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Remote talks: changes to economics seminars during Covid-19

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Abstract
This paper analyzes the consequences of the change in the presentation mode of seminars in economics triggered by the COVID-19 pandemic. Following the technology shock, the number of seminars held decreased by approximately 12 percent as seminars went from in person to online presentations. The composition of seminar speakers changed significantly. Three proxies of speakers' quality suggest that leading top economists gained shares. The share of seminars held by women increased. The geography of knowledge dissemination shifted significantly as the distance between host and speaker institutions increased on average by 32 percent. The growing inequality in presentations among speakers is correlated with an increase in inequality in terms of citations. The results imply that working from home instead of travelling can decrease gender-specific inequality and increase inequality by productivity.

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1 Introduction

The requirement to travel is an important aspect of many occupations. For example, CEOs spend 8 percent of their working time travelling.[1] Academics and institutions alike spend a considerable amount of time and financial resources to exchange ideas in regular seminar series. They are a key aspect for speakers to receive feedback, make their work more visible, and to build a professional network. Therefore, the possibility to present in seminars can have long-lasting effects for individual career paths, especially for early career researchers. Hosting institutions benefit as they stay up to the state of the art in research and seminars are an important input in the knowledge production function. Hence, who is presenting and the topic of the presentation can shape research fields as a whole.

On the 11th of March 2020 the WHO declared a global pandemic after SARS-CoV-2 (colloquial "coronavirus") had spread around the world. Subsequently, most countries issued international travel warnings and international travel seized up.[2]

As a consequence, conferences and seminars in research were cancelled abruptly by the majority of organizers in the first half of March in 2020. Institutions gradually started to change their mode of seminars to online presentations using information and communication technology (ICT) programs such as Zoom. By the fall term 2020 the vast majority of institutions across the world had adopted to the worldwide spread of COVID-19 by forced experimentation of holding seminars online.

There are good reasons to assume that seminars will remain partially online in the future. Even temporary experimentation can result in lasting changes in consumers' behavior (Larcom, Rauch, and Willems 2017). The more important it is to understand the implications of the forced experimentation with ICT for the distribution of seminars.[3] In particular this study addresses the following three research questions: What are the implications of the technology shock for the inequality between speakers? Do the effects differ by gender? How does ICT change the geography of academic seminars?

This paper builds a rich data set of seminars in economics held across the world between fall 2018 and fall 2020. It identifies 270 institutions that satisfy the sampling criteria among approximately 1,200 institutions. Thereby, it extends the coverage compared to previous studies.[4] The data on seminars are complemented by a rich set of characteristics of institutions and speakers. At the institutional level, information on the number of seminars and the institutions' geography were collected. At the speaker level, this study

[1] Source: https://hbr.org/2017/10/a-survey-of-how-1000-ceos-spend-their-day-reveals-what-makes-leaders-successful.

[2] For example, the passenger volume for flights from airports in the European Union decreased to 15 percent between 2020/Q2-2020/Q4 in terms of the volume between 2019/Q2-2019/Q4. Source: Eurostat.

[3] The forced experimentation with ICT will hereafter just be referred to as "technology shock".

[4] Doleac, Hengel, and Pancotti (2021) and Minondo (2020) collect data on seminars in 66 and 143 institutions, respectively.

collected information on three proxies for speakers' quality, gender, academic experience, and citations. The identification presumes that the technology shock was exogenous. The identifying variation comes from the within seminar series comparison before and after the technology shock.

This paper produces three main sets of results. The first set of results shows that the technology shock had important distributional consequences. Speakers at the top of the productivity distribution gained shares following the technology shock. The results show that in particular top economists in terms of recent output and top young economists held relatively more seminars. At the institutional level, speakers from top institutions crowded out speakers from institutions in the bottom of the distribution. The propensity of high productivity speakers to give seminars at lower ranked institutions increased.

The second set of results highlight that technology can have a gender related effect. The share of female speakers increased markedly after the technology shock, which is partially driven by longer distances between female speakers and host institutions.

The changes in presentation shares by speakers' gender and productivity, manifested themselves in changes visibility in terms of citations, which suggests that inequality between speakers decreased by speakers' gender and increased by speakers' productivity due to the technology shock.

The final set of results studies the implications of the technology shock by geography. The technology shock induced institutions to invite speakers from further away and speakers were more likely from abroad.

This paper contributes to the literature on alternative work arrangements. Studies have shown that workers value flexibility in low-skilled occupations, for example Chen et al. 2019 using ride sharing.[5] Mas and Pallais (2017) show experimental evidence that women value particulars kinds job flexibility, such as working from home, by more than men and Wiswall and Zafar (2017) estimate a higher willingness to pay of women for jobs with greater flexibility. The literature has shown that women are underrepresented in the top ranks of many high paying occupations, including corporate management (Bertrand and Hallock 2001) and law firms (Azmat and Ferrer 2017). In the field of economics women have historically been under-represented relative to other research fields (Lundberg and Stearns 2019).[6] Goldin (2014) argues that the gender gap would be reduced if firms did

[5]Cook et al. (2020) show that even in flexible work arrangements a gender gap can persist due to preferences and constrained based characteristics, such as experience on the job.

[6]While the gender representation gap by 2020 has narrowed at the entry level of assistant professors with 41 percent of positions in Europe and 31 percent in the US held by women, it is still huge at the level of full professors with 24 percent in Europe and 15 percent in the US (sources: AEA CSWEP; https://www.women-economics.com). A large literature shows that women are discriminated among a range of factors that determine the professional success in the profession including publication and writing standards: Card et al. (2019); Hengel (2020), citations: Koffi (2021); credit for group work: Sarsons et al. (2021); and interactions in seminars: Dupas et al. (2021).

not give incentives to work long hours and in particular hours as women benefit more from job flexibility. Goldin and Katz (2016) show that technological change can increase substitutability of workers and thereby narrow the gender gap for the case of the pharmaceutical industry. The alternative work arrangement that has received most attention in light of the pandemic is working from home. Bloom et al. (2015) conduct a RCT and find that working from home surprisingly increased productivity and workers' job satisfaction. Mas and Pallais (2017) do not find a wage penalty of working from home. However, the degree to which jobs can be done at home depends also on occupations. Dingel and Neiman (2020) estimate that 37 percent of jobs in the US can be performed from home and their measure of workability from home positive correlates with education and income.[7] Barrero, Bloom, and Davis (2021) conduct a large scale survey among employees in the US and predict that 20 percent of full workdays will be performed from home as the pandemic ends. This paper contributes by highlighting that more flexible job arrangements, such as reducing the requirement to travel, could benefit women in high paying occupations thereby potentially narrowing the gender-representation gap in higher ranks of these occupations. It also contributes by showing that for the specific task of giving seminars, high productivity speakers benefit more from increased job flexibility thereby contributing first evidence who is actually benefiting from an alternative working arrangement within a narrowly defined high paying occupation.

Secondly, this paper contributes to the literature on superstars and inequality. The superstar theory by Rosen (1981) posits that in markets of increasing size the returns to talent increase at the top of the income distribution disproportionately.[8] This paper contributes by documenting "star" effects in a research field in which the quality of researchers is well measurable. It documents that superstar effects occurred conditioning on contemporaneous shocks thereby increasing the inequality among researchers in the economics profession.

The third literature to which this paper contributes examines the determinants and effects of presenting at seminars and conferences in research. Conferences can promote research collaborations (Campos, Lopez de Leon, and McQuillin 2018; Chai and Freeman 2019), increase the likelihood of citing other participants (Head, Li, and Minondo 2019; Lopez de Leon and McQuillin 2020), and the likelihood to publish in leading journals (Gorodnichenko, Pham, and Talavera 2021). Therefore, interactions through conferences or seminars can have a meaningful impact on researchers. Minondo (2020) finds that high

[7]The authors find that large fraction of jobs that can be performed from home is in professional and technical services; education; business and finance; and management.

[8]A number of papers document a correlation between market size and earnings of superstars in a number of occupations: Gabaix and Landier (2008); Tervio (2008); Gabaix, Landier, and Sauvagnat (2014) for CEOs; Kaplan and Rauh (2009); Célérier and Vallée (2019) for professionals in finance; Krueger (2005) for entertainers. Koenig (2021) provides causal evidence for the superstar model by Rosen (1981) using the TV rollout in the US. Kaplan and Rauh (2013) survey the literature and document how the shares of superstar earners have changed across occupations.

quality scholars have a higher likelihood of getting invited and that female speakers do not have a lower probability of being invited than comparable male speakers using data on seminars in the US.[9] This paper contributes to this strand of the literature by expanding the data collection of seminars moving beyond the collection of US departments by including institutions worldwide. It also contributes by identifying a natural experiment in the context of academic seminars and by providing first evidence on the ensuing inequality between speakers due to the technology shock.

Finally, a large literature examines the spillover effects of local agglomeration. The three Marshallian agglomeration forces are knowledge spillovers, labor market pooling, and input-output linkages and studies find empirical support for all of them (Bloom, Schankerman, and Van Reenen 2013; Ellison, Glaeser, and Kerr 2010; Greenstone, Hornbeck, and Moretti 2010). These spillovers are particularly relevant for high-tech industries (Henderson 2003). The knowledge spillovers fall with distance within countries (Jaffe, Trajtenberg, and Henderson 1993; Audretsch and Feldman 1996) and across countries (Comin, Dmitriev, and Rossi-Hansberg 2012) and better travel linkages can increase scientific collaboration (Catalini, Fons-Rosen, and Gaulé 2020). This paper shows preliminary evidence that more presentations online lead to more citations and that removing the cost of travelling can actually lead to stronger knowledge spillovers. The detrimental effect of distance on knowledge spillovers could therefore weaken over time if communication continues to take place remotely in the future.

The remainder of this paper is structured as follows. The following section introduces a conceptual framework to guide the analysis. The third section describes the data. The fourth section presents the analysis. The final section concludes and indicates directions for future research.

