Increasing Trust in Research with Third-Party Reproducibility Certification: Evidence from France's Confidential Microdata

Keywords (5 max): process quality, confidential data, restricted data access, research reproducibility, open science

1. INTRODUCTION

France's restricted data center (CASD) launched in 2019 an innovative service allowing users of French confidential microdata available on CASD to request a reproducibility certification conducted by a fully-acredited trusted third party called *cascad* ([1]). The latter aims to duplicate the results by applying the same methodology to the same confidential microdata, which is the definition of reproducible research ([2], [3]). As shown in Figure 1, to conduct its verification work, the *cascad* reviewer accesses a copy of the exact same raw microdata that the original user and can rerun the code of the user to check whether he or she can reproduce the results (all tables and figures).

The lack of reproducibility has been recognized as a major shortcoming of modern science and a serious impediment for the diffusion of new ideas ([4], [5], [6]). It also severely reduces the usefulness of published results, as well as the trust that society places in scientific activities. A recent infamous example of societal distrust is the Mehra et al. (2020) international study on the effect of chloroquine on COVID-19 mortality published in *The Lancet* on May 22, 2020 and retracted two weeks later because the original data could not be made available to peer reviewers.[1]

Just like medical data, the use of confidential microdata, only available through restricted data access centers, makes very hard for other people to check the validity of a given analysis. In such a context, for example, it is hard to convince policy makers to base their decision on results which are hard to reproduce.

In this paper, we present how reproducibility certification enriches the restricted data ecosystem by increasing the quality of the process leading to the production of statistics and studies. It allows restricted-data users, conducting either academic, administrative or policy work, to signal the reproducible nature of their work. By doing so, they increase the reliability of their analyses and of the generated conclusions.

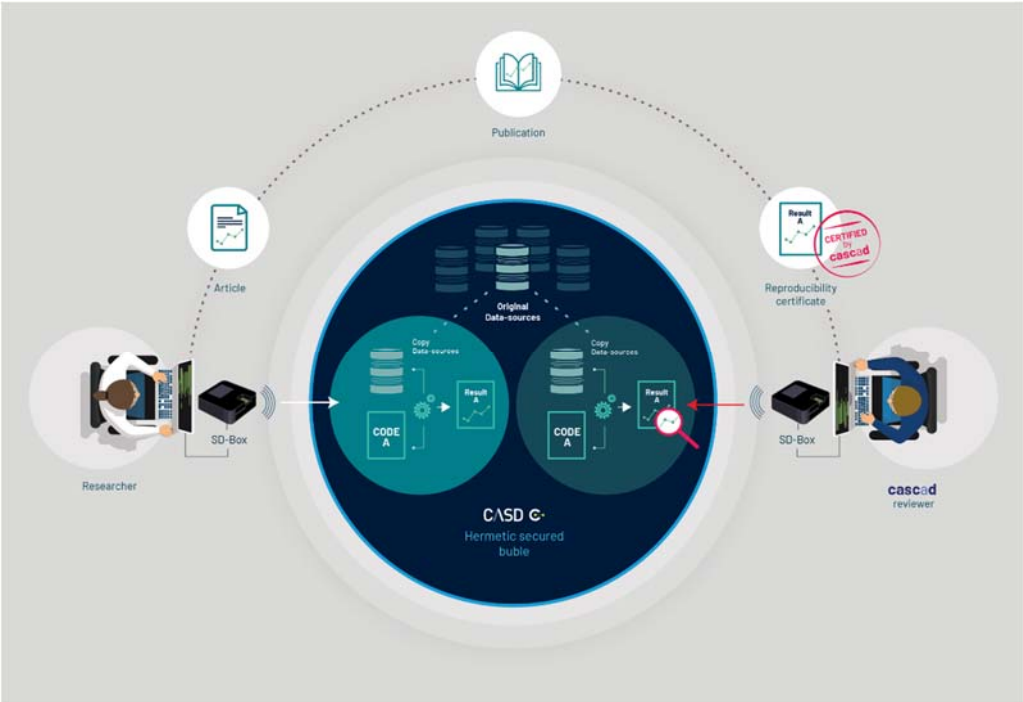
2. METHODS

We will present the technical solution which has been deployed (see Figure 1) as well as the roadblocks (legal, IT, cultural, etc) that we encountered. We will discuss various partnerships that have been put in place with scientific associations (American Economic Association) and academic journals (American Economic Review, American Economic Journal: Policy, etc). The whole process of certification is documented and the

[1] *"We launched an independent third-party peer review […] to replicate the analyses presented in the paper. Our independent peer reviewers informed us that Surgisphere would not transfer the full dataset […]. As such, our reviewers were not able to conduct an independent and private peer review […] Due to this unfortunate development, the authors request that the paper be retracted." The Lancet, June 4, 2020.*

environment used to conduct the certification is sealed and archived (including data, documentation, and code). Finally we will discuss the cost of conducting reproducible research based on confidential administrative data.

Figure 1: The CASD-cascad Technical Solution



3. RESULTS

We will present the resuts of our certification process. It is based on the comparison of the original results presented in a paper or in a report based on confidential data and the results reproduced by the *cascad* reviewer when using the exact same confidential data and same computer code (see Figure 2).

An other important contribution of this paper is to explain how reproducibility certification can increase process quality in the production of reliable statistics and analyses.

Figure 2: Comparing original results with results reproduced by cascad (discrepencies highlighted in orange)

Original :

	Wage growth quantiles				
	(1)	(2)	(3)	(4)	(5)
ICT_0	-.105***	-.105***	-.107***	-.121***	-.110***
	(.027)	(.018)	(.015)	(.018)	(.028)
Observations	4,972	4,972	4,972	4,972	4,972

Reproduced :

Wage growth quantiles					
	est1	est2	est3	est4	est5
ICT_0	-0.105***	-0.105***	-0.107***	-0.121***	-0.110***
	(0.025)	(0.017)	(0.015)	(0.016)	(0.031)
Observations	4,972	4,972	4,972	4,972	4,972

4. CONCLUSIONS

To the best of our knowledge, this partnership between a restricted data access center and a trusted third party is the first of its kind in the world. Although it was conducted within a specific jurisdiction (France), it may inspire other data producers, data access centers, research funding agencies, and data users in other parts of the world. This would allow them to increase the quality of the statistical analyses produced and, as a consequence, their usefulness to Society. Such an approach could also be applied to statistical processes used by NSIs or ONAs for certifying their statistics and results, hence improving citizens' trust in public statististics.

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