The Great Employee Divide: Clustering Employee « Well-being » Challenge during Covid-19

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iCite Working Paper 2020-041

The great employee divide:

Clustering employee « well-being » challenge during Covid-19

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December 2020

Abstract

The Covid-19 pandemic has triggered unprecedented levels of disruption and stress for workers. Still, little is relatively known about the state of mind of the workforce, even if its well-being is increasingly recognized as a driver of productivity. This paper encompasses multiple forms of stress - health, economic, social, and psychological – faced by the workforce, and demonstrates that not only have workers been facing large levels of stress during the Covid-19 pandemic beyond health issues, but that stress is not uniformly distributed among workers. While it is known that Covid-19 has been building a divide between remote and on-site workers, we uncover a much larger divide than the ones induced by work location alone, with the divide being due to different perceptions of mix and level of worries. Human resources practices may have to be much more personalized and include all forms of stress to diagnose the level of workers' state of fragility if they wish to create a much more resilient and productive workforce.

Keywords

Keywords: Covid-19, Coronavirus, Economic shutdowns, Reopening the economy, Preventative behaviors, Risk-taking tendencies, Prosocial tendencies, Workforce burnout

JEL-codes: I12, J22, J23, J33

1.   Introduction

According to the Worldometers database[1], the Covid-19 pandemic has affected more than 60 million people worldwide by early December 2020, resulting in more than 10 million hospitalizations, and 1.5 million official deaths. This figure matches the worse cases of annual flu and is already twice as large as the global pandemic of H1N1 by 2009 (Bughin, 2020).

While waiting for an effective vaccine, half of the governments on the planet have taken radical measures of quarantines. In effect, they also have shut down a material part of economies, through significant reduction of the face-to-face business interactions, and accelerating the shift towards home working.

The debate has been growing over the financial risk of shutting down businesses, especially small businesses (e.g. Bartik et al., 2020). The International Labour Organization (ILO) recently warned that more than 400 million enterprises were facing high risks of serious disruption worldwide, due to Covid-19.[2] Still, the debate has not focused *inside firms*, on *the perception* of the working population.[3] This is rather surprising, as most economies' sources of added value are still driven by the labor force, and the workforce is not doing that well (Pfefferbaum et al., 2020). Recent US research has for instance publicized a 3 times surge in burn-out among the full US working population, of which 75% of the surge can be traced to the Covid-19 pandemic[4]. Academic studies confirm this surge in stress, in most exposed occupations such as medical workers, teachers, or security forces (Sokal et al., 2020; or Dinibutun, 2020).

Further, there is a clear link being made in the literature between workforce well-being and labor productivity boost. A recent study by DiMaria et al. (2020) pervasively shows

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[1] Coronavirus Update (Live): 59,027,330 Cases and 1,394,240 Deaths from Covid-19 Virus Pandemic. Worldometer (worldometers.info).

[2] See Covid-19: Stimulating the economy and employment: ILO: As job losses escalate, nearly half of global workforce at risk of losing livelihoods. These enterprises are operating in the hardest-hit economic sectors, including some 232 million in wholesale and retail, 111 million in manufacturing, 51 million in accommodation and food services, and 42 million in real estate and other business activities.

[3] Exception include VanderWeele (2019); Carnevale and Hatak (2020).

[4] FlexJobs, Mental Health America Survey: Mental Health in the Workplace

that European countries lagging in workers' wellbeing may gain up to 4% of productive efficiency for each extra point increase in subjective wellbeing.[5]

Many firms have been working hard to put into place health prevention measures against Covid-19, including the option of home-working. This strategy is not only guided by government directives but may be optimal to the extent that workers are afraid to come back to work, even if remote working limits productivity gains (Bughin and Cincera, 2020; Rahman, 2020). In Silicon Valley, normally a location that champions pushing for back-to-work, *70% of the tech* professionals have expressed fears of returning to work on-site[6], the so-called FOG (fear of going back to work).[7] Another September 2020 survey commissioned by the work platform Envoy, found that about 3 out of 4 US employees remained worried about going back to work on-site.[8]

The fact that about 40% of workers, and most notably, managers, were able to work from home, without health fear, "in the comfort of their home", while some workers had no choice but to work on-site. This has led to the debate about the divide created by the Covid-19 pandemic (see Dingel and Neiman, 2020; Sostero et al., 2020).

But the divide issue is not exclusively about health (and FOG). Divides may have different flavors. Divide may emerge from the difference of impact of Covid-19 on job preservation and finance or divide may arise in terms of ability to protect close ties. Regarding the former, ILO recently warned in its *ILO Monitor third edition: Covid-19* that a drop in working hours in the current (second) quarter of 2020 would be in the range of a 10.5% deterioration, equivalent to 305 million full-time jobs at risk, and will

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[5] France is set to gain the most among the EU countries analysed.
[6] See https://spectrum.ieee.org/view-from-the-valley/at-work/tech-careers/coronavirus-is-triggering-fear-of-going-to-work.
[7] As result of Covid-19, for instance, ILO has developed multiple advices as to how maximize the returns to teleworking technologies, see:
https://www.ilo.org/global/about-the-ilo/newsroom/news/WCMS_739879/lang--en/index.htm
[8] https://envoy.com/content/new-survey-highlights-employees-fears-about-returning-to-work/

especially affect workers in consumer-facing industries, with lower skills, and in countries, where most employment is self-employment.[9,10]

Regarding the latter, on top of mental health issues, the largest source of stress for medical workers is usually their family, rather than self-worry (see Vagni et al., 2020).

To our knowledge, this article is the first one to look at a comprehensive *fragility* of the workforce, through a broad look of risks the workforce perceives from the Covid-19 crisis. Risks assessed include job and financial risk (micro-economic risk), basic needs provisioning risk (supply chain), violence and psychological risks (social), country finance (macroeconomic risk), on top of health risk. The analysis covers 5 countries in continental Europe (Italy, Spain, France, Sweden, and Germany) so that one can sort out, country effects from common risk effects.

The first insight is that health risk (including about self and third parties like close family) is important but accounts for just above 40% of all risks expressed by the workers. Clearly, there is more than health that stresses the workplace. Second, and as expected, job and financial preservation risk is clearly important for a set of the working population and in all cases, is indeed a more important matter than for the non-working population, e.g. the retired, or the unemployed (who are already without a job, or voluntary unemployed).

Third, fragility is not evenly distributed. Resorting to clustering analysis, we uncover five major segments of the working population concerning the amount and profile of risk perception encountered. 45% of the working population has a large breadth of worries, and in our wording, is rather fragile. There is also large polarization as another, smaller cluster group than the worried workforce one, composed of 17% of the European

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[9] See Covid-19: Stimulating the economy and employment (ILO): As job losses escalate, nearly half of global workforce at risk of losing livelihoods. These enterprises are operating in the hardest-hit economic sectors, including some 232 million in wholesale and retail, 111 million in manufacturing, 51 million in accommodation and food services, and 42 million in real estate and other business activities.
[10] This is only a first-order effect, as damages may drag alone. Ten years after the sub-prime 2008 crisis and the Lehman Brothers bankruptcy, about 60% of countries still have an output trajectory below pre-crisis levels, according to research by the IMF. Likewise, consumption might be pressed downwards during and post covid-time, leading to a demand shortfall, and a risk of recession fuelling a new wave of unemployment (Barro et al., 2020)

population seems to have limited risk perception, except *outside* of work (and related to social violence).

This distribution of risk can be traced to a set of employees' features, e.g. the segment that is more worried about job and finance has a higher portion of workers with lower education, less income generation, and are more in the midlife career. Those only worried about social violence, tend to be more of higher education. But also, macro-elements shape (non-) fragility, i.e. the segment whose worries are essentially more health than wealth-related is hopefully trusting the health system better than the other segments. On the negative side, those whose main worry is job preservation and finance stabilization are the least to trust the governmental actions so far in handling the Covid-19 crisis.