2 Conceptual Framework

When predicting the effects of the technology shock, it is useful to think about potential demand and supply channels, how institutions and speakers will respond to the technology shock. This section also discusses heterogeneous shocks related to the pandemic.

2.A Demand

The hosting institutions will maximize over the quality of knowledge they receive from inviting a seminar speaker and the benefits they gain from personal exchanges with the

[9] With regards to participation of women in economics conferences, Chari and Goldsmith-Pinkham (2017) report no difference between genders in acceptance rates of submissions to the NBER summer institute, whereas Hospido and Sanz (2021) find a 3.2 percentage point lower likelihood of acceptance for women to conferences in Europe.

speaker. The benefits from exchanges with high productivity speakers are on average higher in terms of feedback and learning from the presentations. At the same time hosting institutions face a budget constraint. The costs for a seminar comprise fixed costs (such as hotel bills) and variable costs (for example, travel costs). Some host institutions may have policies in place that restrict the travel distance of in-person seminars due to budget constraints or even environmental reasons.

How will the technology shock affect the demand for seminar speakers? The budget constraint of institutions will become slack and the hosting institutions will maximize their objectives by changing the set of speakers they invite as they have to pay only the sunk cost of setting up the technology.[10][11] In particular, once set up they will pay less attention to distance as it is no longer a constraint financially and more attention to the quality of speakers.

Formally, one would expect that institutions invite more speakers once they have paid the fixed costs. However, if institutional norms exist to hold seminars in regular time intervals, there could be no increase in the overall number of seminars.

2.B Supply

The seminar speakers will allocate their time between leisure time and working time, in which they produce research and present in seminars. They will maximize the quality of the feedback they receive while trying to balance the time between producing research and travelling. One reasonable assumption is that the marginal opportunity costs in terms of foregone research output to hold a seminar increase with speakers' productivity and that the marginal utility of feedback decreases in productivity. High productivity speakers will receive on average more seminar invitations than they can give and they choose to visit the institutions at which they receive more feedback and can better advertise their papers. They decline on average more invitations from places where they cannot sell their papers as good as elsewhere. How will the technology shock affect the supply of high productivity seminar speakers? High productivity speakers will increase their relative supply as the opportunity costs to give a seminar decrease in terms of foregone research output fall for them by more after the technology shock.

The requirement to travel may hinder disproportionately women to present in seminars, as they on average bear a higher share of childcare and chores (Barber et al. 2021; Deryugina, Shurchkov, and Stearns 2021). This suggests an additional fixed cost for women that

[10] If institutions' list of potential speakers to invite for a seminar depends on expected supply, who is actually going to accept an invitation, then the list of speakers institutions consider inviting may change after the technology shock.

[11] The costs of Zoom, for example, were 19.99 dollar per month for a business licenses in October 2021. Therefore, the fixed costs of setting up a technology are small in comparison to hosting a speaker in person.

may increase the further the host institution is apart, as it becomes more costly and difficult to substitute their on average higher contributions in childcare and chores for longer trips. However, the pandemic also led to significant disruptions in time use of women. Day-care closures and school closures necessitated the increase in child care responsibilities and chores. Alon et al. (2020) hypothesize that the pandemic may lead to an erosion of norms with respect to the allocation of childcare in the long run, but that in the short-run it is likely to fall disproportionately on women. Survey evidence shows that this burden indeed disproportionately fell on women among academics (Barber et al. 2021; Deryugina, Shurchkov, and Stearns 2021). Researchers in economics become parents on average for the first time in the first year after their PhD (Krapf, Ursprung, and Zimmermann 2017). Retrieving information from CVs of seminar speakers, this study finds for a sample of 100 seminar speakers a median birth of the first child 3.5 years after the PhD award. This implies that due to the pandemic early career researchers may give less presentations due to increased family duties for young children in particular during closures of daycare and schools.

Another dimension of heterogeneity among speakers is related to increases in time spend for administrative duties (for example, as head of the department) and teaching load for most speakers due the switching costs related to the pandemic. While these variables are generally not observable, the analysis will compare speakers of similar experience and gender to reduce dimensions of unobserved heterogeneity.

2.C Predictions

Taken together the discussion of demand and supply implies the following three testable predictions for observed changes due to the technology shock:

Hypothesis 1: Speakers with high productivity will give more seminars.

Hypothesis 2: Women can decrease or increase their relative supply. If the time saving effect from travelling dominates, women will increase their relative supply and women will increase their relative supply by more for physically more distant places. If the pandemic shock to time use dominates the time saving effect, then women will decrease their relative supply.

Hypothesis 3: The distance between hosting institutions and speakers will increase.

3 Data

This study accessed the universe of research seminars in economics worldwide. The web-sites of four types of institutions that host seminars were accessed: universities, central

banks, research institutes, and international organizations. The universities list is taken from the Tilburg Ranking that measures the academic output in economics of universities worldwide. The journals included in the default settings in the ranking include 35 top general interest and top field journals.[12] The basis for the ranking are publications in these journals between 2015 and 2019. The ranking comprises 1,099 institutions worldwide.[13] Additionally, information on seminars held in central banks and research institutes were collected from the RePEc ranking that includes 31 central banks and 55 research institutes.[14] Furthermore, research institutes were identified through online search. Finally, two international organizations with regular research seminar series in economics were included in the sample.

Among the set of institutions, this study identified a balanced panel of 243 universities, 14 central banks, 11 research institutes, and 2 international organizations that recorded economics seminars in the fall of the academic years 2018/19, 2019/20, and 2020/21.[15] Overall 12,419 seminar were hand-collected for which the full set of speaker controls is available. Additionally, 175 cancellations across all institutions were recorded.[16]

For each institution, seminars were collected by seminar series. More precisely, the hand-collected data record the date at which the talk was given, the speaker, the seminar title, the speaker's institution, the time at which the seminar was held, the host institution, the seminar series (general audience, or the respective field), and the academic year in which the respective talk was given. Throughout the paper, spellings of institutions and speakers across different data sets were harmonized.

The data on seminars are complemented by a rich set of characteristics both at the institutional and at the speaker level.

3.A Speakers

Rich data on speakers were collected for this study including the year of the PhD award, the gender, whether the speaker is registered on RePEc and among the top economists in its rankings, whether the speaker holds an editorial role at a top journal in economics, the rank of the speakers' institution in the Tilburg ranking, and citations of the speakers' work.

The identification of PhDs follow from speakers' CVs, LinkedIn, the family tree of trade economists, the mathematics genealogy, speakers' PhD thesis, and the CVs of super-

[12] See Online Appendix for a full list of journals included in the Tilburg Ranking.

[13] See https://econtop.uvt.nl/rankingsandbox.php for a complete list of institutions. For the complete list of institutions, one has to click on show top: "All". The ranking in terms of publications between 2015 and 2019 was accessed in February 2021.

[14] The complete list of central banks can be accessed from https://ideas.repec.org/top/top.central.html and the full list of research institutes can be accessed from https://ideas.repec.org/top/top.ttanks.html. The rankings were accessed in February 2021.

[15] The Online Appendix provides details about the sampling criteria and selection.

[16] All recorded seminars were double-checked to guarantee the accurateness of the collection.

visors.[17] In doing so, this study identified for 97.4 percent of the speakers the year in which the PhD was obtained. This study also identifies whether the speaker is a PhD student and excludes them. Speakers from institutions that are not universities are also included in the sample provided that they hold a PhD. This is done to ensure comparability in terms of research experience across speakers.

The speakers' gender is determined through a machine learning based algorithm.[18] The algorithm provides a probability with which the suggested gender is true. This paper sets a cutoff, and trusts the algorithm for a probability greater or equal than 95 percent when determining the gender based on the algorithm. For the remaining speakers the proposed gender of the algorithm was hand-verified.

Using the RePEc database, this study first pinpointed seminar speakers registered in the database.[19] Approximately 70 percent of speakers are registered in RePEc. For these speakers, it matched those that are ranked among the top 1 percent based on their overall research output in RePEc, the top 1 percent based on the last 10 years of publications in the RePEc database, and a ranking of 200 top young economists, whose first publication in the RePEc database is not older than 10 years.[20]

The data set on editorial roles by Angus et al. (2021) is merged to the speakers. The authors use these journals that received the highest rating in the Australian Business Deans journal quality list in 2019 and identified researchers holding editorial roles in these journals between the end of July and beginning of August in 2020.

The rank of the speakers' institutions in the Tilburg ranking in terms of output between 2015 and 2019 is identified.[21]

Finally, the Google Scholar profile of speakers is identified and the citations for 2018, 2019, and 2020 were retrieved. A profile could be found for about 78 percent of the speakers.[22]

3.B Institutions

For universities ranked in the Tilburg ranking, their rank in terms of output between 2015 and 2019 is retrieved. For all institutions included in the data, the latitude and longitude of the institutions were determined using Google maps.[23] Finally, the country in which an

[17] If a researcher holds two PhD degrees, the PhD obtained first is recorded in the data.

[18] The provider used is https://gender-api.com. See Santamaría and Mihaljević (2018) for details on the quality of the algorithm.

[19] The RePEc database was accessed using https://ideas.repec.org.

[20] The RePEc rankings were retrieved in March 2021.

[21] If a speaker is affiliated with multiple institutions, then the minimum rank is taken.

[22] In doing so, profiles that contain erroneously papers from other authors than themselves among the top cited papers were excluded. One advantage of Google Scholar over Web of Science is that it also contains citations of working papers and not only citations of published articles.

[23] For universities, the location of the economics department was used, if such a department existed.

institution is located was collected.

