The determinants of the willingness to install a tracing App

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A tracing application is a technological mechanism that, combined with other interventions such as manual tracing, use of masks, limiting mass groupings, etc., reduces the risk of contamination by alerting all persons who may have been infected if the user of the application was diagnosed positive for coronavirus and to warn that user if he or she had been in contact with a person diagnosed positive.

This type of application has been widely discussed since the beginning of the Covid-19 epidemic, and some countries have made use of it on a voluntary basis (Singapore, South Korea) or on a more mandatory basis (China). [1] This illustrates both different policy options from local governments, but also deep differences in populations' norms of behavior and way of handling public issues. [2] The analysis of the advantages and disadvantages of tracing applications at the health level but also at the broader societal level involves considering many aspects of tracing: technological, legal, incentive, economic, cultural, etc. In France, the hypothesis of its use has given rise to intense debate, with many opinion columns alternately for and against being published in the press, and a strong polarization of opinion.

The purpose of this note is simply to explain a certain number of elements relating to the economic and incentive aspects of tracing applications. The first aspect that distinguishes the current pandemic from other past situations is the extreme globalization that characterizes it, not only at the health level, but also at the informational and emotional level. Information on the evolution of the pandemic, on the medical aspects, the search for appropriate care, the responses of public authorities around the world, the political and economic reactions, is available in abundance and in real time. This overload of information

has an impact on the nature of public policies and how the public perceives them.

It is in this highly charged informational context that populations are potentially solicited for a whole series of more or less constraining or coercive measures. In France, the adoption of a tracing application can only be done on a voluntary basis. The potential response of the population therefore depends crucially on the motivations of the individuals who will be asked to install such an application.

In a previous blog post, Mathieu Moslonka-Lefebvre analyses the epidemiological aspects that determine the potential effectiveness of a tracing application. As indicated at the end of his post, one of the outstanding issues is related to the existence of « super spreaders ». This means that the by-now famous R0 parameter, which measures the number of people contaminated *on average* by an infected person, in fact hides significant asymmetry. To give an extreme example, an R0 of 2 may mean that every infected person contaminates 2 others, or that out of 10 infected persons, 9 do not contaminate anyone, and the tenth person contaminates 20 other persons. This is captured by what is called the “dispersion factor”.

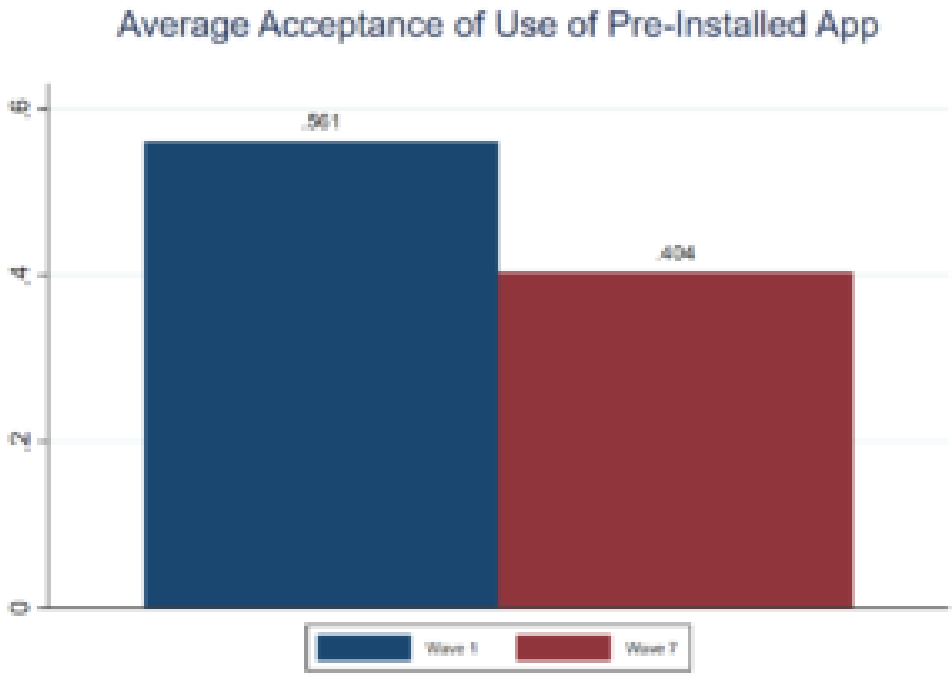
The existence of significant dispersion would explain the periodic occurrence of what has been called super-spreading events, and also that the epidemic started in France only in February 2020, despite cases having been retrospectively identified as early as December.

