Economics Research Collaboration Patterns

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

Motivation

Prior research suggested a trend of increasing collaboration in scientific research, though such results have been limited by data availability. In this paper, we document trends in economics research collaboration using records of both journal publications and working papers from the online database OpenAlex from 2001 to 2022 as well as the NBER working paper series.

Constructing Paper-Level Data

We define Econ 64 papers as journal articles published in the select 64 economics journals[3] Due to inconsistencies in records, we construct each author's affiliation records for calculating affiliation information at the paper level. The steps to construct the records is as follows:

Step 1: For each author-affiliation pair, we record the first and last year that combination appears. We call these *maxyear* and *minyear*.

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.

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

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.

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

With the proper author affiliation data, we calculate, at the paper level, the following variables:

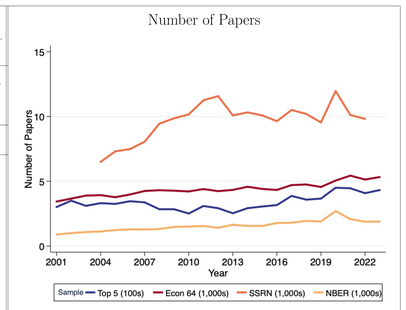
- Number of authors in the paper
- Intra-affiliation: A binary variable that equals 1 if all authors share a common affiliation.
- Inter-affiliation: A binary variable that equals 1 if intra-affiliation equals 0.
- % Author in major affiliation, the affiliation with which the most number of authors are affiliated with in the paper.
- % Junior economist: The percent of authors that are economists whose first Econ64 paper was published one to nine years ago.
- % Senior economist: The percent of authors that are economists whose first Econ64 paper was published ten or more years ago.

We look at three sets of papers for our analysis:

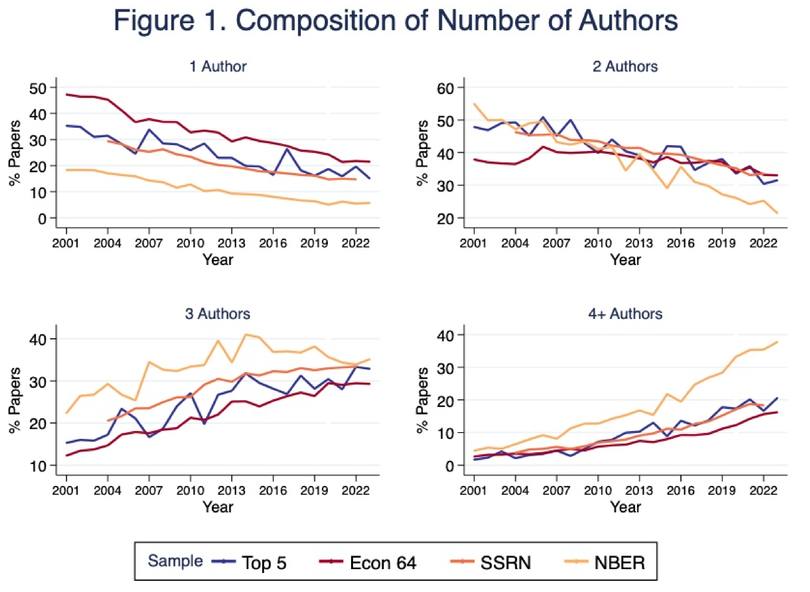
- Economics papers from top 5 journals (AER, JPE, QJE, ECMA, and ReStud), 2001-2023
- Economics papers from top 64 journals, 2001-2023
- Economics working papers from SSRN where more than 33% of the authors are economists, 2004-2022
- Economics working papers from NBER, 2001-2023

The table below presents some relevant statistics about the authors in these three samples:

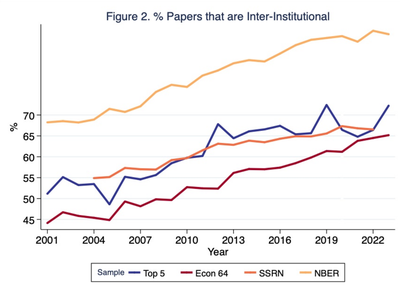
	Top 5	Econ 64	SSRN		NBER
			Econ	Non-Econ	
Number of Authors	9,704	61,386	42,126	57,336	17,848
Number of Institutions	2,293	9,872	6,922	8,922	2,031
% Papers with at least one author from _____ institution					
Education	84.5%	88.9%	82.6%	78.8%	95.9%
Facility	6.7%	6.4%	7.5%	4.7%	10.8%
Non-Profit	17.9%	8.7%	16.0%	6.1%	14.7%
Government	4.1%	4.3%	4.2%	4.9%	6.4%
Company	2.6%	1.7%	2.0%	2.%	3.0%
Other	12.6%	9.7%	11.6%	10.0%	14.4%