3.C Summary Statistics

Table 1 shows summary statistics at the seminar series level and the seminar level in the fall term of two academic years before the technology shock in 2020/21. Overall there are 509 seminar series in the data. The average seminar series includes 8.69 speakers. The share of cancellations as of all planned seminars is on average 4.5 percent. The share of cancellations for talks with female speakers is on average 1.1 percent.[24]

At the seminar level, 21.8 percent of the seminars are held by female speakers. The average speaker has about 12.2 years of experience after PhD award. The top 1 percent of researchers in terms of their overall output and in terms of their publication record in the last 10 years account for 7 and 12.5 percent of seminars, respectively. The 200 top young economists held 3.3 percent of the seminars.[25] The share of speakers with editorial roles in top journals excluding the top 5 in the population of speakers is 11.4 percent and their seminar share is about 18.2 percent. Likewise, speakers with editorial roles at top 5 journals represent 3 percent of the speaker population and their seminar share is 6.3 percent.[26]

4 The Effects of the Technology Shock on the Distribution of Speakers

The following analysis first examines the effects of the technology shock on the number of seminars. Then the effects by speaker characteristics are investigated. Finally, the immediate effects of the technology shock on inequality between researchers in terms of visibility are analyzed.

4.A The Intensive Margin of Seminar Series

The first part of the analysis is carried out at the level of the seminar series. Let h denote the host institution, s the seminar series of the institution, and t the academic year in which the seminar was held. The estimating equation at the seminar series level is given by:

$$\text{Outcome}_{hst} = \lambda_{hs} + \beta \times \mathbb{1}(t = \text{Academic year 2020/21}) + \varepsilon_{hst}, \tag{1}$$

[24]These figures are upper bounds as they condition on the set of institutions that have recorded at least one cancellation between 2018 and 2020 in fall. The share of cancellations as of all planned seminars across all academic years is 1.39 percent.

[25]They are a distinct group as they account for only 3.89 percent of the top 1 percent of researchers in terms of research output in the last 10 years.

[26]The top 5 journals are the American Economics Review, Econometrica, Journal of Political Economy, Quarterly Journal of Economics, and the Review of Economic Studies.

where λ_{hs} is a host institution-seminar series specific fixed effect and ε_{hst} the error term. Larger institutions offer many field specific seminars, and this specification considers the within seminar series change by including λ_{hs}. The coefficient estimate for β identifies the time fixed effect in the year of the technology shock relative to the pre-period. Equation (1) identifies the effect of the technology shock, β, on seminar organization through a time fixed effect, as 79 percent of the institutions in the sample report at least some seminars online in the academic year 2020/21.[27] The onset of the pandemic was a sudden and unexpected event. Therefore, the necessity to switch seminars from in-person to online presentations, the technology shock, can be regarded as exogenous to institutions and speakers. Standard errors are clustered at the host institution level to allow for correlation between seminar series within an institution. The regressions are weighted by the count of seminars to account for the different size of seminar series.

The first outcome in Table 2 is the logarithm of the number of seminars. The results in column (1) show a negative point estimate that is statistically significant at the 1 percent level. The point estimate suggests that during the fall term of the academic year 2020/21 on average 12.4 percent fewer seminars were held compared to before. In fact, a few institutions stopped holding seminars and they are not included in the sample altogether, therefore the intensive margin effect is a lower bound for the reduction in seminars. The number of individual speakers declined correspondingly by 15.3 percent from 3,240 in the pre-technology shock academic year to 2,740 in the academic year 2020/21. One potential explanation for the drop in the number of seminars could be the substitution of institutional seminars with newly established online seminar series.[28] Other potential explanations could be the preference for in-person seminars over virtual seminars, or a reduction in the supply of speakers. The following two regressions rule out that speakers decreased their supply in the short run by considering cancellations.[29] The outcome in column (2) is the share of cancellations as of all planned seminars. As the overall share of cancellations is quite low, this outcome is aggregated to the host institution level h across all seminar series s in equation (1). The point estimate suggests that the share of cancellations decreased by 0.54 percent but it is insignificant. This suggests that contemporaneous shocks did not increase short-term cancellations of planned seminars, on the contrary cancellations decreased. The outcome in column (3) is the share of cancellations by female speakers as of

[27] This is most likely a conservative lower bound, as the information is missing on most other institutions' websites of the remaining institutions.

[28] Numerous cross-institutional seminars have been established as a consequence of the wide-spread use of technology. See, for example, https://ideas.repec.org/v/ for a selection of virtual seminars. Section 4.F.4 discusses the newly established online seminars.

[29] If reasons for cancellations are given, these relate to the supply side more frequently. Common causes for cancellations include family affairs, illness, and weather events.

all planned seminars. The point estimate is positive, but marginally insignificant. This suggests some gender heterogeneity with respect to short-run shocks to the supply of speakers, however female speakers also did not significantly increase the share of cancellations due to contemporaneous shocks during the pandemic.

4.B The Changing Composition of Seminar Series by Speakers' Quality

Overall there are fewer opportunities for speakers to present. This section shows the implications of the technology shock for the composition of seminar series by three proxies of speakers' quality. The proxies are speakers' identified as top economists in RePEc, speakers' taking an editorial role at top journals, and the ranking of speakers' institutions in the Tilburg ranking.

The following analysis is conducted at the level of the seminar talk as it allows to control for contemporaneous shocks at the speaker level by age and gender. Let i denote a seminar talk held by an individual speaker. Equation (2) introduces additionally a vector X_i of controls that includes speakers' experience in years after PhD award and speakers' gender to control for contemporaneous pandemic-related shocks to speakers of different ages and gender as discussed in Section 2.[30] The remaining notation is the same as introduced in equation (1) and the clustering remains at the level of the host institution.

$$\text{Outcome}_{ihst} = \lambda_{hs} + \gamma \times X_i + \beta \times \mathbb{1}(t = \text{Academic year 2020/21}) + \varepsilon_{ihst}. \qquad (2)$$

The results in Table 3 show how the shares of top ranked economists in the RePEc ranking change. The first two columns examine the change in presentations by leading researchers as measured by placement among the top 1 percent in two types of RePEc rankings. The first ranking considers the overall RePEc output of researchers in economics. The coefficient estimate in column (1) is marginally significant at the 10 percent level. Its magnitude suggests that the relative likelihood of this group to give a seminar talk increased by 0.98 percentage points or 13.9 percent of the pre-technology shock mean. The second ranking places economists in terms of their research output in the last 10 years. The results in column (2) show a positive and significant coefficient at the 1 percent level. The point estimate implies an increase of 3.41 percentage points or 27.4 percent in terms of the pre-technology shock mean. The third outcome is equal to one, if the seminar speaker is among 200 top young economists whose first publication in RePEc is no older than 10 years. The point estimate for the academic year 2020/21 is positive and significant at the

[30] For simplicity, this study refers to an individual speaker. About 0.5 percent of the talks were held by multiple speakers. All results are robust, when excluding talks with multiple speakers.

5 percent level. Its magnitude suggests a 0.91 percentage point increase in the relative likelihood to hold a seminar as a top young economist, or 27.5 percent in terms of the pre-technology mean. Overall, "superstar effects" arise at the top of the distribution, for all three types of categories. The effects are more pronounced for rankings based on recent research output.

The results in Table 4 examine the changing shares of speakers that take editorial roles at top journals in economics and at the top 5 journals. The outcome in column (1) is a dummy equal to one if the speaker takes an editorial role at a top journal excluding the top 5.[31] The point estimate is positive but small and insignificant. The outcome in column (2) is a dummy equal to one if the speaker holds an editorial role at a top 5 journal. The coefficient estimate is positive and significant at the 1 percent level. It suggests a significant increase by 2.08 percentage points or 33.2 percent in terms of the pre-technology shock mean. The demand side might increase the demand from speakers with editorial roles to receive feedback on their current research and advertise it. From the supply side, speakers at these journals may have relatively more time to hold seminars due to the technology shock.

The outcomes so far have analyzed the changes in shares for speakers at the top of the productivity distribution. Who is losing shares, when the top gains? To address this question, the outcomes in the Table 5 are functions of the rank of the speakers' institution that is available for the full distribution of speakers employed at universities.

The first outcome in column (1) is the rank of the speakers' institution in the Tilburg ranking. The point estimate is negative and significant at the 5 percent level. It suggests that the position of the speaker institution decreased modestly by 7.37 positions after the technology shock, i.e. the quality of the speaker's institution increased. The outcomes in column (2) to (5) show a reallocation of shares from speakers from institutions with the lowest number of publications (fourth quartile) to speakers based at institutions that have the highest number of publications (first quartile). The point estimates for the second and third quartile have positive and negative signs, respectively, but are insignificant. In Table A.1, the average rank of the host institution in the Tilburg ranking is compared before and after the technology shock by quartiles of the rank of the speaker institution. The average rank of the host institution increased significantly by 10.21 positions for speakers

[31] The data come from Angus et al. (2021). The five most frequent editorial roles include advisory editor, associate editor, co-editor, editorial board member, and editor.

affiliated with an institution in the first quartile. For speakers from institutions in the second to fourth quartile there are no statistically significant differences in the rank of the host institution. This is consistent with a more significant decrease of the costs to give a seminar or a lower marginal utility from feedback for high productivity speakers. As the time required to present in a seminar decreases they are more willing to accept invitations from institutions of lower average quality. Overall, the results in Table 5 suggest a gradient by institutional quality and a crowding out of speakers from institutions with few publications by speakers from institutions with many publications and the results in this section confirm the prediction of the conceptual framework that high productivity speakers gain shares.

4.C The Changing Composition of Seminar Series by Speakers' Gender

The following analysis explores the association between speakers' gender and the technology shock.

