Economics Research Collaboration Patterns Before and After COVID

Willy Chen[1], Xiao Qiao[2] , Hanzhe Zhang[1]

Midwest Economics Association
March 23, 2024

MICHIGAN STATE
U N I V E R S I T Y

[1]Michigan State University
[2]City University of Hong Kong

As information technology advanced, research innovation and collaboration has become simpler than ever. Wutchty, Stefan, and Uzzi (2007) as well as other papers have shown that collaboration has been steadily increasing in research production.

As information technology advanced, research innovation and collaboration has become simpler than ever. Wutchty, Stefan, and Uzzi (2007) as well as other papers have shown that collaboration has been steadily increasing in research production.

With the advent of COVID, researchers everywhere were forced to adapt to a new mode of working...

As information technology advanced, research innovation and collaboration has become simpler than ever. Wutchty, Stefan, and Uzzi (2007) as well as other papers have shown that collaboration has been steadily increasing in research production.

With the advent of COVID, researchers everywhere were forced to adapt to a new mode of working...

How did COVID affect collaboration patterns in economics?

Consider a naive random utility model (McFadden 1974):

- r_s, r_m: The average return to a solo-authored paper (s) and a multi-authored paper (m)
- c_s, c_m: The average cost per author of producing a paper of each type
- $\varepsilon_{s,i}$, $\varepsilon_{m,i}$: Researcher i's idiosyncratic preference for each type of paper

The probability of being willing to participate in a collaboration:

$$P(r_m - r_s - c_m + c_s > \varepsilon_{s,i} - \varepsilon_{m,i})$$

Translates to the market share of multi-authored papers in aggregate data

Challenges

- Disruption of research activities ($c_s \uparrow$, $c_m \uparrow$)
- Strains on funding and resources ($c_s \uparrow$)
- Cancellation of conferences and meetings ($c_m \uparrow$)

Immediate Impacts of COVID on c_s and c_m

Challenges

- Disruption of research activities ($c_s \uparrow$, $c_m \uparrow$)
- Strains on funding and resources ($c_s \uparrow$)
- Cancellation of conferences and meetings ($c_m \uparrow$)

Opportunities

- Aggregate shift towards virtual collaboration ($c_m \downarrow$)
- Increased open science and data sharing ($c_s \downarrow$, $c_m \downarrow$)

- Were there more collaborations (multi-authored papers) during COVID?

- Were there more collaborations (multi-authored papers) during COVID?
- Were there more authors on each collaboration project?

- Were there more collaborations (multi-authored papers) during COVID?
- Were there more authors on each collaboration project?
- Were economists collaborating more or less with their immediate colleagues?

OpenAlex is a publication database similar to Scopus and Google Scholar

Data Source: OpenAlex 2001-2023

OpenAlex is a publication database similar to Scopus and Google Scholar

- Top 64 Economics Journal Publication (2001-2023)
- Working Papers from NBER, RePec, and SSRN (2010-2023)

OpenAlex is a publication database similar to Scopus and Google Scholar

- Top 64 Economics Journal Publication (2001-2023)
- Working Papers from NBER, RePec, and SSRN (2010-2023)

Constructed variables:

- Affiliation-HHI: Approximately the % probability that two randomly selected authors share an affiliation
- Intra-Affiliation: All authors share the same affiliation
- Major affiliation: The affiliation with which the most number of authors are affiliated with in the paper