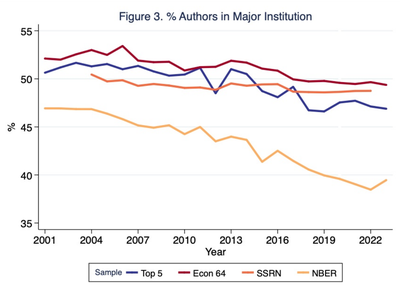
Increase in Collaborations



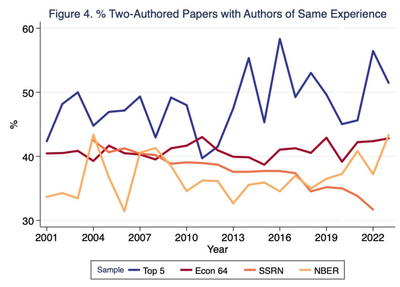
Increase in Inter-Institutional Collaborations

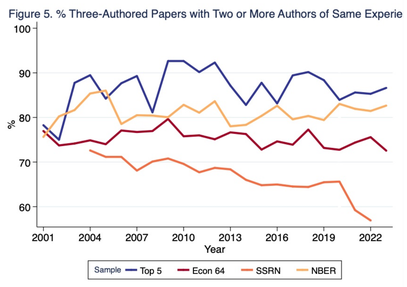


Decrease in Institutional Assortativity

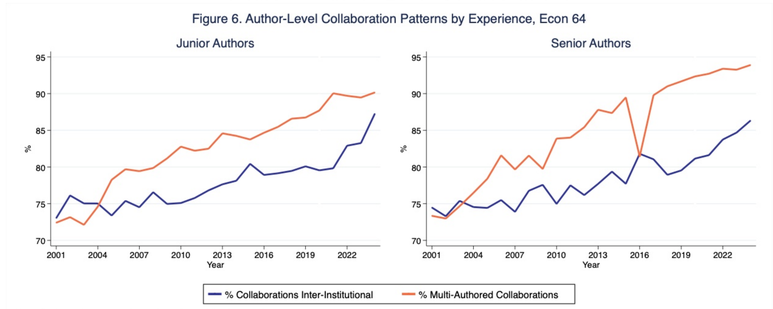


Different Trends in Experience Assortativity





Increase in Author-Level Collaborations



Note: Senior authors are authors whose first publication was from ten or more years ago. Junior authors are authors who are not senior

Changes to Trends During COVID?

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: $Pr\left(r_m - r_s - c_m + c_s > \varepsilon_{s,i} - \varepsilon_{m,i}\right)$

If we are willing to assume that economists' preferences and the returns to types of papers are stable, i.e., both the distribution of ε and the competitive environment of publishing follow trend, then changes in collaboration trends would reflect changes in costs.

Challenges from COVID

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

Opportunities from COVID

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

Table 1: Estimated Deviations of Number of Authors from Linear Yearly Trend During COVID

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Publications	Top 5				Econ 64			
	% 1 Author	% 2 Authors	% 3 Authors	% 4+ Authors	% 1 Author	% 2 Authors	% 3 Authors	% 4+ Authors
2020	1.85	-2.05	-1.44	1.64	1.42**	-3.84***	0.60	1.81***
	(2.12)	(2.56)	(2.46)	(1.98)	(0.69)	(0.75)	(0.71)	(0.50)
2021	0.02	1.02	-4.72*	3.67*	-0.25	-2.42***	-0.65	3.31***
	(2.08)	(2.65)	(2.46)	(2.11)	(0.66)	(0.75)	(0.70)	(0.52)
2022	4.63**	-3.71	-0.27	-0.65	1.38**	-4.50***	-1.12	4.25***
	(2.32)	(2.71)	(2.69)	(2.08)	(0.69)	(0.77)	(0.73)	(0.56)
2023	0.98	-1.86	-1.59	2.47	2.33***	-4.62***	-2.12***	4.41***
	(2.17)	(2.73)	(2.67)	(2.20)	(0.70)	(0.78)	(0.73)	(0.56)
Yearly Trend	-0.92***	-0.75***	0.86***	0.81***	-1.24***	-0.06*	0.85***	0.45***
	(0.10)	(0.11)	(0.10)	(0.06)	(0.03)	(0.03)	(0.03)	(0.02)
N Papers	7,733	7,733	7,733	7,733	100,947	100,947	100,947	100,947
2019 Mean	16.12	37.98	28.14	17.76	25.31	37.11	26.41	11.16