The first outcome is the likelihood that the seminar speaker is female. The point estimate is positive and significant at the 1 percent level. The coefficient estimate suggests a 7.47 percentage point increase in the relative likelihood that the seminar speaker after the technology shock is female, which is about 34.3 percent in terms of the pre-technology shock mean. This finding is even more surprising considering the fact that previous research suggested a negative effect of the contemporaneous pandemic shock to women's research productivity (Barber et al. 2021; Deryugina, Shurchkov, and Stearns 2021). Figure 1 shows that the post-technology shock density of distance between host and speaker institution deviates from the pre-technology shock much earlier for women compared to men around 1,475 km and the densities cross again around 5,000 km. This suggests that there are some gender related costs of travelling to seminars and the technology shock facilitated presentations for women at medium distances. Column (2) explores this hypothesis by examining heterogeneity by defining a dummy equal to one if the distance in greater than 1,475 km. The interaction term is positive and marginally significant at the 10 percent level. The regression in column (3) considers an alternative dummy equal to one if the distance is greater than 1,475 km and less than 5,000 km. The magnitude of the interactions term increases and it becomes significant at the 1 percent level. This implies that parts of the increase in the share of female speakers are driven by a supply side response for medium length distances. The requirement to travel to medium length distant places and to stay overnight may have hindered women to accept seminar invitations before the technology shock. Column (4) explores heterogeneity by the type of institutions at which women held seminars after the technology shock. The point estimate is close

to zero and suggests no heterogeneity in the matching between the quality of institutions and speakers' gender. Female speakers generally give more seminars, whereas speakers from higher average quality institutions give more seminars at institutions of lower average quality. Column (5) tests for heterogeneity by speakers' experience. The interaction term is negative but small and insignificant suggesting that the relative likelihood that the speaker is female increased for speakers of all ages.[32]

4.D The Changing Geography of Seminar Series

Moving from in-person presentations to virtual presentations of seminars has led to literally zero travel costs for seminar speakers to hold a seminar in any location worldwide, apart from potential coordination difficulties due to time-zone differences. What are the consequences of this technology shock to the geography of seminars?

The results in Table 7 investigate the changing geography of seminar presentation mode during the pandemic, by using the log of the geodetic distance as outcome.[33] The coefficient estimate in column (1) is positive and significant at the 1 percent level. The magnitude suggests a huge increase by 31.6 percent in geodetic distance relative to the pre-technology shock period.[34] Column (2) examines heterogeneity among universities as hosting institutions by the rank in the Tilburg ranking. The interaction term is small and insignificant. This suggests that distance was part of the budget constraint for institutions of all kinds. Column (3) examines heterogeneity by the rank of the speakers' institution in the Tilburg ranking. The rank of the speakers' institution enters negatively, i.e. speakers from better ranked institutions generally travel to institutions further away. The interaction term between the time fixed effect and the rank of the speakers' institution is also negative, suggesting that speakers from better ranked institutions travel further after the technology shock. The increase in distance for a speaker affiliated with a top 10 institution is close to 42 percent, whereas the effect dissipates when the speaker comes from an institution ranked at place 367 in the Tilburg ranking. All in all, the results suggest that geographic knowledge dissemination has increased globally, and in particular by speakers affiliated with higher ranked institutions.

What locations are driving the increase in distance between host institution and speaker institution? Table A.2 shows the changes in seminars between the academic years 2018/19,

[32] The association between speakers' experience and the technology shock is negative and insignificant. Unreported results available upon request.

[33] The geodetic distance between institutions is calculated by using the coordinates and the geodist command in Stata.

[34] In unreported results, a gravity equation at the institutional level was estimated and the distance elasticity decreased from 0.514 in 2018/19 to 0.417 in 2020/21.

2019/20, and 2020/21 among the five most frequent continent combinations in the pre-technology shock year. There is a significant decline in growth rates for three continent combinations due to the technology shock. There is a decrease of roughly 18 percent for seminars within the Americas, of 20 percent within Europe, and by approximately 13 percent within Asia. There is only one continent combination for which the number of seminars actually increased in 2020/21. The most significant surge was seen in seminars held by speakers from institutions in Europe hosted by institutions in America by about 65 percent. The number of seminars by speakers from the Americas in institutions in Europe remained roughly constant, which suggests that the share of this combination of host and speaker continent increased in relative terms as the absolute number of seminars decreased by 14.2 percent between the fall of 2019 and 2020.

Table 8 examines whether the increase in distance also translated into a relative increase in seminars across borders. For this purpose, the country codes of the host institution and the speakers' institution were retrieved. The estimates in column (1) show that there was a positive increase in the share of seminars organized across borders during the pandemic. The point estimate implies a 4.6 percentage point increase or a modest rise of 10 percent in terms of the pre-technology shock mean. Column (2) examines the time zone difference between the speakers' and host institutions' countries.[35] The point estimate is positive and significant at the 1 percent level. The point estimate implies a moderate increase in time zone difference between speaker and host of approximately 21 minutes. Column (3) introduces the log of distance as additional control. The point estimate becomes small and insignificant suggesting that the increase in time zone difference is entirely driven by the increase in physical distance.[36]

E The Increasing Inequality by Speakers' Characteristics

4. Did the changing shares also translate into more seminars given by leading researchers and women, or was the increase only in relative terms? The answer is not obvious as the intensive margin of seminars decreased by 12 percent.

To tackle this question, this study builds a panel data set of all speakers in the sample between the academic year 2018/19 and 2020/2021. It identifies the number of seminars given in the fall of each academic year by seminar speakers. If a seminar speaker does not

[35]The time zone difference between institutions was calculated from the latitudes and longitudes.

[36]In unreported results, non-linearity was explored. The effects of time zone differences become negative and significant from 9 hours (the 95th percentile of time zone differences). The magnitude is small, however, a reduction of 1 percent to have a seminar after the technology shock relative to the pre-period.

appear in a given year, the number is replaced as zero. The following equation identifies the effects for different types of individuals.

$$\begin{aligned}\text{Number of seminars}_{it} = \mu_i + \lambda_t + \gamma_t \times X_i \\ + \beta \times \mathbb{1}(t = \text{AY 2020/2021}) \times \text{Speaker characteristic}_i + \varepsilon_{it}.\end{aligned} \tag{3}$$

It includes individual fixed effects μ_i and time fixed effects λ_t. Furthermore, it interacts the year in which the PhD was obtained and speakers' gender with time fixed effects to control for contemporaneous shocks along these dimensions. The coefficient of interest is β, which identifies the differential effect of the technology shock by speaker characteristics. Standard errors are clustered at the individual level.

The results show that for top economists in terms of overall output, in term of recent output, editors at top 5 journals, and female speakers the increase in shares also increased the number of seminars significantly. The magnitudes range from 0.22 additional talks for female speakers to 0.41 additional talks for editors of top 5 journals. The magnitudes do not look significantly at first sight. However, the average number of seminars given before the technology shock was 0.67 and in relation to this figure this corresponds to a 33 percent and 61 percent increase, respectively.

Table A.3 provides further descriptive evidence on the rising inequality between researchers after the technology shock. The share of seminar speakers with zero presentations among the set of speakers in the sample increases from 50.75 percent in 2018/19 to 60.23 percent in 2020/21. The share of seminar speakers for the categories of speakers with at least one presentation declines in all categories but only marginally for the highest category of speakers with four or more presentation. This suggests that after the technology shock presentations are more concentrated among few speakers.

Finally, the first effects of the technology shock on citations are investigated. Citations are an interesting outcome, as they proxy for visibility in the profession.[37]

$$\begin{aligned}\text{IHS}(\text{Citations}_{it}) = \mu_i + \lambda_t + \gamma_t \times X_i \\ + \beta_t \times \mathbb{1}(t = \text{Academic year t}) \times \text{Num. of seminars}_{it} + \varepsilon_{it}.\end{aligned} \tag{4}$$

The structure of the estimation equation is parallel to equation (3). The outcome in

[37] Hamermesh (2018) surveys the literature on citations and labor market outcomes. Most studies find a positive association between citations and researchers' labor market outcomes and salaries, for example Ellison (2013).

equation (4) is the inverse hyperbolic sine.[38] Since the regressor of interest, the number of seminars, varies over academic years it is possible to identify its effects over time.

The results in Table 10 show no significant association of the number of seminars on citations by the end of the year for the academic years 2018/19 and 2019/20. However, the point estimate is positive and significant for the year after the technology shock. One additional seminar increases citations by approximately 3.25 percent after the technology shock. The significance only in the year of the technology shock could be potentially explained by the fact that some institutions allowed visitors to join their seminars thereby the average size of audiences could have increased. The degree to which external participants joined could have been correlated with the productivity of the speaker which could further have increased inequality. The regression in column (2) additionally controls for the number of public seminars and participation in three major conferences (NBER Summer Institute, AEA annual conference, and EEA annual conference).[39] The point estimate for the number of institutional seminars in the fall of 2020 remains significant at the 1 percent level, but the elasticity of an additional seminar falls to 2.5 percent. The point estimate for the number of institutional seminars in the fall of 2019 turns marginally significant at the 10 percent level. The magnitude is small with an increase of 0.67 percent in citations for an additional institutional seminar in comparison to the elasticity in 2020. The point estimate for public seminars is positive, but surprisingly insignificant. The point estimates for participation in three major conferences in 2020 are all positive and significant. For example, the point estimate for participation in the NBER Summer Institute in 2020 is roughly equivalent to 1.85 institutional seminars in the fall of 2020 in terms of the association with citations in the same year. Taken together, the previous findings suggest that the technology shock increased inequality in the seminar allocation among speakers and that the contemporaneous association between seminars and citations increased after the technology shock. Overall, this implies that the technology shock exacerbated inequality in visibility among speakers by productivity. The number of seminars given by women increased and hence their relative visibility has increased after the technology shock.[40]

[38] A few researchers are not cited in a given year. The inverse hyperbolic sine is defined as $\text{IHS}(y) = ln(y + (y^2+1)^{\frac{1}{2}}) \approx ln(2) + ln(y)$, so that first differences can be interpreted as approximate log changes. It has been applied in the context of citations by Card et al. (2019).

[39] The dummies for the EEA control for participation of the speaker itself. The dummies for the AEA and the NBER Summer Institute control for whether a paper of an individual was on the programme, but not necessarily presented by the individual itself. The AEA control is only included for 2020, because the conference programmes for the AEA in 2018 and 2019 would have been too time consuming to digitize.

[40] Future work could trace out the long-run effects of the technology shock on visibility of women.