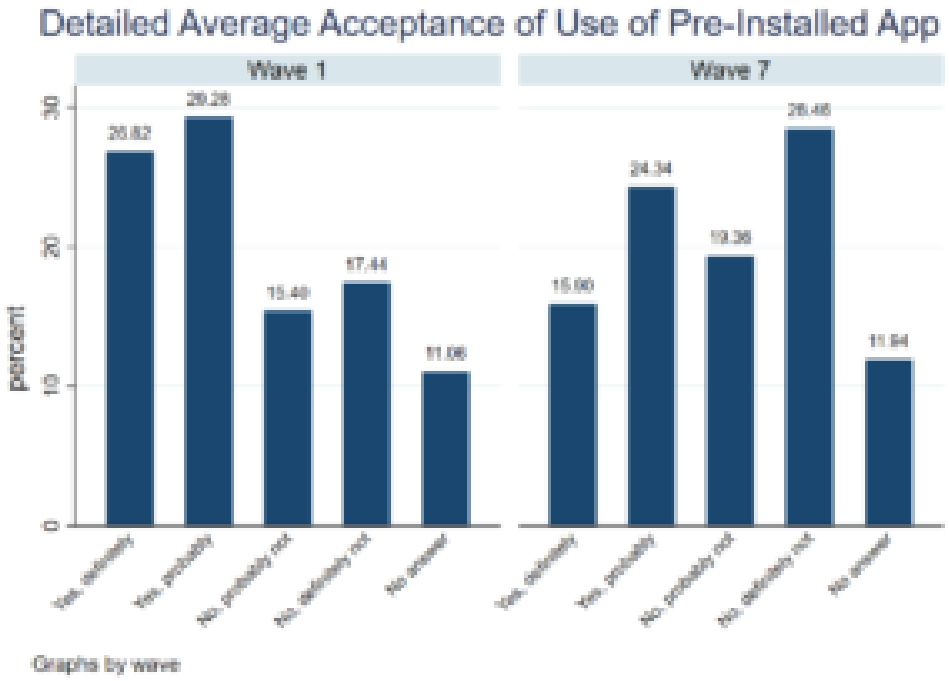
Assuming that such dispersion is non-negligible, policy interventions are then more likely to be effective if they manage to target individuals at greater risk of passing the virus on. Some are obvious and within the public realm, such as the banning of large public gathering. Others, such as the use of a tracing App, are less easy to manipulate, because they crucially depend on individuals’ decisions.

In what follows, we make use of data from two waves of the Baromètre Covid 19 to illustrate who are the individuals more likely to use the tracing application launched by the French government, and what it tells us about the issue above. A question relative to the willingness to download the App was asked in wave 1 between April 7 and April 11. It was repeated in wave 7 from May 26 to May 31. The raw data provide two initial pieces of information (Figure 1). First, overall acceptance of the App is rather low in France. Between on third and half of respondents do not intend to install it depending on the time they were asked. Second, the share of people willing to use the App, computed as the sum of those answering ‘Yes, definitely’ and ‘Yes, probably’, has decreased a lot over time (minus 16 points).

In addition, the right panel of Figure 1 shows that this evolution has been the result of both a sharp decline in the share of people answering ‘Yes, definitely’ and a sharp increase in those saying ‘No, definitely’, while answers involving ‘probably’ were more stable across time. This is in line with the polarization of the topic in the public discourse.