Robust standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. SSRN sample is from 2004 to 2022, the rest of the samples are from 2001 to 2023

Table 2: Estimated Deviations of Number of Authors from Linear Yearly Trend During COVID

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Working Papers	SSRN				NBER			
	% 1 Author	% 2 Authors	% 3 Authors	% 4+ Authors	% 1 Author	% 2 Authors	% 3 Authors	% 4+ Authors
2020	0.70*	-0.95*	-2.37***	2.62***	0.04	-0.63	-5.40***	5.99***
	(0.38)	(0.51)	(0.50)	(0.38)	(0.54)	(1.01)	(1.08)	(1.02)
2021	1.85***	-2.34***	-2.99***	3.47***	1.92***	-1.14	-7.49***	6.71***
	(0.42)	(0.55)	(0.54)	(0.43)	(0.64)	(1.11)	(1.21)	(1.17)
2022	2.56***	-1.21**	-3.68***	2.33***	1.93***	1.32	-8.75***	5.50***
	(0.44)	(0.57)	(0.56)	(0.44)	(0.66)	(1.19)	(1.28)	(1.23)
2023					2.88***	-1.09	-8.34***	6.54***
					(0.68)	(1.17)	(1.30)	(1.26)
Yearly Trend	-0.91***	-0.67***	0.85***	0.73***	-0.73***	-1.41***	0.80***	1.33***
	(0.02)	(0.03)	(0.03)	(0.02)	(0.04)	(0.05)	(0.05)	(0.04)
N Papers	183,908	183,908	183,908	183,908	35,795	35,795	35,795	35795
2019 Mean	16.17	36.10	32.54	15.19	6.33	27.16	38.19	28.32

Robust standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. SSRN sample is from 2004 to 2022, the rest of the samples are from 2001 to 2023

Table 3: Estimated Deviations of Inter-Institutional Collaboration from Linear Yearly Trend During COVID

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	% Papers Inter-Institutional				% Authors in Major Institution			
	Top 5	Econ 64	SSRN	NBER	Top 5	Econ 64	SSRN	NBER
2020	-3.92	-0.41	0.58	-1.94***	0.00	-0.35	-0.01	-0.74*
	(2.43)	(0.76)	(0.47)	(0.68)	(1.07)	(0.33)	(0.18)	(0.42)
2021	-8.49***	-0.67	0.14	-1.76**	0.37	-0.30	0.16	-0.90*
	(2.57)	(0.74)	(0.52)	(0.74)	(0.99)	(0.31)	(0.20)	(0.47)
2022	-3.35	1.43*	-0.42	-1.00	0.00	0.11	0.25	-1.07**
	(2.56)	(0.75)	(0.54)	(0.70)	(1.03)	(0.33)	(0.21)	(0.49)
2023	-1.90	1.21		-2.28***	0.08	-0.12		0.32
	(2.44)	(0.76)		(0.77)	(1.03)	(0.33)		(0.53)
Yearly Trend	0.80***	0.44***	0.06**	0.49***	-0.24***	-0.15***	-0.07***	-0.40***
	(0.11)	(0.04)	(0.03)	(0.04)	(0.04)	(0.01)	(0.01)	(0.02)
N Papers	5,879	68,500	146,803	18,664	4,505	52,104	114,557	17,429
2019 Mean	82.74	78.94	78.22	96.37	46.60	49.75	48.59	39.95

Robust standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. SSRN sample is from 2004 to 2022, the rest of the are from 2001 to 2023. Columns 1-4 are estimated with only multi-authored papers. Columns 5-8 further restrict the papers to be inter-institutional.