4.F Robustness Checks

This section carries out a number of robustness checks.

4.F.1 Alternative Definitions of "Star" Speakers

The baseline definition of "star" speakers comprised the top 1 percent of speakers registered in the RePEc database. In Table A.4, the top 2 to 5 percent and the top 6 to 10 percent in terms of life-time output and in terms of output in the last 10 years are used as definition of "star" speakers. The point estimate in column (1) is close to zero and insignificant. This implies that in terms of life time output gains in shares were concentrated at the top 1 percent of the distribution. The coefficient estimate using the top 2 to 5 percent in terms of output in the last 10 years as outcome in column (2) is positive and significant at the five percent level. The magnitude is smaller than in column (2) in Table 3. The results in columns (3) and (4) for the top 6 to 10 percent show negative and small coefficients that are insignificant. This suggests that "star effects" quickly disappear as one considers higher percentiles of the productivity distribution.

4.F.2 Excluding Seminars Scheduled Rescheduled from Spring to Autumn

A share of approximately 8.68 percent of seminars in autumn 2020 has been rescheduled from spring 2020. These seminars have been included in the analysis so far, as the decision to reschedule is an endogenous choice. In robustness checks, these seminars have been excluded and the results remain the same. Table A.5 shows exemplifying the results for "star" speakers identified in the RePEc data. The results are by and large similar to Table 3. The magnitude of the coefficient estimate in column (1) increases and it becomes statistically significant at the 5 percent level instead of the 10 percent level.[41] This is reassuring as also the distribution of speaker characteristics in spring could be generally different from the distribution in autumn, for example due to teaching duties of speakers differing across fall and spring term.

4.F.3 Excluding Seminars with Pandemic Related Titles

Another concern is that the demand for certain topics changes due to the pandemic and that speakers ability to write a paper on the contemporaneous event correlates with productivity or research interests. As a robustness check all seminars in 2020 with pandemic related topics are excluded.[42] About 5.23 percent of seminar titles in the fall of 2020 are pandemic

[41] The results for the remaining tables are available upon request.

[42] Pandemic related topics are broadly defined and include apart from "COVID" many other key words such as "SIR" for SIR models or "epidemic".

related.[43] Table A.6 presents exemplifying the results for "star" speakers identified in the RePEc data. The results are robust to excluding pandemic related titles. The magnitude of the coefficients for the top 1 percent in terms of lifetime output and in terms of output in the last 10 years is reduced, which could suggest a quicker shift in the research output of high productivity researchers to pandemic related research.

4.F.4 Comparing the Distribution of Public Seminar Series to Institutional Seminar Series

One concern could be that seminar speakers that are underrepresented in institutional seminars after the technology shock select themselves into the newly established online seminar series open to the public. In order to address this issue, this study accessed the schedules for 31 online seminar series and compared them to the 509 institutional seminar series.[44] The distributions of institutional and public seminars look by and large very similar (Table A.7). Overall there are three significant differences in means. Public seminar series offer more presentations on average, which could be due to the fact that institutional seminar series also include small institutions. Editors from top journals excluding the top 5 were more likely to speak at public seminar series, which could be due to the focus on one field of most of the public online seminar series. The difference that stands out most is the difference in the rank of institutions of seminar speakers. Speakers in public seminar series were from institutions ranked 50 positions lower on average. In addition to the increased inequality in existing seminars due to the technology shock, this suggests an additional dimension of inequality across institutions due to the introduction of public seminar series. On the other hand, researchers with no access to top speakers might benefit more by being exposed to the frontier of ongoing research.

5 Conclusion

Understanding the effects of alternative work arrangements on individuals of different gender and productivity within a high paying occupation is challenging due to idiosyncratic tasks and unobserved shocks. This paper uses the transition from in-person presentations of seminars to online presentations as an exogenous technology shock. Drawing on a novel and unique data set on seminars in economics worldwide, this study documents first evidence on the changing nature of seminars in economics following the technology shock. First, this paper shows that the overall number of seminars declined and that the decline was not driven by the short-run supply of speakers. Then the distributional consequences of the technology shock are traced. The distribution of seminars speakers shifted toward

[43] The paper title is available for approximately 85 percent of seminars in 2020.

[44] A list of 31 online seminars included in the comparison is available upon request.

researchers of better quality, where quality was proxied by three different measures. The share of seminars held by women increased and even more so at medium distances, which suggests that the requirement to travel could be a barrier for women to accept seminar invitations. The geography of knowledge dissemination changed significantly as the average distance between host and speakers' institutions increased by 32 percent and the share of seminars across borders also increased. Finally, this paper presents preliminary evidence that the inequality in presentation opportunities manifested itself in inequality in citations.

Whether the rising inequality in terms of presentation opportunities is welfare increasing due to increased knowledge spillovers from access to frontier level research or welfare decreasing because of less presentation opportunities for speakers not at the top of the productivity distribution is an open question. From a normative perspective the findings suggest that offering to hold a virtual seminar for medium length distances may further reduce gender-inequality over time. The ICT capabilities learned during pandemic may mark the beginning of a new flexibility for all.

The lessons drawn in this paper may not only be applicable to economics, but also to other research fields that experienced a similar transition in the organization of research seminars. More generally, they can be relevant for the transition of in-person services that are provided remotely through ICT. The existing literature has argued that inventors and workers gain from personal interactions (Lucas 2009; De La Roca and Puga 2016; Akcigit et al. 2018; Andrews 2020; Battiston, Blanes i Vidal, and Kirchmaier 2020). Future research could trace the network effects of seminars in terms of collaboration and the publication outcomes of presented work. Thereby quantifying the extent to which online seminars are a substitute for in-person seminars in creating ties among researchers and in improving the quality of presented work.

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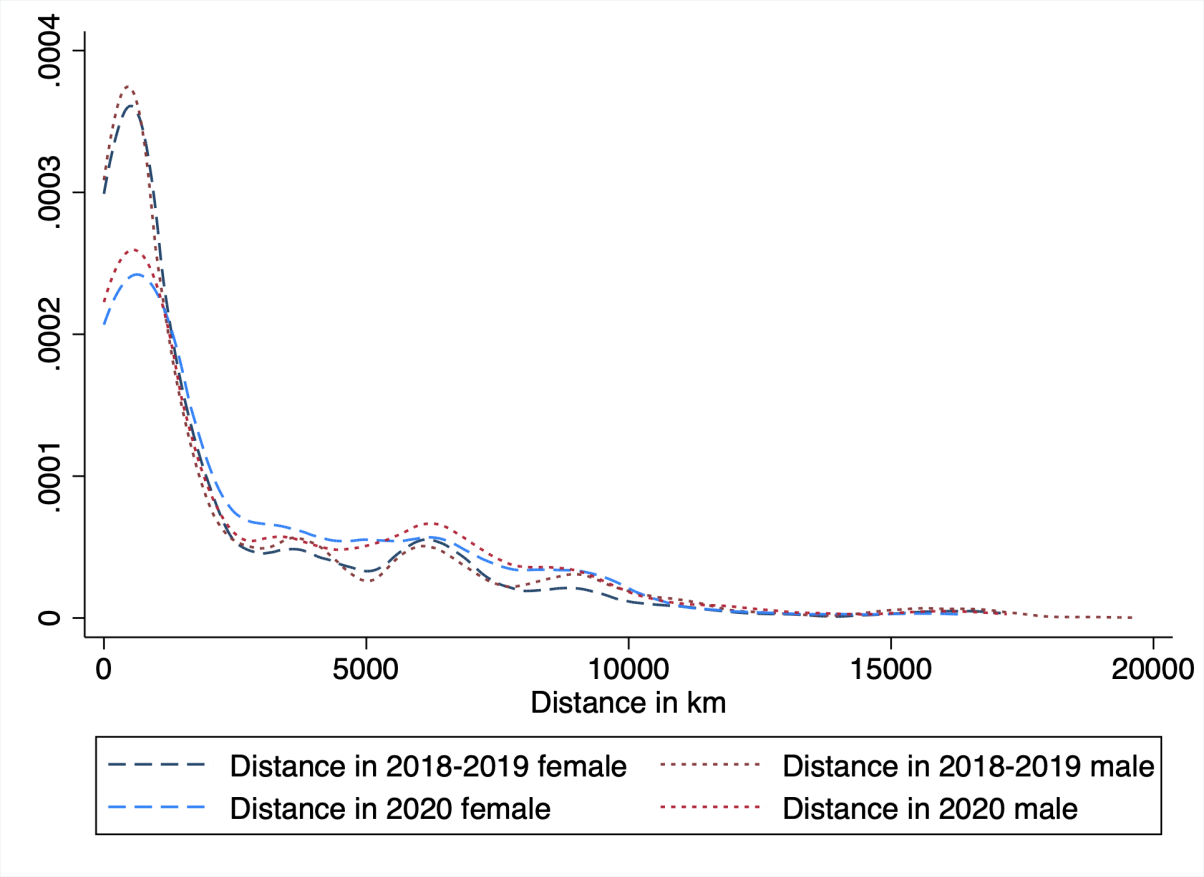
Figure 1: Density of bilateral distances before and after the technology shock by gender



Notes: The figure plots the density of presenters in the academic years 2018/19 and 2019/20 (before the technology shock) and 2020/21 (after the technology shock) by gender.