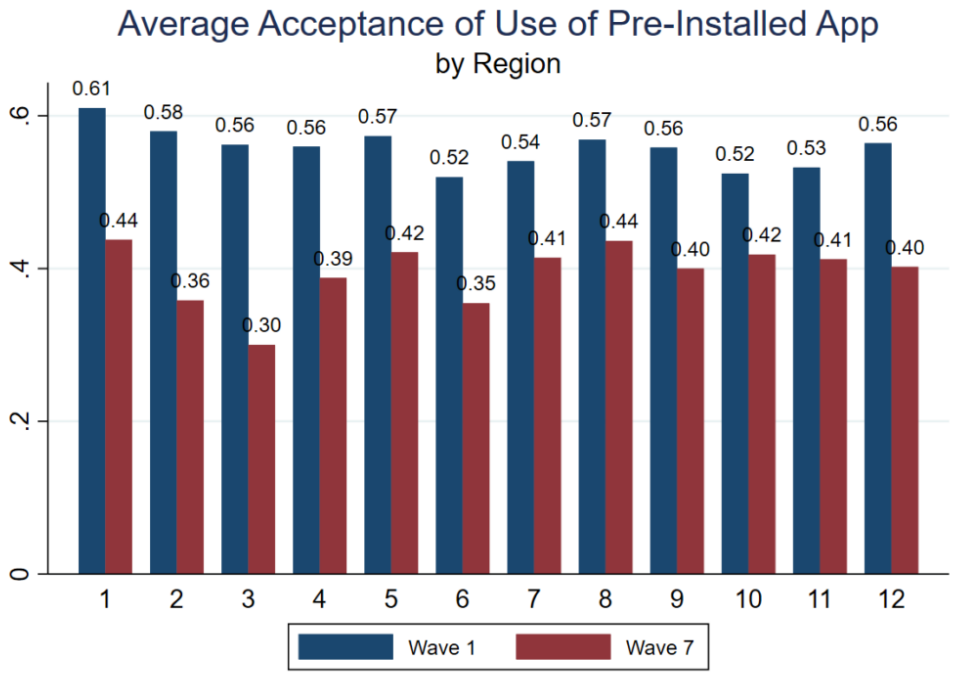
Fig 1: Overall acceptance of a tracing application

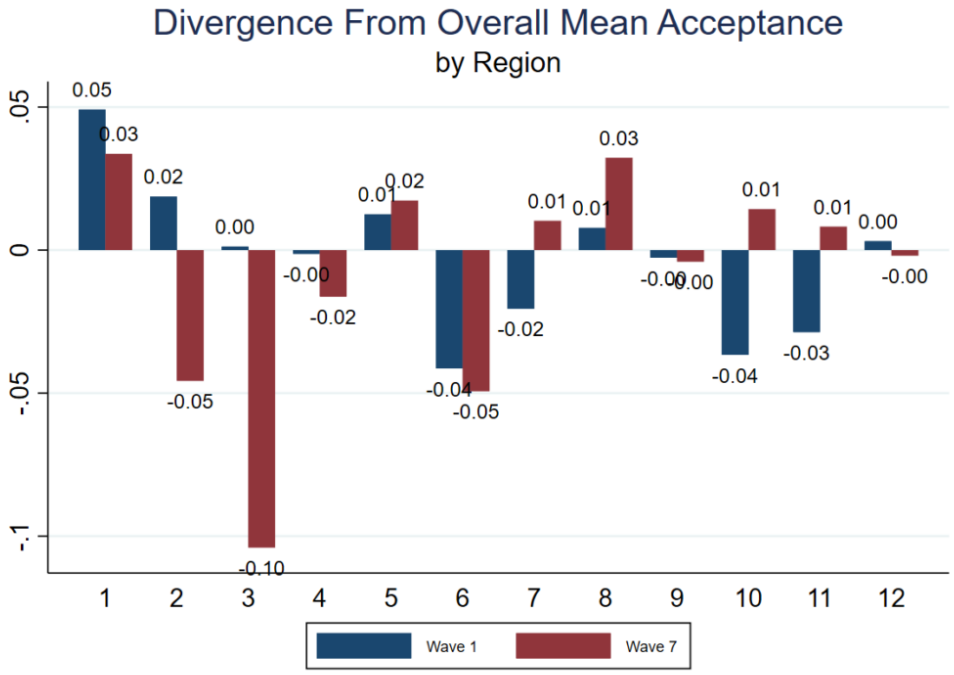




This overall level of acceptance appears to be quite uniform across regions, and there is no clear pattern regarding for example the local severity of the epidemic (Figure 2). Taking two of the hardest-hit regions, l'Ile-de-France (1) and Grand Est (6) shows while the level of acceptance is slightly higher than the general average in the former, it is lower in the latter.