Last, but not least, the results are based on a representative sample survey, conducted online, but relying on respondents' statements. In order, to limit any bias, we use response time online, to adjust survey answers, based on the neuroeconomics principle that response time is an indicator of attitude strength (see Fazio et al., 1989). As we correct for this response time, we essentially make answers re-centered towards a neutral response. Thus, our statistically significant results are reinforced by this procedure.

The paper reads as follows. The next section discusses the methodology and sampling. Section 3 discusses the clustering analysis and implications. Section 4 concludes.

2. Background and sampling

The background of this research is a part of an extensive multinational Covid-19 Fever project aimed at understanding people's attitudes, emotions, and behaviors connected with the pandemic. The full list of questions is described in Appendix 1 to this paper.

The focus of the research is on understanding people's perception of disruption and stress brought by the pandemic, as it is well-known that risk perception may support larger protective behavior against the virus exposure (Wise et al., 2020; Harper et al.,

2020). The general point is that *individual* behavior is badly needed to limit the *social* diffusion of a fast reproducing Covid-19 (see Viceconte and Petrosillo, 2020).[11]

Using the same data set of this article, a companion paper (Bughin et al., 2020a) supports the link between risk and protection, but emphasize that the intensity and type of protection, as well as the intensity of the link with risk, is not homogeneously distributed in the population, casting doubt on « one size fits all » analysis.

For this paper, we also look at the heterogeneity of behaviors during the first wave of the Covid-19, at its peak of April 2020 in European countries, but focuses on *the workforce* population. The workforce population is typically 50% of all citizens, and in aggregate, labor is one of the largest drivers of productivity growth for our economies. Yet, the focus on how Covid-19 affects this specific population has been rare to date. Risks we look at are furthermore not only health risks, but other risks specific to work, such as fear of job and financial stability among others.

2.1. Data sampling and scope

We focus on Europe. Five countries are being analyzed: France, Germany, Italy, Spain, Sweden. Those countries are the largest of Europe and/or are representative of different socio-economic models (Esping-Andersen, 1999), as well as have been chosen because they stand for different archetypes of policy responses to the Covid-19 crisis.

The data collection was performed online[12], based on country representative samples for age (above 18 years old) and gender, and recruited via a panel agency in April 2020, with a total sample of more than 5,000 answers, or a minimum of 1,000 per country. Considering employees only, the total sample is just above 2,780 employees across 5

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[11] With a Ro of 2-3, the Covid-19 reproduction rate implies a fast rate of diffusion. This is similar to the 2002 SRAS, with Ro was in the range of 2.2 to 3.6, but say much lower than the MERS-Cov, which broke out in the Middle East by 2012, and with a confined Ro, at less than 0.5 in Saudi Arabia and Middle East. Ebola by 2014, is said to have a reproduction rate, Ro between 1.5 to 2.3. The 1918 Spanish influenza Ro was estimated imprecisely between 1.8 to 4 (this was the case for Covid too, as the Ro range published varied between 1.5 to 6.5, with a mean of Ro = 3.3).

[12] We would like to thank Neurohm and Syno for collecting the data in all the countries.

countries (Table 1a), or 55% of the sample, a ratio in line with workers participation in the 18+ population of those countries.

Table 1a. Number of (employee) respondents and demographic split by country

	Total	Gender		Age			Total employees
	N	Females	Males	18-35	36-49	50+	N
FRANCE	1,024	51%	49%	29%	28%	43%	639
GERMANY	1,017	49%	51%	27%	24%	50%	535
ITALY	1,021	51%	49%	26%	30%	44%	507
SPAIN	1,019	50%	50%	32%	32%	36%	635
SWEDEN	1,006	51%	49%	30%	20%	49%	466

Table 1b provides high-level demographics of employees in the sample. In terms of largest frequency, the sample is also well representative of Western Europe - that is, it contains more male (53%) workers, whose age is between 36-49 years range (37%), who are relatively well educated (35%), have one child, and a monthly income above 2,000 Euro per month (71%). Note that by the time the sample got collected (by April and May 2020), about 26% of employees reported knowing at least someone being infected by the Covid-19. The sample is balanced in terms of traditional left/right political orientations.

Respondents got email invites and were informed about the study scope. No personal data were collected. The task of the respondents was to evaluate if they agree with the statements presented on the screen.[13] To avoid people being « forced » to respond, or respond with answers that are not reflective of actual behavior, each question was structured to respond, on a 3 point scale (yes, hard to tell, no) with hard to tell allowing not to force an answer.

A caveat of surveys is the uncertainty of the fit between what people report and their actual attitudes/behaviors. This is critical in a study like this one, as results may lead to managerial human resources or broader public policy implications. We thus apply response time measurement, and adjust data, in line with Fazio et al. (1989) who find a high correlation between report and actual behavior among people with fast reaction time when expressing their opinions. iCode Smart test was used to collect the data

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[13] See Appendix 1.

(Ohme et al., 2020), with response time (RT) collected for each answer. RT given with a latency lower than 500 milliseconds (ms) (suspected to be given randomly) or higher than 10,000 ms (suspected to have been given after distraction) were eliminated. In total, this amounts to only 0.52% of dubious responses.[14]

Table 1b. Employees high-level demographics and Covid exposure

Features	Types	Percent	Features	Types	Percent
Gender	Female	47%	Location	<100,000 inhab.	56%
	Male	53%		>100,000 inhab.	44%
			Income	<20,000€	29%
Age	<18	0%		>20,000€	71%
	18-25	7%		Don't want to answer	7%
	26-35	23%	Infected	Yes	26%
	36-49	37%		No	68%
	50-64	31%		Don't know	6%
	>64	2%		Don't want to answer	1%
Education	Primary schools	2%	Political orientation	Left	23%
	Middle school	8%		Right	26%
	Vocational	28%		Other	21%
	High school	26%		Don't associate with politics	21%
	Bachelor or higher	35%		Don't want to answer	8%
Kids	0 children	50%			
	1 child	25%			
	2 children	19%			
	3 children	4%			
	>3 children	1%			

To account for individual differences in reaction speed, we standardize reaction time data measured in milliseconds, with STDRT being the z-score of log(RT), with mean = 0 and standard deviation = 1. We then build the variable, RTC, that takes into account both the explicit answer as well as the reaction time (RT) needed to produce the answer,

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[14] Furthermore, to ensure high quality of data and eliminate test biases a calibration phase and control screen have been added. Calibration preceded the test phase and consisted of 3 steps:
   a. Familiarization with the scale. The task of the respondents was to press certain answer options – this task made sure respondents are aware of the position of the buttons on the screen.
   b. Familiarization with the purpose of the task. A few statements were presented describing the test and the task. After each screen respondents had to press a button. This part served as a motoric warm up.
   c. Increasing the focus on the task. During the study a screen appeared asking the respondent to indicate the statement that was presented last. The aim of this task was to make sure respondents focus their attention on the presented statements. Such screen was presented twice.
The control screen was introduced to eliminate the effect of the position of the mouse on the screen. It was presented before each statement, forcing a standardized position of the mouse (the distance to the yes and no answers was always the same).

that is RTC' - 1/2 = (1 - a) x (Y - N)/4 (0 < RTC'< 1) where (1 - a) = max(SDRT, 2)/2 and Y-N is the difference between the portion of reported Yes and of reported N. Thus 0 < a < 1 acts as a factor that reduces the difference in responses, in the function of answer reaction time, which we call the confidence index. When RTC' converges to 50%, this implies either that everyone's answer oscillates around "Hard to tell", or simply because all the answers are not at all credible because of unusual reaction time. The more extreme RTC' value is, the stronger the survey answer is taking a firm position on the statement qualification asked in the survey, thus RTC = 0 is a strong and dominant NO, and RTC = 1 is an overwhelming YES. We notice here-after in Table 2 that the confidence index is not immaterial, and we thus use the adjusted responses as a more reliable dataset for our analyses in this paper.