Table 1: Summary statistics of dependent variables

		Mean	Std. dev.	Min	Max	Observations
Dependent variables	Description					
Number of seminars$_{hst}$	Number of seminars at the host institution-seminar level	8.690	5.080	1	47	1,018
Share of cancellations$_{ht}$	Share of seminars cancelled at the host institution level	0.045	0.063	0	0.375	144
Share of female cancellations$_{ht}$	Share of seminars cancelled by female speakers at the host institution level	0.011	0.039	0	0.333	120
$\mathbb{1}$(RePEc top 1 percent$_{ihst}$)	Dummy equal to one, if speaker is among top 1 percent in RePEc ranking	0.070	0.256	0	1	6,528
$\mathbb{1}$(RePEc top 1 percent last 10 yrs.$_{ihst}$)	Dummy equal to one, if speaker is among top 1 percent in RePEc ranking based on publications in last 10 years	0.125	0.330	0	1	6,528
$\mathbb{1}$(RePEc top YE$_{ihst}$)	Dummy equal to one, if speaker is among top 200 young economists whose first RePEc publication is no older than 10 years	0.033	0.179	0	1	6,528
$\mathbb{1}$(Editorial role at top journal$_{ihst}$)	Dummy equal to one, if speaker fulfils editorial role at top journal excluding the top 5	0.182	0.386	0	1	8,127
$\mathbb{1}$(Editorial role at top 5$_{ihst}$)	Dummy equal to one, if speaker fulfils editorial role at top 5 journal	0.063	0.243	0	1	8,671
Rank speaker institution$_{ist}$	Rank of the speakers' institution in the Tilburg ranking	107.611	149.330	1	882	7,569
$\mathbb{1}$(Speaker is female$_{ihst}$)	Dummy equal to one, if speaker is female	0.218	0.413	0	1	8,671
Experience$_{ihst}$	Experience in years after PhD award at the time of the seminar talk	12.240	10.242	0	55	8,671
ln(distance$_{ihst}$)	Log of distance between host institution and speaker institution	6.827	1.962	-8.195	9.884	8,088
$\mathbb{1}$(Speaker institution abroad$_{ihst}$)	Dummy equal to one, if speaker institution is abroad	0.459	0.498	0	1	8,671
Δhours host and speaker$_{ihst}$	Time difference in hours between host institution and speaker institution	2.038	3.256	0	20	8,670
Number of seminars$_{it}$	Number of seminars given across 270 institutions in fall 2020	0.668	0.874	0	8	12,942
IHS(Citations$_{ihst}$)	Inverse hyperbolic sine of citations from Google scholar	5.354	1.647	0	10.385	10,541

Notes: The table shows means, standard deviations, minima, and maxima of the dependent variables. All values are for the academic years 2018/19 and 2019/20.

Table 2: The association between the number of held and cancelled seminars and the technology shock

	(1) ln(Number of seminars$_{hst}$)	(2) Share of cancellations$_{ht}$	(3) Share of female cancellations$_{ht}$
$\mathbb{1}(t =$ Academic year 2020/21)	−0.1240***	−0.0054	0.0054
	(0.0184)	(0.0042)	(0.0035)
Host institution × Seminar series FE	Yes	No	No
Host institution	No	Yes	Yes
R^2	0.792	0.295	0.310
Observations	1,527	216	180

Notes: Estimates of equation (1). The outcome in column (1) is the log of the number of academic seminars. The outcome in column (2) is the share of cancellations of planned seminars and the outcome in column (3) is the share of cancellations by female speakers of planned seminars. The specification in column (1) includes an institution-seminar series fixed effect and in column (2) and (3) a host institution fixed effect. The independent variable of interest is a time dummy for the academic year 2020/21. The regressions are weighted by the number of seminars in the respective year. Standard errors in parentheses, clustered at the host institution level.* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 3: The association between "star" speakers and the technology shock

	(1) $\mathbb{1}$(RePEc top 1 per.$_{ihst}$)	(2) $\mathbb{1}$(RePEc top 1 per. 10 yrs. publ.$_{ihst}$)	(3) $\mathbb{1}$(RePEc top YE$_{ihst}$)
$\mathbb{1}(t =$ Academic year 2020/21)	0.0098*	0.0341***	0.0091**
	(0.0056)	(0.0084)	(0.0042)
Host institution × Seminar series FE	Yes	Yes	Yes
Individual-level controls	Yes	Yes	Yes
R^2	0.278	0.165	0.085
Observations	9,169	9,169	9,169

Notes: Estimates of equation (2). The outcome in column (1) is a dummy variable equal to one, if the speaker is ranked among the top 1 percent of researchers in terms of overall output in the RePEc database. The outcome in column (2) is a dummy variable equal to one, if the speaker is ranked among the top 1 percent of researchers based on publications in the last 10 years in the RePEc database. The outcome in column (3) is a dummy variable equal to one, if the speaker is ranked among the top 200 economists whose first publication in the RePEc database is no older than 10 years. The specifications include an institution-seminar series fixed effect. Individual-level controls are speakers' gender and experience in years after PhD award. The independent variable of interest is a time dummy for the academic year 2020/21. Standard errors in parentheses, clustered at the host institution level.* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 4: The association between seminars by editors and the technology shock

	(1) $\mathbb{1}$(Editorial role at top journal.$_{ihst}$)	(2) $\mathbb{1}$(Editorial role at top 5.$_{ihst}$)
$\mathbb{1}(t =$ Academic year 2020/21)	0.0033	0.0208***
	(0.0072)	(0.0057)
Host institution × Seminar series FE	Yes	Yes
Individual-level controls	Yes	Yes
R^2	0.151	0.089
Observations	11,554	12,419

Notes: Estimates of equation (2). The outcome in column (1) is a dummy variable equal to one, if the speaker fulfills an editorial role at a top journal excluding the top 5 journals. The outcome in column (2) is a dummy variable equal to one, if the speaker fulfills an editorial role at a top 5 journal. The specifications include an institution-seminar series fixed effect. Individual-level controls are speakers' gender and experience in years after PhD award. The independent variables of interest is a time dummy for the academic year 2020/21. Standard errors in parentheses, clustered at the host institution level.* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 5: The association between speaker institutions' rank and the technology shock

	(1) Rank speaker inst.$_{ihst}$	(2) $\mathbb{1}$(Rank speaker inst. Q1$_{ihst}$)	(3) $\mathbb{1}$(Rank speaker inst. Q2$_{ihst}$)	(4) $\mathbb{1}$(Rank speaker inst. Q3$_{ihst}$)	(5) $\mathbb{1}$(Rank speaker inst. Q4$_{ihst}$)
$\mathbb{1}(t =$ Academic year 2020/21)	−7.3704**	0.0207*	0.0117	−0.0132	−0.0192**
	(3.0055)	(0.0108)	(0.0097)	(0.0091)	(0.0084)
Host institution × Seminar series FE	Yes	Yes	Yes	Yes	Yes
Individual-level controls	Yes	Yes	Yes	Yes	Yes
R^2	0.315	0.221	0.070	0.099	0.242
Observations	10,850	10,850	10,850	10,850	10,850

Notes: Estimates of equation (2). The outcome in column (1) is the rank of the speakers' institution in the Tilburg ranking. The outcomes in columns (2)-(5) are dummies equal to one, if the speaker institution is in the respective quartile, with the first quartile comprising the best institutions in the Tilburg ranking. The specifications include an institution-seminar series fixed effect. Individual-level controls are speakers' gender and experience in years after PhD award. The independent variables of interest is a time dummy for the academic year 2020/21. Standard errors in parentheses, clustered at the host institution level.* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 6: The association between speakers' gender and the technology shock

	(1)	(2)	(3)	(4)	(5)
	$\mathbb{1}$(Speaker is female$_{ihst}$)				
$\mathbb{1}(t =$ Academic year 2020/21)	0.0747***	0.0629***	0.0626***	0.0760***	0.0820***
	(0.0092)	(0.0109)	(0.0096)	(0.0122)	(0.0138)
$\mathbb{1}(t =$ Academic year 2020/21)$\times$ $\mathbb{1}(1{,}475\text{km} <$ Distance$_{iht})$		0.0271*			
		(0.0163)			
$\mathbb{1}(t =$ Academic year 2020/21)$\times$ $\mathbb{1}(1{,}475\text{km} <$ Distance$_{iht} < 5{,}000\text{km})$			0.0628***		
			(0.0201)		
$\mathbb{1}(t =$ Academic year 2020/21)$\times$ Rank host institution$_h$				0.00002	
				(0.00006)	
$\mathbb{1}(t =$ Academic year 2020/21)$\times$ Experience$_i$					−0.0006
					(0.0007)
Host institution $\times$ Seminar series FE	Yes	Yes	Yes	Yes	Yes
Experience	Yes	Yes	Yes	Yes	Yes
Distance dummy	No	Yes	Yes	No	No
R^2	0.095	0.095	0.096	0.098	0.095
Observations	12,419	12,417	12,417	11,281	12,419

Notes: Estimates of equation (2). The outcome all columns is a dummy variable equal to one, if the speaker is female. The specifications include an institution-seminar series fixed effect. The regressions control for speakers' experience. The regression in column (2) examines heterogeneity by a dummy equal to one if the distance between host and speaker institution is more than 1,475 km. The regression in column (3) adds an upper threshold of less than 5,000 km to the distance dummy introduced in column (2). The specifications additionally control for the respective distance heterogeneity dummy. The regressions in columns (4) and (5) investigate heterogeneity by the rank of the hosting department and speakers' experience, respectively. The independent variables of interest is a time dummy for the academic year 2020/21. Standard errors in parentheses, clustered at the host institution level.* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 7: The association of distance between host and speakers' institution and the technology shock

	(1)	(2)	(3)
	ln(Distance$_{ihst}$)		
$\mathbb{1}(t =$ Academic year 2020/21)	0.3158***	0.2999***	0.4189***
	(0.0552)	(0.0754)	(0.0579)
$\mathbb{1}(t =$ Academic year 2020/21)$\times$ Rank host institution$_h$		0.0002	
		(0.0004)	
Rank speaker institution$_{ist}$			–0.0009***
			(0.0003)
$\mathbb{1}(t =$ Academic year 2020/21)$\times$ Rank speaker institution$_{ist}$			–0.0011***
			(0.0003)
Host institution $\times$ Seminar series FE	Yes	Yes	Yes
Individual-level controls	Yes	Yes	Yes
R^2	0.202	0.202	0.214
Observations	11,594	10,570	10,135