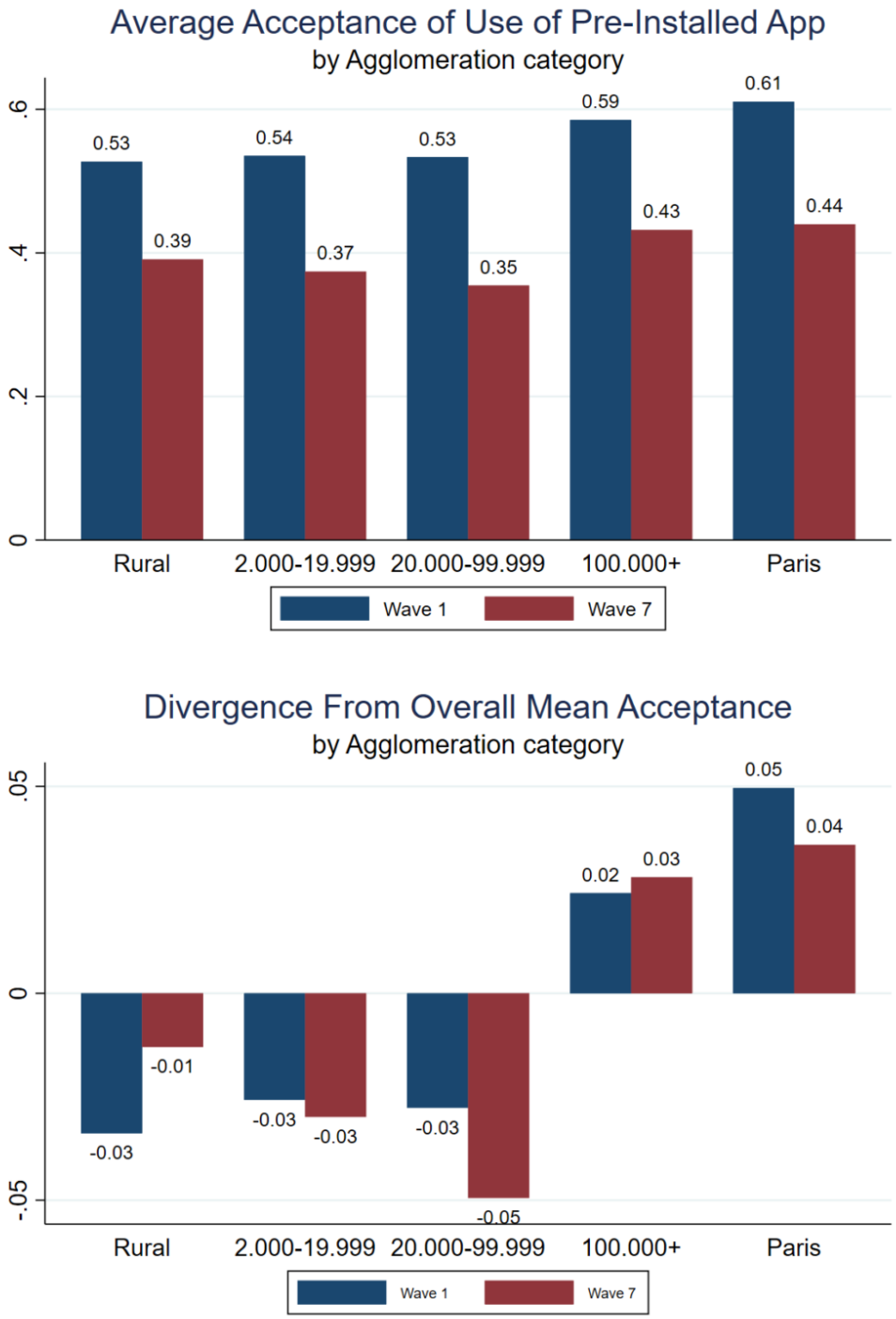
Fig 2: Acceptance of a tracing application across regions





It seems, however, that people living in bigger agglomerations are on average more willing to install and use the App (Figure 3).