2.3. High-level data statistics

2.3.1. Breadth of Worries

Remember that we look at four types of worries mostly, health (henceforth, H), economic (E), social (S), and psychological (P). Table 2 provides the RTC' value as well as the confidence index of answers, associated with each risk measures perception, ranked from the largest to the lowest, for the total sample, and from 16 constructs allocated to H, E, S, and P.

First, if one sums up all the RTC' values, the total goes to 9.1 out of 16, or a value of 56.8%. Clearly, a majority of worries prevails in the employee population, during the first wave of the Covid-19 pandemics. As our sample selects only employees, we can also compare the extent of worries to the one of non-employees, e.g. retirees or working-age people not working. There, the total for retirees is 7.8 (or 15% lower than employees), while it is 8.7 (6% lower than employees) for the other non-working population. Otherwise stated, the employee population expresses a broader risk than non-employees.

Looking at the different drivers, there is no surprise that half of the gap is linked to economic consideration, e.g. the largest difference between retirees and employees is by far job preservation risk. This worry for employees should be even more prevalent as the countries we cover, except for Sweden, had forced full blanket lockdown, with large pressure of economic activity (Coibion et al., 2020). But other (and expected) differences

still exist between employees and retirees. Not surprisingly, retirees are more worried about their health, and less so about social risk (as they tend to be more standalone).

Taking the average of the 4 constructs by type of risk, for the employee only, which is our focus here, we have that H = 61.2%, S = 59.5%, P = 56.0%, and E = 50.7%. All constructs are above 50%, meaning that each is majorly present in the employees' population.

H has the largest value but stands for only 40% of the total worries. H includes the two highest ranks in Table 2. Interestingly, worry about self is only average in the ranking, and the main risk is linked to people with a high risk of fatalities, like the older family members. This is consistent with other literature findings, e.g. Dryhurst et al. (2020).

Table 2. European employees worry during wave 1 of the Covid-19 pandemic

RTC'	Confidence	Statement
0.7	0.43	I am worried about the health of my older family members (H)
0.67	0.41	I am worried about the health of people in my country (H)
0.63	0.49	COVID-19 increases domestic violence (S)
0.62	0.61	The COVID-19 outbreak will make society more unequal (S)
0.60	0.53	I am worried that our country will run out of money (E)
0.60	0.49	I am worried about not being able to meet with my family (P)
0.59	0.52	COVID-19 will increase divorce rates(S)
0.57	0.52	I am anxious about not being able to meet with friends(P)
0.54	0.58	Living in isolation negatively impacts my wellbeing (P)
0.54	0.31	I am worried about my own health(H)
0.54	0.35	I am worried about the health of my children(H)
0.54	0.63	Being together all the time increases family tensions (S)
0.53	0.59	I worry how living in isolation will affect me (P)
0.52	0.35	I am worried about my financial situation (E)
0.47	0.36	I am worried about my job situation (E)
0.44	0.59	I am worried that of not enough necessities in the stores (E)

Economic elements, E, has the lowest risk value. Supply chain risk (as measured by necessary goods availability) is a minor risk, but the macro-economic risk of a country running out of money is a larger risk than personal risk, as we have noticed also for

health. Psychological and social risks are clearly important too. Domestic violence and divorce rates are clearly signaled as a risk among the employee's sample.[15]

3.2.2. Contextual drivers of worries.

We also have collected responses linked to various attitudes and beliefs that may affect employee risk expression.

As we have a large list of statements (see Appendix 1), we first have applied Principal Categorical Component Analysis (CATPCA) to reduce the information. CATPCA was performed using Varimax rotation with Kaiser Normalization, to maximize the sum of the variance of the factor coefficients.

Ten factors were derived, which stands for 19.6% of the total variance. Table 3a provides the ten factors and associated dimensions, in order of how they emerge from the data rotation. Table 3b reports the RTC' and the confidence values, ranked from highest to lowest importance of the Factors.

Three factors (1, 4, 6) are linked to *third party trust*. The first is linked essentially to governmental institutions, the second is linked to healthcare, while the last relates to how people are reacting around the Covid-19 crisis. Factors 2 and 5 relate to *precautionary measures*, with Factor 2 encompassing the most important NPIs in terms of controlling the disease (Bo et al, 2020).

Factors 8, 9, 10 are all linked to the perception of a *lasting danger* linked to the virus.

Factor 10 relates to the duration of the crisis, Factors 8 and 9 relate to the vulnerability to the virus and the prioritization bias towards health versus wealth. Finally, Factors 3 and 7 are more social care about self and family.

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[15] Note evidently that the risks measured concerns employees at their broad life - not only at work. But it can be correlated with work situation. For instance, domestic violence or divorce rate may arise from the fact that lockdown made people work at home, through teleworking, and that there is no escape from a close group.

Table 3a. PCA Factors from European employees' statements linked to the Covid-19 pandemic

Factor	Dimensions	Dimension loading
1. Trust in institutions	I am satisfied with how my government is handling this crisis	0.912
	The government is doing a good job dealing with COVID-19	0.908
	The government discloses real numbers of coronavirus infections and deaths	0.702
	[PRESIDENT] is doing a good job dealing with COVID-19	0.608
	Media provide reliable information about the pandemic	0.519
2. NPI compliance	I comply with the recommendations for physical distancing	0.683
	I comply with the restrictions to stay home	0.619
	I wash hands for 20 seconds when necessary	0.600
	I am grateful to our healthcare professionals	0.594
	I actively encourage others to follow the restrictions and guidelines	0.549
3. Social Fabric/citizenship	Since COVID-19 I exercise at home more	0.607
	Since COVID-19 I eat healthier	0.603
	I'm worried about my children's education	0.561
	I would like to help people who are more vulnerable to COVID-19	0.534
	COVID-19 will bring countries closer	0.482
	I worry that there will be an increase in break-ins and thefts	0.435
4. Trust in Healthcare	In case of coronavirus infection, I will get appropriate medical help	0.711
	I am grateful to our essential workers	0.599
	I am satisfied with how our healthcare system is handling this crisis	0.590
	I believe we will beat COVID-19 soon	0.304
5. Extra caution	I disinfect groceries before putting them away	0.902
	I disinfect mail and deliveries before opening them	0.899
6. Trust in people	COVID-19 reveals the worse in people	-0.788
	COVID-19 reveals the best in people	0.775
	People will stop following the restrictions soon	-0.571
7. Lifestyle maintenance	Since COVID-19 I exercise less	-0.745
	Since COVID-19 I eat unhealthier	-0.740
8. Vulnerability	My chance of getting COVID-19 is high	0.839
	Coronavirus is dangerous for my health	0.663
9. Covid a top priority	Media exaggerate the situation with COVID-19	-0.845
	Slowing the spread of COVID-19 is more important than the economy	0.434
	When a COVID-19 vaccine is available, I'd like to be vaccinated	0.375
10. Duration of Covid	The restrictions caused by COVID-19 will be over in a month	-0.807
	The restrictions caused by COVID-19 will continue at least until the fall	0.795

Notes: Variable Principal Normalization. Rotation Method: Varimax with Kaiser Normalization.

Regrouping by themes, Table 3a highlights good NPI compliance (average = 62%), even after correcting for likely over-statement in answers. In effect, the confidence level is the lowest of all themes. This overstatement might originate from appearing to obey the public mandate of quarantines and social distancing measures to limit the diffusion of the pandemics. Still, the RTC' < 100%, that is, "true" NPI compliance, is not complete, as

found in many studies (Zickfeld et al., 2020). A third-party trust is relatively well acknowledged (58%), yet people feel majorly vulnerable (56%). Lifestyle impact is felt more minor (48%). Expectations linked to the duration of the crisis is that it may be more short-term than long-term so that it seems that most European employees were not necessarily expecting the current second wave.

