specific components (marginal fixed)

Dep. variables	Dep. Variables: research-specific productivity components					
	(1) papers	(2) literature	(3) conference	(4) projects	(5) lessons	(6) review
Female (d)	0.00848	0.0148	0.0919***	0.0286**	0.0398**	0.000753
	(0.0105)	(0.00975)	(0.0184)	(0.0137)	(0.0163)	(0.00761)
Family members (n.)	-0.00182	-0.00276	0.00542	-0.00181	-0.00516	-0.000926
	(0.00558)	(0.00536)	(0.00994)	(0.00739)	(0.00880)	(0.00414)
Young sons (n.)	-0.0186	-0.0162	-0.0509*	0.0392**	-0.00534	-0.00615
	(0.0155)	(0.0143)	(0.0273)	(0.0199)	(0.0242)	(0.0113)
Parents (d)	0.0163	0.00450	-0.00719	-0.0299	0.0244	-0.00314
	(0.0253)	(0.0241)	(0.0479)	(0.0370)	(0.0409)	(0.0199)
STEM area	0.0087	0.103***	-0.0915***	-0.00670	-0.089***	0.0126
	(0.0204)	(0.0260)	(0.0329)	(0.0251)	(0.0267)	(0.0151)
Director (d)	-0.0500	-0.0192	-0.0471	-0.0142	0.0572	-0.0145
	(0.0583)	(0.0480)	(0.0889)	(0.0625)	(0.0687)	(0.0397)
Technician (d)	0.0374***	0.0277**	0.131***	0.0341*	0.113***	-0.00521
	(0.0131)	(0.0126)	(0.0258)	(0.0192)	(0.0211)	(0.0122)
House dimension (sq)	-0.000323	0.0003**	-0.00016	-0.0002	-0.00015	0.00032
	(0.0001)	(0.0001)	(0.0002)	(0.0001)	(0.0002)	(0.0001)
Distance to job (km)	0.00046***	0.0003**	0.00058***	0.00044***	0.00034*	0.00015
	(0.00013)	(0.0001)	(0.0002)	(0.00016)	(0.000177)	(0.00085)
Adsl connection (d)	0.0138	0.0374**	-0.0153	-0.0123	0.0205	0.0197*
	(0.0144)	(0.0146)	(0.0239)	(0.0175)	(0.0215)	(0.0115)
Observations	2,884	2,884	2,884	2,884	2,884	2,884

Robust SE in parentheses; *** p<0.01, ** p<0.05, * p<0.1. Marginal effects computed at the mean