Notes: Estimates of equation (2). The outcome in column (1) is the physical distance between the speakers' institution and the host institution. Column (2) examines heterogeneity by the rank of the host institution in the Tilburg ranking. Column (3) shows heterogeneity by the rank of the speakers' institution in the Tilburg ranking. Standard errors in parentheses, clustered at the host institution level.* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 8: The association between cross-border seminars and the technology shock

	(1) $\mathbb{1}$(Speaker institution abroad$_{ihst}$)	(2) ΔHours host and speaker$_{ihst}$	(3) ΔHours host and speaker$_{ihst}$
$\mathbb{1}(t =$ Academic year 2020/21)	0.0464***	0.3500***	0.0314
	(0.0123)	(0.0783)	(0.0525)
Host institution $\times$ Seminar series FE	Yes	Yes	Yes
Individual-level controls	Yes	Yes	Yes
Distance control	No	No	Yes
R^2	0.401	0.193	0.548
Observations	12,419	12,417	11,594

Notes: Estimates of equation (2). The outcome in column (1) is a dummy equal to one, if the speaker institution is located in a different country than the host institution. The outcome in column (2) is the time difference in hours between the time zone of the country of the speakers' institution and the country of the host institution. The regression in column (3) controls for the log of distance between host and speaker institution. All regressions are estimated using OLS. Standard errors in parentheses, clustered at the host institution level.* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 9: The association between the number of seminars and the technology shock by speaker characteristics

	(1)	(2)	(3)	(4)	(5)	(6)
	Number of seminars$_{it}$					
$\mathbb{1}(t = \text{Academic year 2020/21}) \times \mathbb{1}(\text{RePEc top 1 per.}_i)$	0.2288***					
	(0.0767)					
$\mathbb{1}(t = \text{Academic year 2020/21}) \times \mathbb{1}(\text{RePEc top 1 per. 10 yrs. publ.}_i)$		0.2481***				
		(0.0764)				
$\mathbb{1}(t = \text{Academic year 2020/21}) \times \mathbb{1}(\text{RePEc top young economist}_i)$			0.1588			
			(0.1523)			
$\mathbb{1}(t = \text{Academic year 2020/21}) \times \mathbb{1}(\text{Editor at top journal}_i)$				0.0047		
				(0.0457)		
$\mathbb{1}(t = \text{Academic year 2020/21}) \times \mathbb{1}(\text{Editor at top 5}_i)$					0.4057***	
					(0.1245)	
$\mathbb{1}(t = \text{Academic year 2020/21}) \times \mathbb{1}(\text{Speaker is female}_i)$						0.2178***
						(0.0315)
Individual FE	Yes	Yes	Yes	Yes	Yes	Yes
Individual controls x Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.376	0.377	0.376	0.384	0.386	0.384
Observations	13,943	13,943	13,943	19,521	19,521	19,521

Notes: Estimates of equations (3). The outcome in all columns is the number of seminars in the respective year. The regressions are estimated using OLS. The specifications include an individual fixed effect and time fixed effects. In addition, all regressions interact controls for gender and the year in which the PhD was awarded with time fixed effects. The regression in column (6) only controls for the year of PhD award interacted with time fixed effects. The independent variables of interest are speaker characteristics interacted with a time fixed effect for the technology shock. Standard errors in parentheses, clustered at the individual level.* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.)

Table 10: The association between speakers' citations and the technology shock

	(1)	(2)
	IHS(Citations$_{ijt}$)	
$\mathbb{1}(t = \text{Academic year 2018/19}) \times$ Number of seminars$_{ijt}$	−0.0030	0.0005
	(0.0051)	(0.0052)
$\mathbb{1}(t = \text{Academic year 2019/20}) \times$ Number of seminars$_{ijt}$	0.0049	0.0067*
	(0.0038)	(0.0039)
$\mathbb{1}(t = \text{Academic year 2020/21}) \times$ Number of seminars$_{ijt}$	0.0325***	0.0250***
	(0.0061)	(0.0063)
$\mathbb{1}(t = \text{Academic year 2020/21}) \times$ Number of public seminars$_{ijt}$		−0.0013
		(0.0229)
$\mathbb{1}(t = \text{Academic year 2018/19}) \times$ $\mathbb{1}$(NBER SI 2018$_{ijt}$)		−0.0112
		(0.0134)
$\mathbb{1}(t = \text{Academic year 2019/20}) \times$ $\mathbb{1}$(NBER SI 2019$_{ijt}$)		−0.0031
		(0.0117)
$\mathbb{1}(t = \text{Academic year 2020/21}) \times$ $\mathbb{1}$(NBER SI 2020$_{ijt}$)		0.0462**
		(0.0183)
$\mathbb{1}(t = \text{Academic year 2020/21}) \times$ $\mathbb{1}$(AEA 2020$_{ijt}$)		0.0490***
		(0.0124)
$\mathbb{1}(t = \text{Academic year 2018/19}) \times$ $\mathbb{1}$(EEA 2018$_{ijt}$)		−0.0620**
		(0.0244)
$\mathbb{1}(t = \text{Academic year 2019/20}) \times$ $\mathbb{1}$(EEA 2019$_{ijt}$)		0.0035
		(0.0207)
$\mathbb{1}(t = \text{Academic year 2020/21}) \times$ $\mathbb{1}$(EEA 2020$_{ijt}$)		0.0782**
		(0.0389)
Individual FE	Yes	Yes
Individual controls x Time FE	Yes	Yes
Public seminars x Time FE	No	Yes
Conference controls x Time FE	No	Yes
Time FE	Yes	Yes
R^2	0.981	0.981
Observations	15,881	15,881

Notes: Estimates of equations (4). The outcome in columns (1) and (2) is the inverse hyperbolic sine of citations of the seminar speaker in the respective year. The regressions are estimated using OLS. The specifications include an individual fixed effect and time fixed effects. In addition, all regressions interact controls for gender and the year in which the PhD was awarded with time fixed effects. The independent variables of interest are the number of seminars in fall in the respective year interacted with time fixed effects. The regression in column (2) introduces the number of public seminars in fall 2020 and the participation in three major conferences (NBER SI, AEA, EEA) as additional controls. Standard errors in parentheses, clustered at the individual level.* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.)

6 Online Appendix

Extract of host institutions included in the Sample[45]
Universities:

- Arizona State University, Bates College, Bilkent University
- Bocconi University, Bogazici University, Boston College
- Ca Foscari University of Venice, Catholic University of Milan, Central European University
- City University Hong Kong, City University London, City University of New York
- College Carlo Alberto, Columbia University, Cornell University
- Dartmouth College, Deakin University, Del Rosario University
- George Washington University, Georgia State University, Goethe University Frankfurt
- Harvard University, Heidelberg University, Hong Kong University of Science and Technology
- Humboldt University of Berlin, Indiana University, Instituto Tecnologico Autonomo De Mexico
- Keio University, Kings College, London; Kobe University
- Korea University, Lancaster University, Lingnan University
- London School of Economics and Political Science, Louisiana State University, Luiss Guido Carli University
- Maastricht University, Mcgill University, Monash University
- New University of Lisbon, New York University, Northeastern University
- Osaka University, Pompeu Fabra University, Purdue University
- Radboud University Nijmegen, Rutgers State University, Ryerson University
- Sabanci University, Seoul National University
- Sogang University, Southern Methodist University, Stanford University
- Suny, Stony Brook; Syracuse University, Technical University of Karlsruhe
- Tel Aviv University, Trinity College Dublin, Tsinghua University
- Tulane University, Universite Libre de Bruxelles, University College London

[45] Extract of 135 out of 270 host institutions chosen for space reasons. Full list available upon request.

- University Complutense Madrid, University Laval, University of Adelaide, University of Bergen
- University of California, Davis; University of California, Los Angeles; University of California, San Diego
- University of California, Santa Cruz; University of Connecticut, University of Edinburgh
- University of Erlangen-Nuremburg, University of Granada
- University of Graz, University of Groningen, University of Haifa
- University of Hamburg, University of Hannover
- University of Hohenheim, University of Innsbruck, University of Kiel
- University of Konstanz, University of Mainz, University of Marburg
- University of Memphis, University of Miami, University of Michigan
- University of Minho, University of Missouri, Columbia; University of Munich
- University of Naples Federico 2, University of Nebraska, Lincoln; University of New South Wales
- University of Notre Dame, University of Nottingham, University of Oklahoma
- University of Oslo, University of Ottawa, University of Oxford, University of Pavia
- University of Pittsburgh, University of Potsdam, University of Quebec, Montreal
- University of Regensburg, University of South Carolina
- University of Surrey, University of Texas, Austin; University of Tokyo
- University of Toulouse, University of Trento, University of Trier
- University of Turin, University of Verona, University of Victoria
- University of Vienna, University of Wyoming, University of York, University of Zurich
- Yale University, York University

Central Banks

- Banco de la Republica de Colombia, Banque de France, de Nederlandsche Bank
- Federal Reserve Bank of Atlanta, Federal Reserve Bank of Dallas, Federal Reserve Bank of St. Louis

Research Institutes

- IAB, IFN, IfW, RWI, VATT, WiiW

Journal List Tilburg Ranking

- American Economic Review; Brookings Papers on Economic Activity; Econometrica
- Economic Journal; Economics Letters; European Economic Review
- Games and Economic Behavior; International Economic Review; Journal of Applied Econometrics
- Journal of Business and Economic Statistics; Journal of Development Economics; Journal of Econometrics
- Journal of Economic Behavior and Organization; Journal of Economic Dynamics and Control; Journal of Economic Growth
- Journal of Economic Literature; Journal of Economic Perspectives; Journal of Economic Theory
- Journal of Financial Economics; Journal of Health Economics; Journal of Human Resources
- Journal of International Economics; Journal of Labor Economics; Journal of Monetary Economics
- Journal of Money, Credit and Banking; Journal of Political Economy; Journal of Public Economics
- Journal of Urban Economics; Journal of the European Economic Association; Quarterly Journal of Economics
- Rand Journal of Economics; Review of Economic Dynamics; Review of Economic Studies
- Review of Economics and Statistics; World Bank Economic Review

Sample selection

The mean (median) number of publications in the Tilburg ranking of matched host institutions that are universities is 58.07(29), whereas the mean (median) number of publications of institutions included in the sample is 22.32 (6), i.e. better ranked universities are more likely to report their seminar series over the past two academic years on their website. The average rank of matched host institutions that are universities in the Tilburg ranking is 257.13, whereas the average rank of universities is 550. The average rank of central banks in the sample is 15.18 in the RePEc ranking, and therefore very similar to the average rank of central banks included in the search, which is 15.53.