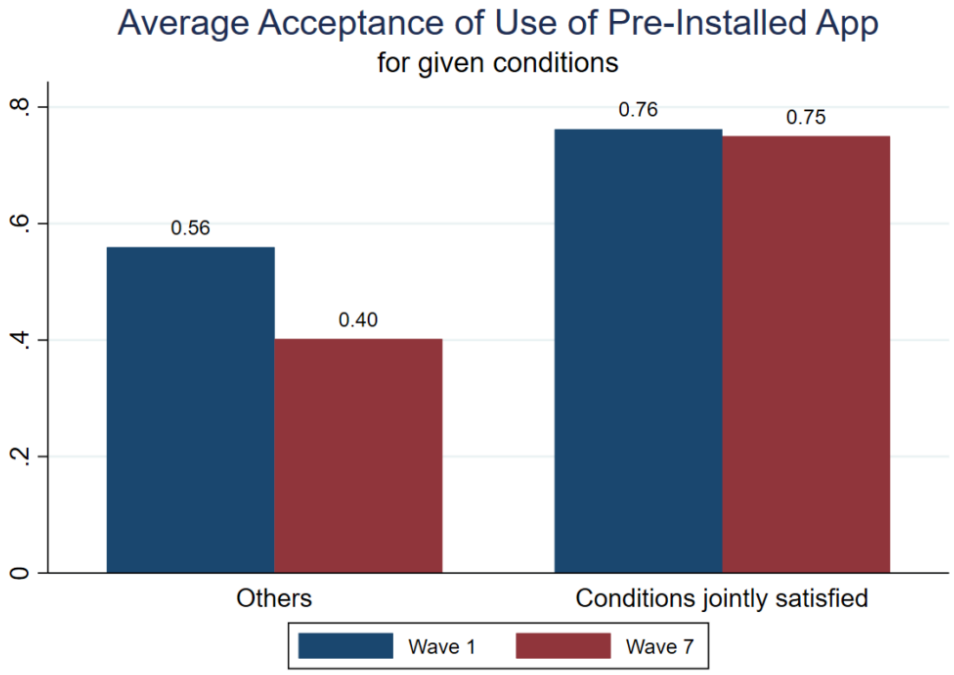
Fig 3: Acceptance of a tracing application across agglomeration size

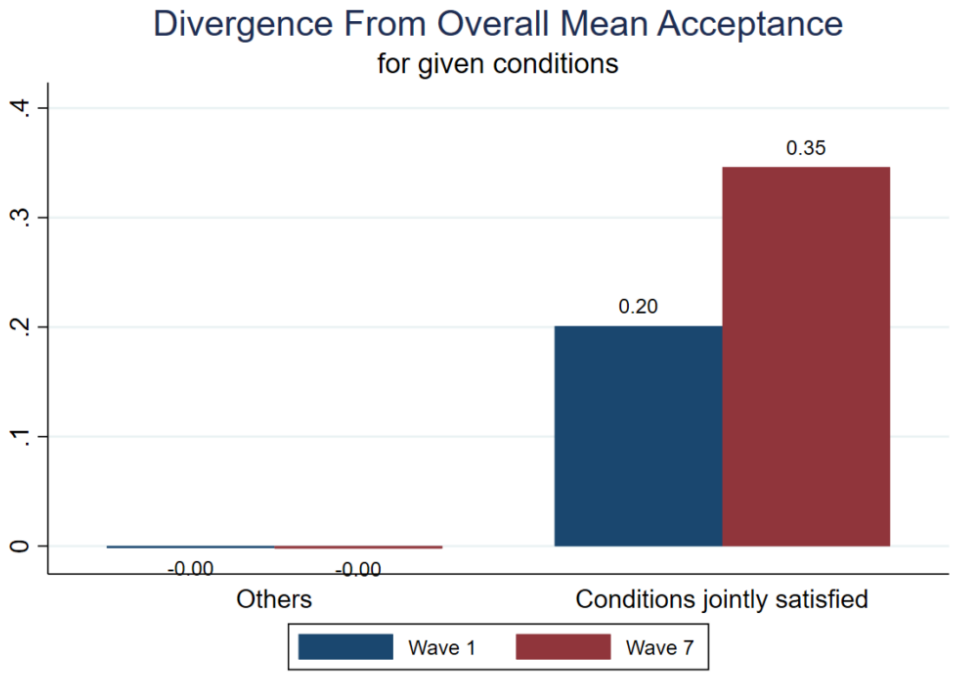


Still looking at average acceptance, a few other markers are noteworthy. In general, people