Table 1: Summary Statistics by Year

	(1)	(2)	(3)	(4)	(5)	(6)
	All Years	2010-2014	2015-2019	2020	2021/22	2023
		Pre-COVID		COVID Shock	During COVID	After COVID
% Single-Authored	17.4	21.7	16.4	12.7	9.2	11.8
Number of Papers	420,837	166,345	188,481	33,334	54,669	11,342
Among Multi-Authored Papers						
Affiliation HHI	41.4	40.6	40.8	41.9	46.8	48.3
% Intra-Affiliation	12.2	12.3	12.1	11.5	16.4	13.5
% Authors in Major Affiliation	47.0	45.7	46.3	47.9	53.5	52.8
Number of Authors	3.2	2.7	3.1	3.5	4.4	3.3
% 4 or More Authors	23.1	14.1	22.2	29.8	44.9	31.3
% 5 or More Authors	10.4	4.3	8.4	13.3	30.8	12.3
% 6 or More Authors	6.6	2.0	4.6	8.1	23.9	6.3
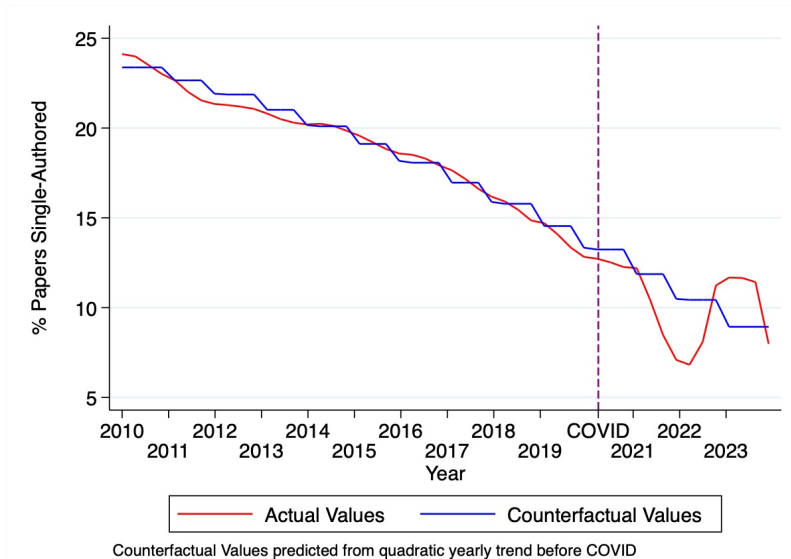
Counterfactual Values predicted from quadratic yearly trend before COVID
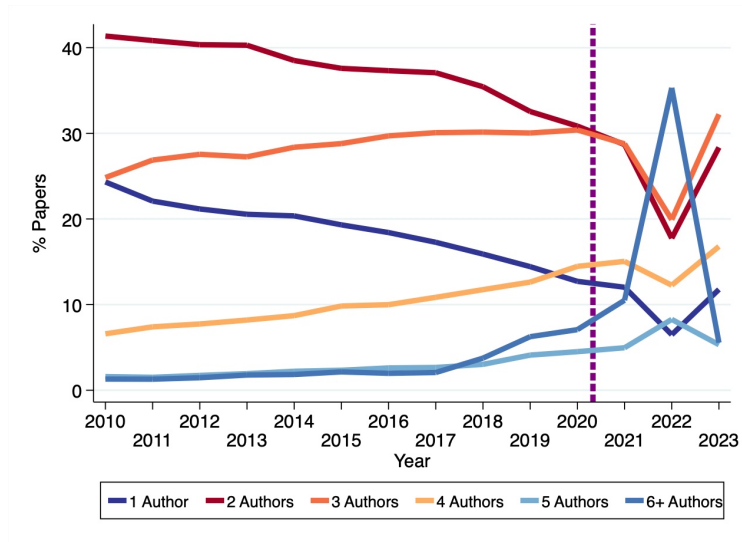
Table 2: Negative Effects of COVID on the Share of Single-Authored Papers during COVID, 2010-2023

	(1) % Single-Authored
Apr.-Dec. 2020	-1.35***
	(0.35)
2021	-0.75***
	(0.24)
2022	-5.28***
	(0.22)
2023	1.01***
	(0.35)
Yearly Trend	-1.01***
	(0.02)
Number of Papers	420,837
Pre-COVID Mean	19.06

Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 3: Effects of COVID on Number of Authors Multi-Authored Economics Working Papers, 2010-2023