**Table 3b. How employees perceive and act upon the Covid-19 pandemic**

RTC'	Confidence	Factors
0.72	0.44	NPI Compliance
0.66	0.52	Trust in healthcare
0.57	0.51	Lifestyle maintenance
0.56	0.47	Vulnerability
0.55	0.54	Trust in people
0.54	0.50	Trust in Government
0.53	0.58	Covid top priority
0.52	0.52	Social fabric
0.44	0.49	NPI Extra caution
0.41	0.67	Crisis duration

Trust is especially larger towards healthcare than for the government. It is nevertheless important that public authorities are trusted in their way of managing the crisis so that citizens actually adopt recommended protective actions (Li et al., 2018). Finally, vulnerability is more than less perceived by the employees' population and in general, there is a majority to think that the crisis will last until this time (as it did indeed).

3. Clustering results

One caveat of Table 2 about risk expressed by employees is that it only shows averages, but the key insight is not that people are worried about a pandemic, but more that the risk distribution is very wide. Figure 1 for instance plots the distribution of risk expression among the employees, and clearly the distribution is not uniform, building up a major divide; from Figure 1, one among others derives that 20% of employees express less than 50% of the type of the H, S, P, E risks surveyed, and 20% of others mention at least 81% of them during wave 1 of the Covid-19 pandemic. Furthermore, we find that 18% of employees make up 90% of all risks mentions, or more concentrated than a typical Pareto distribution.

Figure 1. Distribution of Covid-19 related risk expression among employees
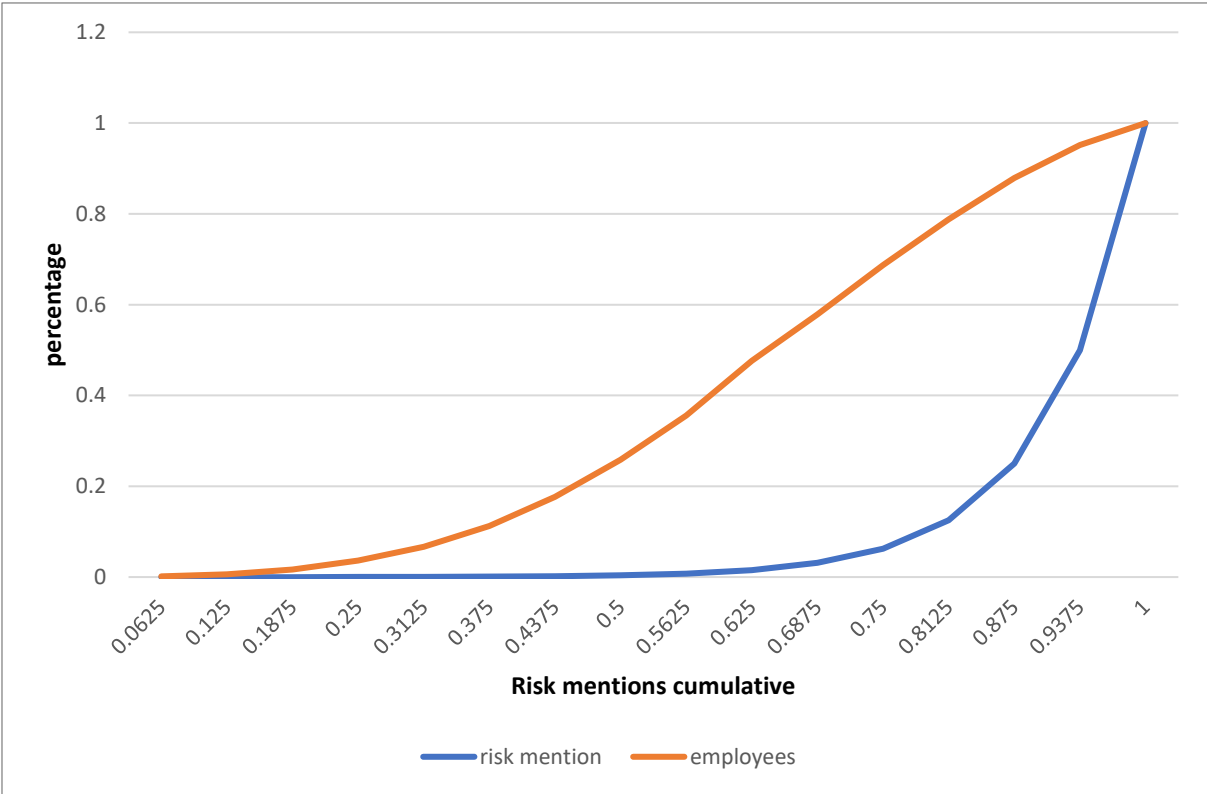
3.1. Method

We resort to *clustering analysis* around the 16 elements that feature the four H, S, P, E risk domains. We have sued K-means clustering intending to partition the population into cohesive and stable segments, and in the hope to identify high risk and low-risk segments, as per Figure 1 above.[16]

The K-means technique minimizes the sum of square distances within each possible risk cluster to its centroid. Several analyses with different solutions of clusters number were conducted. The 5-cluster solution appears to be the most informative.

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[16] To the best of our knowledge, the only study that segments risk attitudes is the one by Bodrud-Doza et al. (2020), in a study for Bangladesh. The authors demonstrate four homogenous groups linked to risk attitudes towards Covid-19, linked to health risks, socio-economic issues, and mental health problems. The study however only covers 340 people online, and given the country current digital development, is non- representative of the population. Finally, drivers of cluster belonging are not tested, which we do in our current study. We remind as well that we focus on employees only, where job risk may be acute, and for a large sample around Western Europe; among final innovations, we also have adjusted response rate for their confidence, based on large difference versus a base line of response time.

Table 4. K-means cluster size of European employees for different risks associated with the Covid-19 pandemic

Cluster	Total	Germany	Spain	France	Italy	Sweden
1	30.4%	19.8%	46.5%	32.1%	31.2%	17.8%
2	15.6%	10.7%	18.6%	13.8%	23.1%	11.8%
3	15.4%	21.1%	9.4%	13.9%	16.8%	17.4%
4	21.2%	23.0%	20.8%	25.8%	15.8%	19.5%
5	17.3%	25.4%	4.7%	14.4%	13.2%	33.5%
Total	100%	100%	100%	100%	100%	100%

Table 4 shows the size of the segments in aggregate, then, split by country. We see that the size of a segment is country dependent. Cluster 5 is the dominant one for Sweden and Germany, but the smallest one for Italy and Spain. As seen later, the 5th segment is composed of the least worried employees in contrast to the first segment. That Italy and Spain have such a large worried workforce can be traced to the fact that Italy and Spain have suffered relatively high contamination, healthcare under-capacity, and a largely enforced lockdown. This contrasts with Sweden, where no lockdown was applied, or with Germany where the healthcare capacity is rather large, and contamination was less spread than in the South of Europe.

3.2. Clusters details

Table 5 provides the RTC' values by segment across the 16 risks analyzed, while Figure 2 aggregates the risk profile along with the four domains H, P, S, E.

Segments vary both in level and mix of risks expressed. As said, the risk expression level is the largest for the first segment. Risk mention then decreases along for each other segment.

The 5th Segment is the only segment with an average RTC' < 50%, Segment 5 has the lowest risk perception across all types of risk domains (See Figure 2), except that Segment 5 exhibits similar social risk perception as the average of other segments. Its main worry is social and linked to home violence and divorce rate.