more willing to install a tracing App are male, younger, actively working. They are also more likely to have some previous health condition, to assess the epidemic as severe, to respect barrier gestures, and more likely to have been in contact with persons who tested positive to Covid-19, were hospitalized, or died. In Figure 4, we compare average acceptance levels for individuals who cumulate all the determinants above (202 individuals in total). They are both much more likely to be favorable to the App, but it is also noteworthy that their acceptance level did not decrease in line with the general population between waves 1 and 7.

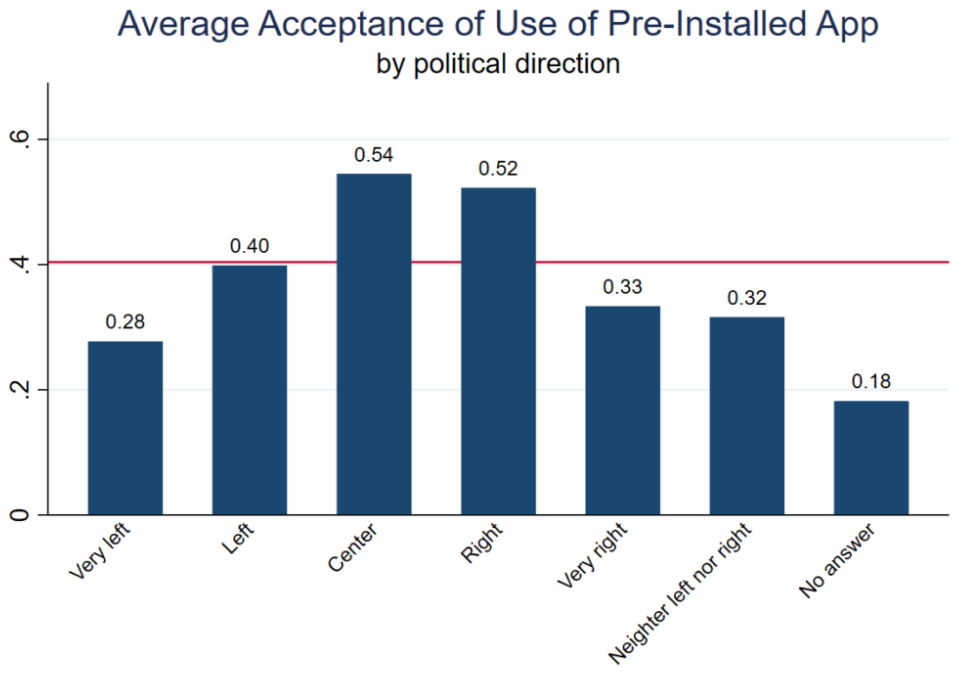
Fig 4: Acceptance of a tracing application by young males, actively working