	(1) % 2 or 3 Authors	(2) % 4 or 5 Authors	(3) % 6 or More Authors
Apr.-Dec. 2020	-4.37***	3.94***	0.44
	(0.51)	(0.47)	(0.28)
2021	-7.01***	1.89***	5.12***
	(0.36)	(0.32)	(0.23)
2022	-30.51***	0.15	30.36***
	(0.36)	(0.31)	(0.32)
2023	-0.57	2.27***	-1.69***
	(0.51)	(0.48)	(0.27)
Yearly Trend	-1.55***	0.97***	0.58***
	(0.02)	(0.02)	(0.01)
Number of Papers	347,521	347,521	347,521
Pre-COVID Mean	81.82	14.89	3.30

Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Increase in Intra-Institutional Collaboration during COVID
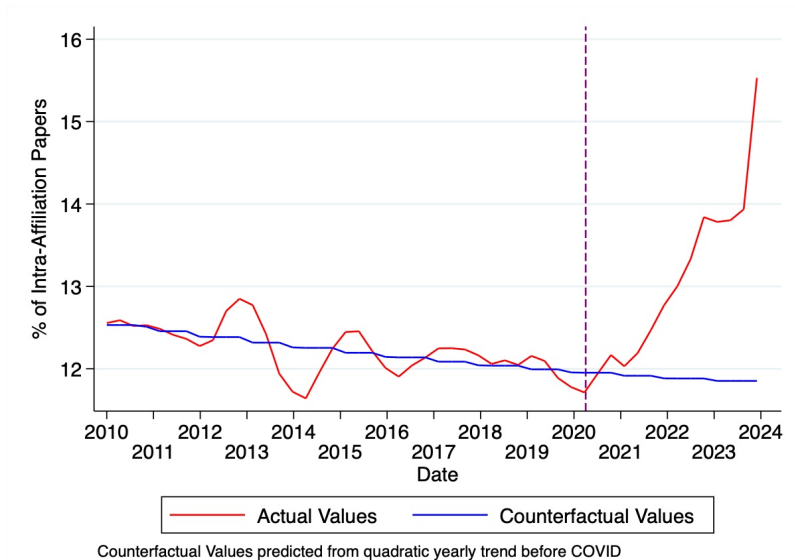
Counterfactual Values predicted from quadratic yearly trend before COVID

Increase in Intra-Institutional Collaboration during COVID

Counterfactual Values predicted from quadratic yearly trend before COVID
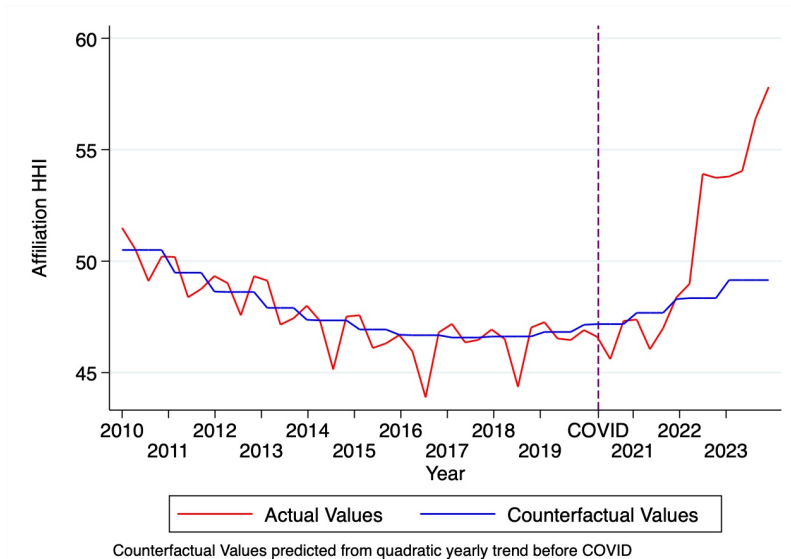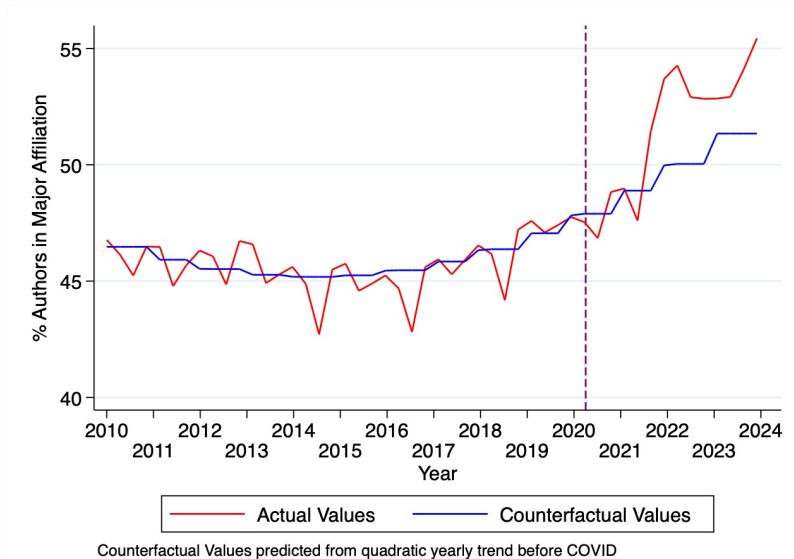
Counterfactual Values predicted from quadratic yearly trend before COVID