Figure 2. Covid-19 Risk profile radar by segment, European population
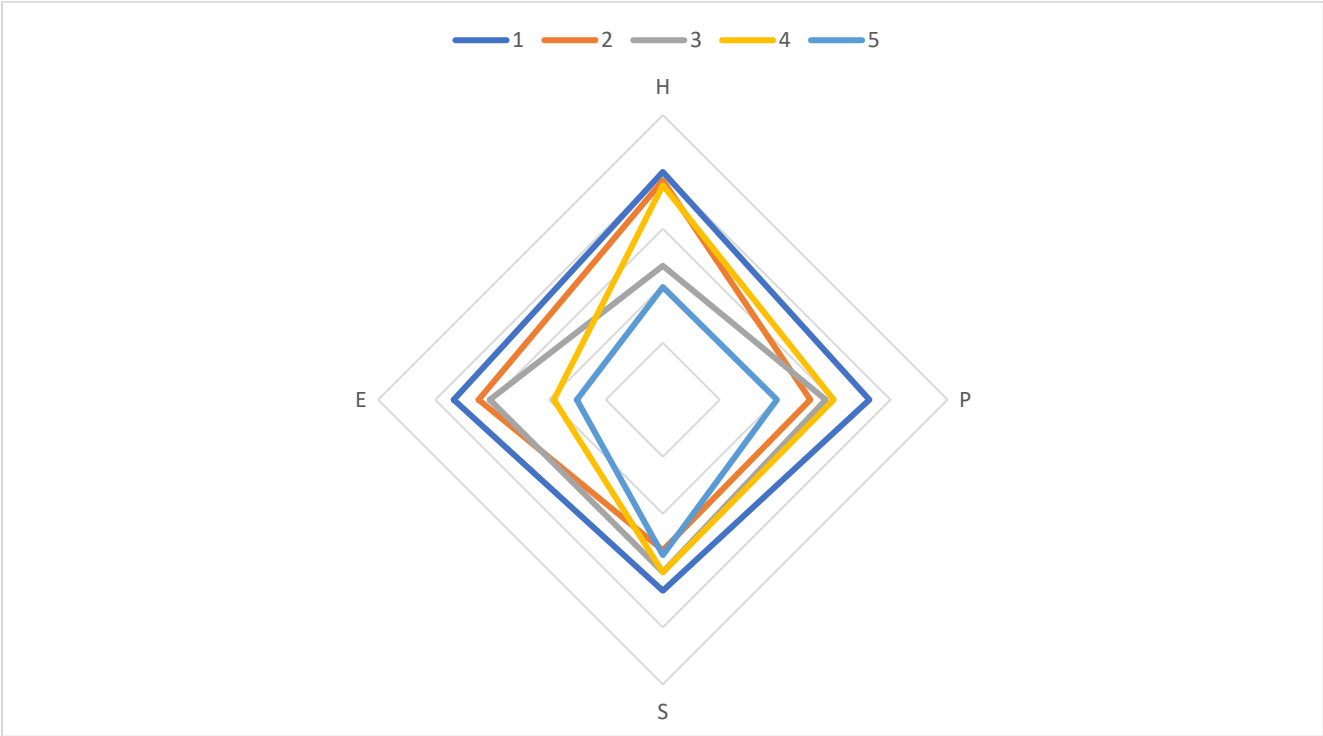
Among the four other segments, Segment 1 has the largest risk perception across all dimensions. Segment 2 suffers less from the lack of social contacts than other segments, but this Segment expresses large concern across all other types of risk. Segment 3 perceives lower health problems than other segments, and finance is its key concern. Segment 4 has relatively low economic risk perception but is especially health concerned.

Those risk profile differences are striking. We see that the 3rd Segment has an opposite concern to the 4th Segment when it comes to the health-wealth trade-off. The 1st Segment is rather fragile, as the breadth of risk mention (12.9) is three times larger than the 5th Segment (4.3).

Figure 3 reports the distribution of risk per segment, normalized to the most risk-prone segment (Segment 1). The probability to mention more than 50% (= 8) of all worries, is just 15% for an employee in the 5th Segment but raises to 99% for the 5th Segment.

Table 5. Risk expressions linked to Covid-19 pandemic by European employee segments

Segment	1	2	3	4	5
I am worried about my financial situation	80%	77%	74%	28%	22%
I am worried about my job situation	79%	73%	66 %	22%	20%
I am worried that our country will run out of money	73%	66%	62%	61%	46%
I am worried that there will not be enough basic necessities in the stores	62%	43%	42%	42%	33%
I am worried about my health	84%	82%	30%	74%	22%
I am worried about the health of my children	77%	71%	37%	69%	30%
I am worried about the health of my older family members	79%	78%	63%	79%	57%
I am worried about the health of people in my country	80%	77%	59%	80%	49%
I am anxious about not being able to meet with friends	71%	50%	59%	63%	41%
I am worried about not being able to meet with my family	77%	60%	58%	69%	40%
I worry how living in isolation will affect me	73%	50%	53%	52%	37%
Living in isolation negatively impacts my wellbeing	69%	48%	58%	56%	41%
The COVID-19 outbreak will make society more unequal	68%	60%	63%	64%	56%
Being together all the time increases family tensions	65%	47%	54%	53%	47%
COVID-19 increases domestic violence	67%	51%	65%	65%	61%
COVID-19 will increase divorce rates	68%	53%	59%	61%	54%
Total risk mentions out of 16	12.91	8.79	7.78	8.62	4.26

In fact, we can compute that about 85% of the 18% of employees accountable in Figure 1, for 90% of total volume stress expression belongs to the 1st Segment. This is an odd ratio of 85%/30% = 2.83, (where 30% is the share of employees in the 1st Segment). In contrast, the odd ratio is only 3%/17% = 17.6% (where 17% is the share of employees in the 5th Segment), or just above 1 chance of 6, for the less risk-prone 5th Segment.

Using further Figure 3 the probability to express more than 8 worries, over the 16 possibilities is just 15% for the 5th Segment, but still 70% for Segments 2, 3, and 4 and 99% for the 5th Segment.

Based on those distribution profiles, we can compute that about 85% of the 1st Segment makes up for the 18% of employees accountable in Figure 1, for 90% of total volume stress expression. This is an odd ratio of 85/30, or close to 3 for the Segment (where 30% is the share of employees in the 1st Segment in total).