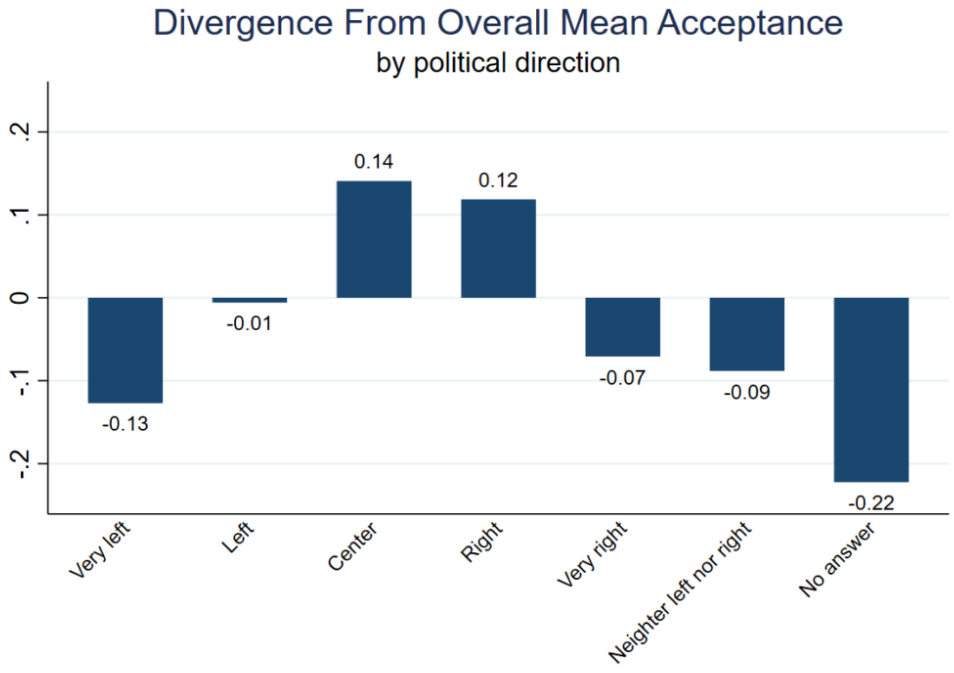




Finally, and we find this quite interesting, people who declare a political orientation at one of the extreme of the political spectrum (extreme right or extreme left) appear to be much less favorable to the tracing App (Figure 5). Note that the question on political beliefs was only asked in the first wave of the barometer.

Fig 5: Acceptance of a tracing application by political orientation





To assess more precisely the role of personal characteristics and behavior, we conducted some econometric analysis using the individual data. First, we note from the previous graphs that the acceptance is subject to strong level effects. We therefore perform simple

probit estimates of individual responses, using the complete barometer data. This analysis must be considered correlational in nature, because it does not allow us to control for individual characteristics that are not directly observed or reported in the barometer.

Table 1 reports a simple probit analysis using the answers from the seventh wave of the barometer. The results indicate that the following variables correlate with a higher reported willingness to install a tracing App: assessing the epidemic as severe, respecting barrier gestures, and being more likely to have been in contact with persons who tested positive to Covid-19, were hospitalized, or died. It also sustains the negative impact of age and of extreme political views.

Table 1: Marginal Effects Probit Model Wave 7

	Acceptance App
Age	
45 - 49	-0.0918*** (0.0277)
50 - 54	-0.0821*** (0.0287)
55 - 59	-0.0839*** (0.0239)
60 - 64	-0.0581*** (0.0185)
65 +	-0.0445*** (0.0169)
Been in contact with tested positive	0.0495*** (0.0164)
Know person who was hospitalized/died	0.0827*** (0.0178)
Assess epidemic as severe	0.190*** (0.0224)
Implement barrier gestures	0.130*** (0.0322)
Nr. people in accommodation	0.0168*** (0.00632)
Political conviction*	

Very left	-0.351*** (0.0323)
Left	-0.167*** (0.0235)
Right	-0.0445** (0.0200)
Very right	-0.212*** (0.0370)
Neither left nor right	-0.239*** (0.0242)
No answer	-0.173 (0.124)
Observations	4353
Pseudo R2	0.059

** 'Center' is the reference category.*

****, **, and * indicate significance at the 1, 5, and 10 percent level.*

Standard errors are clustered at the region level.

This problem is hard to address, because the barometer is not a panel, meaning that it does not interview the same individuals across waves. In the final part below, we develop an analysis called "pseudo-panel", which groups individuals in subcategories sharing similar characteristics, to perform more robust estimations.

As mentioned above, the analysis so far must be considered to provide only correlations. One specific problem is the so-called "anchoring effect", which implies that even though individuals may experience the same level of acceptance, they may use different answers on the scale to report it. [3] In addition, other aspects in the environment, which we don't observe, may drive their answers to the acceptance question and some of the explanatory variables. For example, some individuals maybe intrinsically more risk averse, so that they report both a more severe assessment of the situation and a higher willingness to adopt the App. If that is the case, interpersonal comparisons of the type performed above are uninformative.