Table 4: Positive Effects of COVID on Intra-Institutional Economics Working Papers, 2010-2023

	(1) HHI	(2) % Intra-Affiliation	(3) % Authors in Major Affiliation
Apr.–Dec. 2020	-0.22	-0.12	0.28
	(0.33)	(0.36)	(0.31)
2021	0.82***	0.11	1.56***
	(0.23)	(0.25)	(0.21)
2022	4.99***	1.29***	7.43***
	(0.23)	(0.26)	(0.22)
2023	7.20***	2.16***	5.96***
	(0.31)	(0.39)	(0.29)
Yearly Trend	0.06***	-0.06***	0.13***
	(0.02)	(0.02)	(0.02)
Number of Papers	347,521	347,521	347,521
Pre-COVID Mean	40.61	12.22	45.96

Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 5: Positive Effects of COVID on Intra-Institutional Papers with Two to Five Authors, 2010-2023

	(1) HHI	(2) % Intra-Affiliation	(3) % Authors in Major Affiliation
Apr.–Dec. 2020	0.22	0.04	0.73**
	(0.34)	(0.38)	(0.31)
2021	0.87***	0.24	1.35***
	(0.23)	(0.27)	(0.22)
2022	6.67***	3.14***	7.28***
	(0.26)	(0.33)	(0.24)
2023	8.19***	2.58***	6.93***
	(0.31)	(0.41)	(0.29)
Yearly Trend	0.02	-0.05**	0.06***
	(0.02)	(0.02)	(0.02)
Number of Papers	324,467	324,467	324,467
Pre-COVID Mean	41.05	12.46	46.27

Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

How did COVID affect collaboration patterns in economics?

- Were there more collaborations (multi-authored papers) during COVID?

- Were there more authors on each collaboration project?

- Were economists collaborating more or less with their immediate colleagues?

How did COVID affect collaboration patterns in economics?

- Were there more collaborations (multi-authored papers) during COVID?
  More multi-authored papers. 5 years worth of increase in 2022.
- Were there more authors on each collaboration project?

- Were economists collaborating more or less with their immediate colleagues?

- Were there more collaborations (multi-authored papers) during COVID?
  More multi-authored papers. 5 years worth of increase in 2022.
- Were there more authors on each collaboration project?
  More authors in multi-authored papers. Much effects in 6+ author papers.
- Were economists collaborating more or less with their immediate colleagues?

- Were there more collaborations (multi-authored papers) during COVID?
  More multi-authored papers. 5 years worth of increase in 2022.