Seminar selection

This study restricts the set of seminars to those that are open to external speakers and excludes internal work in progress seminar series. It excludes cancelled and postponed seminars, as well as flyouts by job market candidates. When a seminar is held jointly by two series within an institution, it is assigned firstly to the seminar series which usually takes place at the time of the talk to avoid double recording.

Table A.1: The average rank of host institutions by quartiles of speakers' institutions rank

		Mean rank host inst.$_{h,18\text{-}19}$	Mean rank host inst.$_{h,20}$	Difference
Dependent variables	Description			
$\mathbb{1}$(Rank speaker inst. Q1$_{ihst}$)	Speaker institution ranked in first quartile before the technology shock	81.28	91.48	-10.21**
$\mathbb{1}$(Rank speaker inst. Q2$_{ihst}$)	Speaker institution ranked in second quartile before the technology shock	125.44	125.45	-0.01
$\mathbb{1}$(Rank speaker inst. Q3$_{ihst}$)	Speaker institution ranked in third quartile before the technology shock	161.12	164.23	-3.11
$\mathbb{1}$(Rank speaker inst. Q4$_{ihst}$)	Speaker institution ranked in fourth quartile before the technology shock	265.25	256.45	10.49

Notes: The table shows the average rank of the host institution by quartiles of the rank of speakers' institutions in the Tilburg ranking before and after the technology shock. The last column shows the difference between the two.

Table A.2: The growth rate of seminars at the continent level

(1) Continent host institution	(2) Continent speaker institution	(3) #Seminars in AY 2018/19	(4) GR btw. 2018/19 and 2019/20	(5) #Seminars in AY 2019/20	(6) GR btw. 2019/20 and 2020/21
Americas	Americas	1,965	0.36	1,972	-17.55
Europe	Europe	1,289	-2.48	1,257	-20.21
Europe	Americas	408	6.13	433	-1.39
Asia	Asia	248	-12.90	216	-13.43
Americas	Europe	206	-1.46	203	65.02

Notes: The table shows the aggregate number of seminars between continents in columns (3) and (5) for the academic years 2018/19 and 2019/20, respectively. The respective growth rates in percent are calculated in columns (4) and (6). Americas includes North and South America.

Table A.3: Distribution of the number of seminars per speaker

Number of seminar presentations	(1) 2018/19	(2) 2019/20	(3) 2020/21
0	50.75	52.56	60.41
1	37.22	35.89	29.93
2	8.50	7.73	6.28
3	2.13	2.58	2.14
$>= 4$	1.41	1.24	1.24

Notes: The table shows the distribution of seminars given, aggregated across 270 institutions in the sample.

Table A.4: The association between "star" speakers and the technology shock

	(1) $\mathbb{1}$(RePEc top 2-5 per.$_{ihst}$)	(2) $\mathbb{1}$(RePEc top 2-5 per. 10 yrs. publ.$_{ihst}$)	(3) $\mathbb{1}$(RePEc top 6-10 per.$_{ihst}$)	(4) $\mathbb{1}$(RePEc top 6-10 per. 10 yrs. publ.$_{ihst}$)
$\mathbb{1}(t =$ Academic year 2020/21)	0.0004	0.0262**	−0.0059	−0.0092
	(0.0089)	(0.0128)	(0.0091)	(0.0097)
Host institution × Seminar series FE	Yes	Yes	Yes	Yes
Individual-level controls	Yes	Yes	Yes	Yes
R^2	0.385	0.178	0.170	0.105
Observations	8,509	7,942	5,400	6,545

Notes: Estimates of equation (2). The outcome in column (1) is a dummy variable equal to one, if the speaker is ranked among the top 2 to 5 percent of researchers in in terms of overall output the RePEc database. The outcome in column (2) is a dummy variable equal to one, if the speaker is ranked among the top 2 to 5 percent of researchers based on publications in the last 10 years in the RePEc database. The samples in columns (1) and (2) exclude the top 1 percent of researchers in the respective sample. The outcome in column (3) is a dummy variable equal to one, if the speaker is ranked among the top 6 to 10 percent of researchers in terms of overall output in the RePEc database. The outcome in column (2) is a dummy variable equal to one, if the speaker is ranked among the top 6 to 10 percent of researchers based on publications in the last 10 years in the RePEc database. The samples in columns (3) and (4) exclude the top 5 percent of researchers in the respective sample. The specifications include an institution-seminar series fixed effect. Individual-level controls are speakers' gender and experience in years after PhD award. The independent variable of interest is a time dummy for the academic year 2020/21. Standard errors in parentheses, clustered at the host institution level.* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A.5: The association between "star" speakers and the technology shock - excluding rescheduled seminars

	(1) $\mathbb{1}$(RePEc top 1 per.$_{ihst}$)	(2) $\mathbb{1}$(RePEc top 1 per. 10 yrs. publ.$_{ihst}$)	(3) $\mathbb{1}$(RePEc top YE$_{ihst}$)
$\mathbb{1}(t =$ Academic year 2020/21)	0.0126**	0.0372***	0.0091**
	(0.0058)	(0.0091)	(0.0044)
Host institution × Seminar series FE	Yes	Yes	Yes
Individual-level controls	Yes	Yes	Yes
R^2	0.279	0.165	0.084
Observations	8,924	8,924	8,924

Notes: Estimates of equation (2). The outcome in column (1) is a dummy variable equal to one, if the speaker is ranked among the top 1 percent of researchers in terms of overall output in the RePEc database. The outcome in column (2) is a dummy variable equal to one, if the speaker is ranked among the top 1 percent of researchers based on publications in the last 10 years in the RePEc database. The outcome in column (3) is a dummy variable equal to one, if the speaker is ranked among the top 200 economists whose first publication in the RePEc database is no older than 10 years. The specifications include an institution-seminar series fixed effect. Individual-level controls are speakers' gender and experience in years after PhD award. The independent variable of interest is a time dummy for the academic year 2020/21. The sample excludes seminars that were rescheduled from spring 2020 to fall 2020. Standard errors in parentheses, clustered at the host institution level.* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A.6: The association between "star" speakers and the technology shock - excluding seminars with pandemic related titles

	(1) $\mathbb{1}$(RePEc top 1 per.$_{ihst}$)	(2) $\mathbb{1}$(RePEc top 1 per. 10 yrs. publ.$_{ihst}$)	(3) $\mathbb{1}$(RePEc top YE$_{ihst}$)
$\mathbb{1}(t =$ Academic year 2020/21)	0.0088*	0.0292***	0.0103**
	(0.0052)	(0.0084)	(0.0043)
Host institution × Seminar series FE	Yes	Yes	Yes
Individual-level controls	Yes	Yes	Yes
R^2	0.280	0.159	0.085
Observations	8,973	8,973	8,973

Notes: Estimates of equation (2). The outcome in column (1) is a dummy variable equal to one, if the speaker is ranked among the top 1 percent of researchers in terms of overall output in the RePEc database. The outcome in column (2) is a dummy variable equal to one, if the speaker is ranked among the top 1 percent of researchers based on publications in the last 10 years in the RePEc database. The outcome in column (3) is a dummy variable equal to one, if the speaker is ranked among the top 200 economists whose first publication in the RePEc database is no older than 10 years. The specifications include an institution-seminar series fixed effect. Individual-level controls are speakers' gender and experience in years after PhD award. The independent variable of interest is a time dummy for the academic year 2020/21. The sample excludes seminars with titles related to the pandemic. Standard errors in parentheses, clustered at the host institution level.* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A.7: Summary statistics by institutional and public seminars

		$\text{Mean}_{\text{inst.}}$	$\text{Mean}_{\text{public}}$	Difference
Dependent variables	Description			
Number of seminars$_{hst}$	Number of seminars of a host institution in a given year	7.454	9.065	-1.611**
$\mathbb{1}$(RePEc top 1 percent$_{ihst}$)	Dummy equal to one, if speaker is among top 1 percent in RePEc ranking	0.074	0.060	0.014
$\mathbb{1}$(RePEc top 1 percent last 10 yrs.$_{ihst}$)	Dummy equal to one, if speaker is among top 1 percent in RePEc ranking based on publications in last 10 years	0.153	0.109	0.044
$\mathbb{1}$(RePEc top YE$_{ihst}$)	Dummy equal to one, if speaker is among top 200 young economists whose first RePEc publication is no older than 10 years	0.041	0.044	-0.002
$\mathbb{1}$(Editorial role at top journal$_{ihst}$)	Dummy equal to one, if speaker fulfils editorial role at top journal excluding the top 5	0.178	0.224	-0.046*
$\mathbb{1}$(Editorial role at top 5$_{ihst}$)	Dummy equal to one, if speaker fulfils editorial role at top 5 journal	0.085	0.093	-0.008
Rank speaker institution$_{ist}$	Rank of the speakers' institution in the Tilburg ranking	102.480	52.879	49.601***
$\mathbb{1}$(Speaker is female$_{ihst}$)	Dummy equal to one, if speaker is female	0.297	0.342	-0.045
Experience$_{ihst}$	Experience after PhD graduation at the time of the seminar talk in years	11.688	11.350	0.338

Notes: The table shows mean of seminars in institutional and public seminars. The data for institutions comprise 509 seminar series and 3,794 seminars. The data on public seminars include 31 seminar series and up to 281 seminar speakers. All values are for the academic year 2020/21.

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