To address this, we move on to a "pseudo-panel analysis". We group individuals by

departement, gender, and age, which yields 466 representative groups. This allow us to introduce group "fixed effects," which in effect will control for any group-level dimensions that we do not observe and cannot control for because they are not covered by the survey (the level of risk aversion mentioned above, other beliefs, or medical knowledge are a few examples). It however only controls for such unobserved effects that are not changing over time. The interpretation is thus the following: significant effects correspond to how specific categories (gender-age groups in each department) react to the evolution of the situation by increasing or decreasing their willingness to use the App. Note that it is still possible that individuals' answers and behavior is driven by idiosyncratic effects that change over time as the environment evolves and that we do not observe. For this reason, all results must still be interpreted with precaution.

In the pseudo-panel results (Table 2), we expectedly find less characteristics to be significant. In fact, the only ones are the severity assessment, which continues to drive acceptance. On the other hand, the number of people an individual is in close contact with is negative an significant, indicating that given the evolution of the situation between wave 1 and 7, people having more such contacts become less willing to install a tracing App. The question about the location of work provides a similar result, although less strongly significant, with people working outside the home also becoming less likely to install the App.[4]

Table 2: Pseudo-Panel Fixed Effects Regression

	Acceptance App
Actively working	0.125 (0.115)
Working outside home	-0.128* (0.0669)
Think have been infected	0.129 (0.205)
Been in contact with tested positive	0.141 (0.109)
Assess epidemic as severe	0.496*** (0.150)
Implement barrier gestures	-0.109 (0.199)
Known health conditions	-0.0502 (0.117)

Nr. people in accommodation	-0.0202 (0.0146)
Nr. people close contact	-0.00885*** (0.00247)
Constant	0.217 (0.298)
Observations	466
R2	0.331

***, **, and * indicate significance at the 1, 5, and 10 percent level.

Standard errors are clustered at the region level.

What do we learn overall? First, there are strong level effects, so the acceptance an tracing App is likely to fluctuate widely over time depending on the evolution of the epidemic and other aspects of the environment. Acceptance was higher at the beginning of the confinement period, than later when déconfinement had begun and people probably perceived the main danger to be behind them.

Second, if anything, it seems that more cautious individuals are more likely to be willing to install the App, the more so the more they assess the evolution of the situation to be bad, while those getting more regular close contacts are less keen on it. This is probably bad news. In fact, in a context in which there is significant dispersion in the individuals' risk of contaminating others, a tracing App would be much more useful if those who are also more likely to be active spreaders were more likely to adopt it. The results seem to indicate exactly the opposite. More cautious people, having a greater sense of the danger and implementing barrier gestures more thoroughly, are both less likely to spread the virus and more likely to be users of the App, while people having more outside contacts are less likely to adopt it. It could of course be the case that in case of "second wave", the level effect mentioned above would generate more acceptance and drive overall usage up. It is however quite speculative given the available information.

Finally, the political results show the very important effects of the strong and antagonistic views that were expressed in the media before the launch of the App. While we don't have more recent data, the results from the "first wave" indicate that while 54 and 52 percent of individuals reporting themselves as center and right respectively (so more likely to be favorable to the current government) express a positive view on a tracing App, the share

among “very left” or “very right” individuals is only 28 and 33 percent respectively. The willingness to use a tracing App thus seems to respond as much to political beliefs and values as to actual assessments of its effectiveness.

1. https://www.ehess.fr/fr/carnet/prêts-pour-surveillance-algorithmique-en-permanence[↩]
2. Richard Nisbett. *The Geography oh Thought. How Asian and Westerners Think Differently…and Why*. Simon and Schuster, NY.[↩]
3. See for example Bertrand M. and S. Mullainathan, 2001, “Do People Mean What They Say? Implications for Subjective Survey Data”, American Economic Review, 91: 67-72 ; and Senik, C., 2004, “When Information Dominates Comparison. Learning from Russian Subjective Panel Data”, Journal of Public Economics, 88: 2099-2123.[↩]
4. This variable was excluded in the probit analysis of Table 1 because of too many missing observations. This problem is less severe when using group averages.[↩]