- Were there more authors on each collaboration project?
  More authors in multi-authored papers. Much effects in 6+ author papers.

- Were economists collaborating more or less with their immediate colleagues?
  More economists chose to collaborate with others from their home institution
  (especially for papers with two to five authors).

Thank you!

Thank you!
(Time for Discussant)

Future Work

- Robustness checks show that our estimates are robust to removing papers from 2020 and removing papers from both 2020 and 2023

- Explore how the effects differ between authors with different preferences (different $\varepsilon_s, \varepsilon_m$ distributions)

- Take a structural approach to estimate the relative decrease in the cost of collaborating in a multi-authored paper

- Extend our analyses to examine changes in the working-paper-to-publication timeline. Hadavand, Hamermesh, and Wilson (2024) points out that the delay in this timeline are typically unrelated to greater scholarly attention.

Appendix: Constructing Author-Affiliation-Year Record

Consider the case of an author who was ever affiliated with institutions A, B, and C:

For each author-affiliation pair, we record the first and last year that combination appears. We call these *maxyear* and *minyear*.

Affiliation	y2005	y2006	y2007	y2008	y2009	y2010	minyear	maxyear
A	1	1	.	.	.	.	2005	2006
B	.	1	1	.	.	1	2006	2010
C	.	1	.	.	1	1	2006	2010

Appendix: Constructing Author-Affiliation-Year Record

Step 2: For every year that is between *maxyear* and *minyear* and missing a record, a manual fill for that author-affiliation pair is created.

Affiliation	y2005	y2006	y2007	y2008	y2009	y2010	minyear	maxyear
A	1	1	.	.	.	.	2005	2006
B	.	1	1	F	F	1	2006	2010
C	.	1	F	F	1	1	2006	2010

Step 3: For any given year, if there is record of any other affiliation for said author, then the filled records are removed.

Affiliation	y2005	y2006	y2007	y2008	y2009	y2010	minyear	maxyear
A	1	1	.	.	.	.	2005	2006
B	.	1	1	F	.	1	2006	2010
C	.	1	.	F	1	1	2006	2010

Step 4: For any given year that only has filled records, only the filled record that is closest to the last actual record is kept.

Affiliation	y2005	y2006	y2007	y2008	y2009	y2010	minyear	maxyear
A	1	1	.	.	.	.	2005	2006
B	.	1	1	F	.	1	2006	2010
C	.	1	.	.	1	1	2006	2010

These steps will yield the long-form of the data:

year	affiliation
2005	A
2006	A
2006	B
2006	C
2007	B
2008	B
2009	C
2010	B
2010	C

Table 6: Distribution of Papers Across Days, Months, and Years

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
1	81.0	81.7	81.9	80.2	79.1	77.7	76.8	77.3	79.1	78.5	81.6	84.4	96.1	95.4
2-10	5.4	5.2	5.0	5.6	6.2	6.4	7.1	7.3	5.9	6.2	5.3	5.1	1.1	1.5
11-20	6.4	6.2	6.3	7.0	6.8	7.3	7.8	7.1	7.7	7.2	6.3	5.1	1.2	1.6
21-31	7.2	6.9	6.8	7.3	7.9	8.6	8.4	8.3	7.3	8.1	6.7	5.4	1.6	1.5
Jan.	50.8	53.1	54.0	50.6	50.9	49.6	47.1	51.9	57.4	57.4	63.1	68.5	92.3	91.1
Feb.-Jun.	22.5	20.9	20.6	21.8	21.4	22.4	24.2	23.1	20.2	20.5	17.0	17.6	4.0	5.8
Jul.-Sep.	13.3	12.7	12.2	13.1	13.7	13.5	14.2	12.9	11.1	11.5	10.7	8.4	2.1	2.2
Oct.-Dec.	13.3	13.2	13.2	14.5	13.9	14.5	14.6	12.2	11.3	10.6	9.2	5.5	1.7	0.9