Figure 3. Distribution of risk mentions by population segments
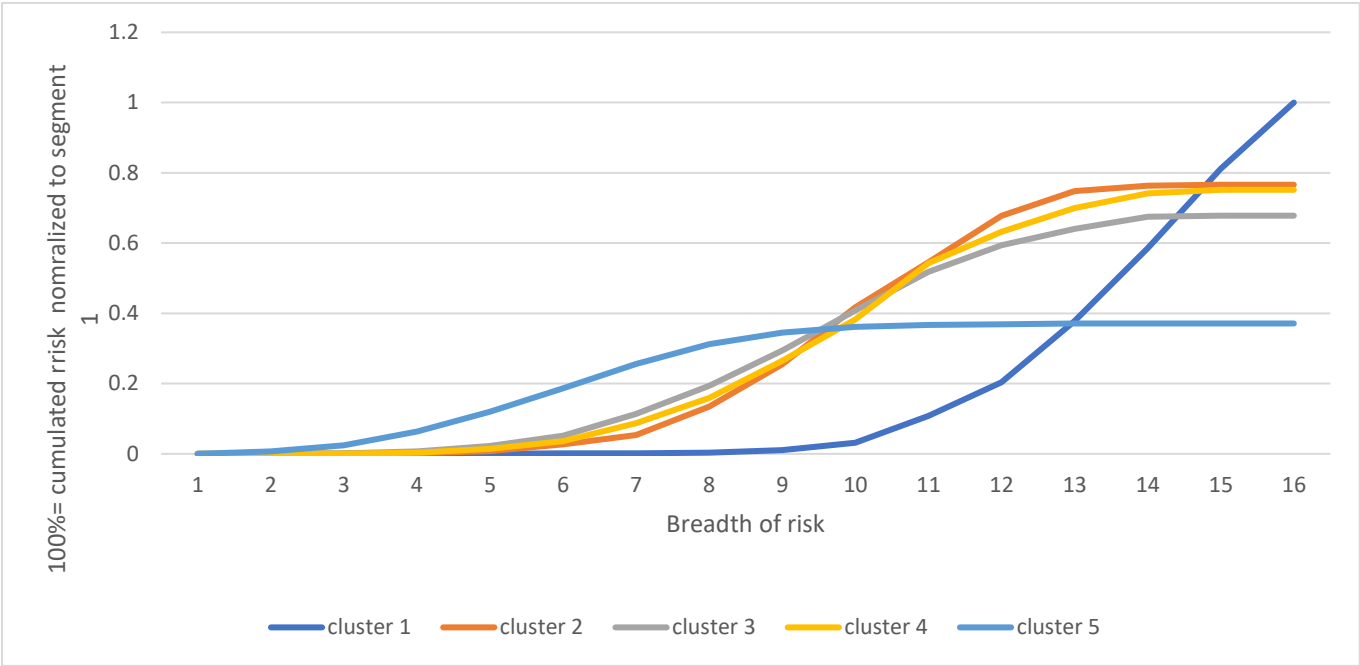
In contrast, the odd ratio is 3%/17%; or just above 1 chance of 6, for the less risk-prone 5th Segment. The segmentation allows thus to provide some significant information as to the skewed distribution of risk expression among employees, especially the most fragile, as the latter has an 85% probability to be linked to the 1st Segment.

As a further cross-check to Table 5, Table 6 also correlates the compliance to key non-pharmaceutical interventions (NPI) and risk mentions; as higher risk perception would lead to more extensive use of NPIs (see Bughin et al., 2020a; Harper, 2020; or Hammond, 2020 among others). This is indeed what we observe as a simple indicative log-log regression running from employee risk expression to her NPI compliance has a largely positive, highly significant elasticity (2.9, $p < 0.01$, $R^2 = 0.71$).[17]

Especially, the 5th Segment is less compliant to any measure as it suffers from the lowest level of risk. Segments 1 and 2 actually prefer to be quarantined or prefer the least interactions possible as they bear the largest burden of risk.

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[17] Equation controls for employee socio-demographics from Table 2, and country dummies. A log-log specification is used as per the prevailing distribution of risk mention, and because typical risk aversion is said to be exponential.

The 2nd Segment is the most compliant to quarantine as it also suffers relatively less from being alone. The 3rd Segment also has a relatively low health concern, and more job preservation issue, so that it complies more with social distancing than quarantine.

Table 6. NPI compliance by European employees, per risk segments

Segment	1	2	3	4	5
NPI	77%	78%	70%	76%	68%
I comply with the recommendations for physical distancing	77%	78%	72%	78%	72%
I comply with the restrictions to stay home	79%	81%	68%	76%	64%
I wash hands for 20 seconds when necessary	76%	75%	69%	75%	69%

3.2. Cluster belonging

The above demonstrates that a factor such as NPI compliance is a good marker as to where an employee lies in terms of a risk-perceptual segment. Here, we formally test factors as markers of segmentation. We include socio-economic drivers, as they are well known to impact attitudes and risk expression (e.g. Dryhurst et al., 2020; Papageorge et al., 2020), as well as condition the ability to work remotely (Sostero et al., 2020).[18]

The detail of each logit regression per segment is presented in Appendix 2. Table 7 synthesizes the results, presenting only markers that are statistically significant at the 10% statistical threshold, and omitting country effect and constant. For simplicity, we also have regrouped factors into 4 major categories (trust, NPI compliance, vulnerability, and lifestyle). A negative sign means a lower impact on the probability to belong to a segment.

Regarding socio-demographics, neither the kid's family composition nor gender has any impact. Income, type of location (countryside or not), as well as education, play a role, as expected.

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[18] In this sample, we neither have information on the rank of the employees, nor her work status (part versus full time, and home or site working). In other work (Bughin and Cincera, 2020), we test this specifically in the context of the French market. On-site workers are indeed significantly more health-stressed related (a FOG effect). Higher rank employees are less prone to risk perception, but a part of this is linked to their higher propensity to work from home. In general, the work location effect exists, but is a minor driver of the full risk perception.

Low income (less than 2,000 Euro per month) reduces the likelihood to belong to the 5th Segment. One reason, already highlighted in the introduction of this study, is that lower-income is often associated with essential work, exposing people more to health risks and vulnerability to the virus. Leaving in the countryside (in places with less than 100,000 inhabitants) makes an employee less likely to belong to the 3rd Segment. Education achievement plays on the likelihood to belong to various segments.

Table 7. Probit estimates of risk segment belonging

Segment	1		2		3		4		5	
	coeff.	s.e.	coeff.	s.e.	coeff.	s.e.	coeff.	s.e.	coeff.	s.e.
1.Trust in institutions	-0.2	0.082	0.15	0.09			-0.24	0.08	0.45	0.1
4. Trust in Healthcare			-0.4	0.13	-0.33	0.13	0.67	0.13		
6. Trust in people	-0.42	0.123	0.24	0.13					0.26	0.15
2. NPI compliance	0.7	0.123	0.64	0.16	-0.46	0.12	0.51	0.13	-0.63	0.14
5. Extra caution	0.15	0.058	0.28	0.06	-0.27	0.07	-0.17	0.06	-0.16	0.08
8. Vulnerability	0.72	0.123	0.51	0.09	-0.72	0.08	0.37	0.07	-0.91	0.09
9. Covid top priority	0.46	0.067	-0.5	0.13						
10. Covid duration										
Social Fabric/citizenship							-0.31	0.11	-1.77	0.16
Lifestyle maintenance				0.07	0.16	0.07	-0.15	0.07	-0.48	0.09
Primary school	-0.74	0.442	0.85	0.38						
Middle school			0.38	0.21						
Vocational									-0.26	0.16
High school			0.24	0.14						
< 100,000 habitants					-0.29	0.12				
< 2,000 euros/month									-0.53	0.26

Of interest are the markers of trust, NPI, vulnerability, and lifestyle. As expected, vulnerability perception is a significant discriminant across all segments, as it drives health risk.

NPI compliance (and extra caution) are behaviors emerging out of health risk, but we see that they play a role on top of vulnerability. One reason is that NPI has been imposed as a government mandate response, and thus, NPI here also captures the compliance to authoritative measures.

Trust matters for each segment too, and especially the mix determines what segment an employee will belong to. Segments 1 and 3 are especially less inclined to accept their government actions to fight the Covid-19 pandemic. The 1st Segment is also a segment that is more trusting its peers than institutions for example.

Using the exponential of point estimates of Table 7, we can compute the marginal probability impact for the four categories of markers in Table 8. It becomes apparent that markers can truly discriminate among segments. Consider one employee among many with low institutions trust, which further complies to NPI, and is feeling vulnerable to the virus, belongs to the 1st Segment. The true mirror opposite belongs to the 5th Segment. Those two segments are also the most and least fragile among employees. One who is not scared too much about the virus trusts the healthcare system and complies with NPI while keeping its healthy lifestyle habit belongs to the 4th Segment.

Table 8. How markers determine risk segments associated with Covid-19

Segment	1	2	3	4	5
Trust	-18%	4%	-9%	25%	29%
NPI	59%	61%	-30%	26%	-31%
Virus dangerouness	55%	9%	-17%	15%	-20%
Lifestyle	0%	48%	66%	53%	-7%
Total	96%	122%	10%	118%	-29%

What is also crucial about those segments is that the 5th Segment may be less fragile, but may cause a risk to other segments, given low NPI compliance. Likewise, the 4th Segment may be ok with the Covid related health situation but is more stressed about jobs. The 1st Segment, and to a lesser extent the 2nd Segment, are rather stressed, and the physical and psychological health and, to a lesser extent, wealth are three considerations that employers should consider keeping those segments productive.