Table 4: Estimated Deviations of Author Experience assortativity from Linear Yearly Trend During COVID

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	% Two-Authored Papers with Authors of Same Experience				% Three-Authored Papers with Two of More Authors of Same Experience			
	Top 5	Econ 64	SSRN	NBER	Top 5	Econ 64	SSRN	NBER
2020	-5.90	-1.97	-4.11*	1.59	-5.71	-0.53	2.92	3.09**
	(4.56)	(1.31)	(2.15)	(2.07)	(3.56)	(1.10)	(2.39)	(1.44)
2021	-5.62	1.04	-1.00	5.20**	-4.34	0.91	-4.28***	2.08
	(4.54)	(1.29)	(0.91)	(2.43)	(3.64)	(1.07)	(0.95)	(1.67)
2022	4.90	1.15	-2.71***	1.62	-4.93	1.17	-6.11***	1.69
	(5.06)	(1.37)	(0.92)	(2.49)	(3.63)	(1.11)	(0.99)	(1.80)
2023	-0.39	1.55		7.77***	-3.89	-0.94		2.99*
	(5.00)	(1.38)		(2.75)	(3.57)	(1.17)		(1.78)
Yearly Trend	0.31*	0.04	-0.40***	-0.04	0.29*	-0.00	-0.49***	-0.09
	(0.18)	(0.05)	(0.04)	(0.09)	(0.17)	(0.05)	(0.05)	(0.08)
N Papers	3,154	37,800	73,971	12,783	1,942	22,737	53,959	12,217
2019 Mean	49.64	42.91	35.19	36.50	88.35	83.14	65.48	79.42

Robust standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$. SSRN sample is from 2004 to 2022, the rest of the are from 2001 to 2023. Columns 1-4 are estimated with only two-authored papers. Columns 5-8 are estimated with only three-authored papers

Summary

We find that, in the last twenty years,

- Collaboration in economics research has increased;
- Inter-institutional collaboration grew more than intra-institutional collaboration;
- Among inter-institutional papers, the concentration of institutions decreased;
- Trends in experience assortativity are different in different samples; and
- The average author is more likely to collaborate with others, and the collaborations are more likely to be inter-institutional.

During COVID,

- Single-authored papers increased, but 4+ author papers also increased.
- Little to no change in institutional assortativity or experience assortativity.

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[1]Michigan State University. Corresponding author email: hanzhe@msu.edu
[2]City University of Hong Kong

[3]We use the tiered list of journals by SUFE. This list is consistent with the lists from other journal rankings (Heckman and Moktan, 2020; Kalaitzidakis, Mamuneas, and Stengos, 2003). **Tier 1:** *American Economic Review, Econometrica, Journal of Political Economy, Quarterly Journal of Economics, Review of Economic Studies*; **Tier 2:** *Economic Journal, Games and Economic Behavior, International Economic Review, Journal of Development Economics, Journal of Econometrics, Journal of Economic History, Journal of Economic Theory, Journal of International Economics, Journal of Labor Economics, Journal of Monetary Economics, Journal of Public Economics, Journal of the European Economic Association, Quantitative Economics, Rand Journal of Economics, Review of Economics and Statistics, Theoretical Economics, American Economic Journal: Applied Economics, American Economic Journal: Economic Policy, American Economic Journal: Macroeconomics, American Economic Journal: Microeconomics*; **Tier 3:** *Econometric Theory, Experimental Economics, Journal of Applied Econometrics, Journal of Business & Economic Statistics, Journal of Economic Growth, Journal of Environmental Economics and Management, Journal of Health Economics, Journal of Human Resources, Journal of Industrial Economics, Journal of Law & Economics, Journal of Money, Credit and Banking, Journal of Urban Economics, Review of Economic Dynamics, American Journal of Agricultural Economics, AER/AEA Papers and Proceedings, Brookings Papers on Economic Activity, Canadian Journal of Economics, Economic History Review, Economic Theory, European Economic Review, Explorations in Economic History, Journal of Comparative Economics, Journal of Economic Behavior & Organization, Journal of Economic Dynamics & Control, Journal of Economic Education, Journal of Economic Literature, Journal of Economic Perspectives, Journal of Economics & Management Strategy, Journal of Mathematical Economics, Journal of Population Economics, Journal of Real Estate Finance and Economics, Journal of Regulatory Economics, Journal of Risk and Uncertainty, History of Political Economy, International Journal of Industrial Organization, Macroeconomic Dynamics, Social Choice and Welfare, Journal of Finance, Journal of Financial Economics.*