3.3. Country specificities

A final note concerns differences among countries, as, among others, it has been seen that the most / read least fragile segments size happens in South/ read Northern, Europe.

One reason for this is likely because of contrasts in the type of lockdown imposed, in the urgency of the sanitary crisis, as well as incapacity of the healthcare system.

In general, there could also be some key country nuance within segments. Table 9 illustrates the markers' impact on the most fragile employee segment in the five respective countries. As for the total, higher NPI compliance, higher Covid-19 vulnerability perception, strong social fabric, or lifestyle maintenance, are common to all countries.

Still, Spain discriminates in terms of trust in people versus the government, Sweden in terms of NPI compliance and social fabric, while German employees in the 1st Segment are biased towards more health than wealth in terms of social priority. Again, those can be traced to culture and background. Sweden has a large social culture versus the other countries (Esping-Andersen, 1999), and has not imposed lockdown. Thus, NPI compliance by Swedish employees is likely to be a more clear-cut discriminant behavior than in countries where NPI has been imposed.

Table 9. Marginal probability to belong to most fragile segment (Segment 1)

	Sweden	Germany	France	Spain	Italy
Trust in government				-33%	
Trust in healthcare					
Trust in people				95%	
NPI compliance	369%	191%	208%	132%	252%
Extra caution					
Vulnerability	247%	300%	185%	155%	278%
Top priority	0%	252%	0%	87%	136%
Duration					
Social fabric	753%	278%	397%	480%	272%
Lifestyle maintenance	116%	99%	107%	116%	108%

Note: Only statistically significant coefficients at 10% included.

Country differences thus prevail, but in general, a large set of common drivers allows to segment the workforce fragility and state of mind, across different countries.

4. Discussion and conclusion

For the workforce of an economy, the total number of physical contacts at work may be as important as the number of contacts at home. For the society at large, employees thus stand for a non-negligible channel of large contagion hazard and risk for absenteeism for companies. Further, the risk is not only health-based, and is much broader, including psychological stress, or job preservation worries, that, if not accounted for, may adversely affect productivity. The later worries can remain even if people telework, in which case, other stress may emerge, like at-home violence, or more.

We confirm in this research that the type of stress affecting the workforce is rather broad and that it goes beyond the pure physical health effect of the pandemic of Covid-19. Among 16 indicators of stress, the average worker reports to be affected by more than 9. We further show that the fragility of the workforce is not evenly distributed, with close to 20% of employees bearing 90% of the breadth of risk mentions by workers.

Using clustering techniques, we find five clear-cut segments that can be identified through a set of key markers. Those markers give not only an indication of fragility but how Human resources should engage in the appropriate selective dialogue with the various workers. For the human resources of companies, this is a potentially powerful tool to better engage with the workforce, improve their well-being during this pandemic. This is not only a question of corporate responsibility. This is one that may help keep high productivity and resilience for companies.

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APPENDIX 1. Tested statements

BEHAVIOR

1. I actively encourage others to follow the restrictions and guidelines
2. I comply with the recommendations for physical distancing
3. I comply with the restrictions to stay home
4. I disinfect groceries before putting them away
5. I disinfect mail and deliveries before opening them
6. I wash hands for 20 seconds when necessary
7. I would like to help people who are more vulnerable to COVID-19
8. Since COVID-19 I eat healthier
9. Since COVID-19 I eat unhealthier
10. Since COVID-19 I exercise less
11. Since COVID-19 I exercise at home more
12. When a COVID-19 vaccine is available, I'd like to be vaccinated

EMOTIONS

13. I'm worried about my financial situation
14. I'm worried about my job situation
15. I'm worried that our country will run out of money
16. I'm worried that there will not be enough basic necessities in the stores
17. I am worried about my own health
18. I am worried about the health of my children
19. I am worried about the health of my older family members
20. I am worried about the health of people in my country
21. I worry that there will be an increase in break-ins and thefts
22. I'm worried about my children's education
23. I am anxious about not being able to meet with friends
24. I am worried about not being able to meet with my family
25. I worry how living in isolation will affect me
26. Living in isolation negatively impacts my wellbeing

OPINIONS

27. The COVID-19 outbreak will make society more unequal
28. Being together all the time increases family tensions
29. COVID-19 increases domestic violence
30. COVID-19 will increase divorce rates
31. COVID-19 will bring countries closer
32. I am grateful to our essential workers
33. I am grateful to our healthcare professionals
34. My chance of getting COVID-19 is high
35. Slowing the spread of COVID-19 is more important than the economy
36. Coronavirus is dangerous for my health
37. Media exaggerate the situation with COVID-19
38. Media provide reliable information about the pandemic
39. [The President] is doing a good job dealing with COVID-19
40. I am satisfied with how my government is handling this crisis
41. The government is doing a good job dealing with COVID-19
42. I am satisfied with how our healthcare system is handling this crisis
43. In the case of coronavirus infection, I will get appropriate medical help
44. The government discloses real numbers of coronavirus infections and deaths
45. COVID-19 reveals the best in people
46. COVID-19 reveals the worse in people
47. I believe we will beat COVID-19 soon
48. People will stop following the restrictions soon
49. The restrictions caused by COVID-19 will continue at least until the fall
50. The restrictions caused by COVID-19 will continue for about a month

APPENDIX 2. Probit estimates

CLUSTER 1 [K-Means 5 clusters for risk perception RTC][a]	B	Std. Error	Wald	df	Sig.	Exp(B)	95% Confidence Interval for Exp(B)	
							Lower Bound	Upper Bound
Intercept	-2.478	0.203	149.006	1	0.000			
[Gender - Male=1,00]	-0.223	0.107	4.364	1	0.037	0.800	0.649	0.986
[Gender - Male=2,00]	0[b]			0				
[Kids - 0 children=1,00]	-0.293	0.112	6.823	1	0.009	0.746	0.599	0.929
[Kids - 0 children=2,00]	0[b]			0				
[Income - <20000€=1,00]	0.303	0.117	6.664	1	0.010	1.354	1.076	1.704
[Income - <20000€=2,00]	0[b]			0				
[Quarantine - yes=1,00]	-0.366	0.176	4.339	1	0.037	0.693	0.491	0.979
[Quarantine - yes=2,00]	0[b]			0				
Factor02_RTC - Compliance	0.517	0.154	11.321	1	0.001	1.677	1.241	2.266
Factor03_RTC - Social citizenship	1.428	0.126	129.322	1	0.000	4.171	3.261	5.335
Factor05_RTC - Extra caution	0.166	0.060	7.560	1	0.006	1.180	1.049	1.328
Factor06_RTC - Bad in people	0.585	0.120	23.933	1	0.000	1.795	1.420	2.269
Factor07_RTC - Lifestyle impact	0.641	0.070	83.711	1	0.000	1.899	1.655	2.179
Factor08_RTC - Percived vulnerability	0.570	0.083	46.882	1	0.000	1.768	1.502	2.081
Factor09_RTC - Fighting Covid top priority	0.594	0.125	22.384	1	0.000	1.811	1.416	2.315
Factor10_RTC - Predictions	0.298	0.121	6.087	1	0.014	1.347	1.063	1.708
GAP_INF [mean Std-RT from 16 risk perception attributes]	-4.019	0.292	188.861	1	0.000	0.018	0.010	0.032

a. The reference category is other clusters.
b. This parameter is set to zero because it is redundant.

APPENDIX 2. Probit estimates

CLUSTER 2 [K-Means 5 clusters for risk perception RTC][a]	B	Std. Error	Wald	df	Sig.	Exp(B)	95% Confidence Interval for Exp(B)	
							Lower Bound	Upper Bound
Intercept	-2.170	0.185	137.545	1	0.000			
[country_DE=1,00]	-0.462	0.171	7.261	1	0.007	0.630	0.450	0.882
[country_DE=2,00]	0[b]			0				
[country_IT=1,00]	0.474	0.137	12.067	1	0.001	1.607	1.230	2.100
[country_IT=2,00]	0[b]			0				
[Edu - Bachelor or higher=1,00]	-0.294	0.121	5.907	1	0.015	0.745	0.588	0.945
[Edu - Bachelor or higher=2,00]	0[b]			0				
[Infected - don't want to answer=1,00]	-20.349	0.000		1		1.455E-09	1.455E-09	1.455E-09
[Infected - don't want to answer=2,00]	0[b]			0				
Factor02_RTC - Compliance	0.628	0.151	17.220	1	0.000	1.874	1.393	2.522
Factor04_RTC - Trust in healthcare	-0.426	0.121	12.470	1	0.000	0.653	0.516	0.827
Factor05_RTC - Extra caution	0.327	0.060	29.954	1	0.000	1.387	1.234	1.560
Factor06_RTC - Bad in people	-0.270	0.119	5.147	1	0.023	0.763	0.604	0.964
Factor07_RTC - Lifestyle impact	-0.330	0.076	19.008	1	0.000	0.719	0.620	0.834
Factor08_RTC - Percived vulnerability	0.585	0.091	41.352	1	0.000	1.794	1.502	2.144
Factor09_RTC - Fighting Covid top priority	-0.449	0.129	12.041	1	0.001	0.638	0.495	0.823
GAP_INF [mean Std-RT from 16 risk perception attributes]	1.869	0.273	46.747	1	0.000	6.484	3.794	11.081

a. The reference category is other clusters.
b. This parameter is set to zero because it is redundant.

APPENDIX 2. Probit estimates

CLUSTER 3 [K-Means 5 clusters for risk perception RTC][a]	B	Std. Error	Wald	df	Sig.	Exp(B)	95% Confidence Interval for Exp(B)	
							Lower Bound	Upper Bound
Intercept	-1.414	0.157	80.696	1	0.000			
[Gender - Female=1,00]	0.277	0.116	5.672	1	0.017	1.319	1.050	1.656
[Gender - Female=2,00]	0[b]			0				
[Age - 50-64=1,00]	-0.313	0.133	5.505	1	0.019	0.731	0.563	0.950
[Age - 50-64=2,00]	0[b]			0				
[Kids - 0 children=1,00]	0.458	0.118	15.050	1	0.000	1.581	1.254	1.993
[Kids - 0 children=2,00]	0[b]			0				
[Town - >100000 inhab.=1,00]	0.275	0.116	5.665	1	0.017	1.317	1.050	1.652
[Town - >100000 inhab.=2,00]	0[b]			0				
[Income - <20000€=1,00]	0.270	0.127	4.568	1	0.033	1.311	1.023	1.679
[Income - <20000€=2,00]	0[b]			0				
Factor02_RTC - Compliance	-0.426	0.118	13.018	1	0.000	0.653	0.518	0.823
Factor04_RTC - Trust in healthcare	-0.544	0.119	21.037	1	0.000	0.580	0.460	0.732
Factor05_RTC - Extra caution	-0.246	0.066	14.087	1	0.000	0.782	0.688	0.889
Factor07_RTC - Lifestyle impact	0.182	0.073	6.233	1	0.013	1.200	1.040	1.385
Factor08_RTC - Percived vulnerability	-0.759	0.079	91.549	1	0.000	0.468	0.401	0.547
GAP_INF [mean Std-RT from 16 risk perception attributes]	1.617	0.272	35.204	1	0.000	5.037	2.953	8.592

a. The reference category is other clusters.
b. This parameter is set to zero because it is redundant.

APPENDIX 2. Probit estimates

CLUSTER 4 [K-Means 5 clusters for risk perception RTC][a]	B	Std. Error	Wald	df	Sig.	Exp(B)	95% Confidence Interval for Exp(B)	
							Lower Bound	Upper Bound
Intercept	-2.262	0.168	181.827	1	0.000			
[country_IT=1,00]	-0.504	0.142	12.616	1	0.000	0.604	0.458	0.798
[country_IT=2,00]	0[b]			0				
[country_SE=1,00]	-0.401	0.141	8.102	1	0.004	0.670	0.508	0.883
[country_SE=2,00]	0[b]			0				
[Kids - 2 children=1,00]	0.254	0.119	4.580	1	0.032	1.289	1.022	1.627
[Kids - 2 children=2,00]	0[b]			0				
[Town - <100000 inhab.=1,00]	0.221	0.099	4.921	1	0.027	1.247	1.026	1.515
[Town - <100000 inhab.=2,00]	0[b]			0				
[Income - <20000€=1,00]	-0.341	0.115	8.840	1	0.003	0.711	0.568	0.890
[Income - <20000€=2,00]	0[b]			0				
Factor02_RTC - Compliance	0.684	0.130	27.704	1	0.000	1.981	1.536	2.555
Factor03_RTC - Social citizenship	-0.410	0.107	14.754	1	0.000	0.664	0.539	0.818
Factor04_RTC - Trust in healthcare	0.363	0.113	10.322	1	0.001	1.437	1.152	1.793
Factor05_RTC - Extra caution	-0.189	0.058	10.460	1	0.001	0.828	0.738	0.928
Factor07_RTC - Lifestyle impact	-0.146	0.063	5.344	1	0.021	0.864	0.763	0.978
Factor08_RTC - Percived vulnerability	0.399	0.074	29.431	1	0.000	1.491	1.291	1.722
GAP_INF [mean Std-RT from 16 risk perception attributes]	0.499	0.237	4.410	1	0.036	1.646	1.034	2.622

a. The reference category is other clusters.
b. This parameter is set to zero because it is redundant.

APPENDIX 2. Probit estimates

CLUSTER 5 [K-Means 5 clusters for risk perception RTC][a]	B	Std. Error	Wald	df	Sig.	Exp(B)	95% Confidence Interval for Exp(B)	
							Lower Bound	Upper Bound
Intercept	-0.912	0.144	40.127	1	0.000			
[country_ES=1,00]	-0.622	0.222	7.876	1	0.005	0.537	0.347	0.829
[country_ES=2,00]	0[b]			0				
[country_SE=1,00]	0.537	0.147	13.251	1	0.000	1.710	1.281	2.283
[country_SE=2,00]	0[b]			0				
[Gender - Female=1,00]	-0.458	0.126	13.175	1	0.000	0.633	0.494	0.810
[Gender - Female=2,00]	0[b]			0				
[Income - <20000€=1,00]	-0.391	0.149	6.880	1	0.009	0.676	0.505	0.906
[Income - <20000€=2,00]	0[b]			0				
Factor01_RTC - Trust in Government	0.394	0.087	20.280	1	0.000	1.483	1.249	1.760
Factor02_RTC - Compliance	-0.555	0.127	19.069	1	0.000	0.574	0.448	0.737
Factor03_RTC - Social citizenship	-1.822	0.144	161.056	1	0.000	0.162	0.122	0.214
Factor06_RTC - Bad in people	-0.326	0.134	5.901	1	0.015	0.722	0.555	0.939
Factor07_RTC - Lifestyle impact	-0.456	0.084	29.378	1	0.000	0.634	0.537	0.747
Factor08_RTC - Percived vulnerability	-0.865	0.085	103.806	1	0.000	0.421	0.356	0.497
GAP_INF [mean Std-RT from 16 risk perception attributes]	1.119	0.305	13.458	1	0.000	3.063	1.684	5.570

a. The reference category is other clusters.
b. This parameter is set to zero because it is redundant.

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