

# The environmental cost of the international job market for economists

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## Abstract

We provide an estimate of the environmental impact of the recruitment system in the economics profession, known as the “international job market for economists”. Each year, most graduating PhDs seeking jobs in academia, government, or companies participate in this job market. The market follows a standardized process, where candidates are pre-screened in a short interview which takes place at an annual meeting in Europe or in the United States. Most interviews are arranged via a non-profit online platform, econjobmarket.org, which kindly agreed to share its anonymized data with us. Using this dataset, we estimate the individual environmental impact of 1,057 candidates and one hundred recruitment committees who attended the EEA and AEA meetings in December 2019 and January 2020. We calculate that this pre-screening system generated the equivalent of about 4,800 tons of avoidable CO<sub>2</sub>-eq and a comprehensive economic cost over €4.4 million. We contrast this overall assessment against three counterfactual scenarios: an alternative in-person system, a hybrid system (where videoconference is used for some candidates) and a fully online system (as it happened in 2020-21 due to the COVID-19 pandemic). Overall, the study can offer useful information to shape future recruitment standards in a more sustainable way.

**Keywords:** job market for economists; international job market; carbon footprint; environmental impact; comprehensive economic cost

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# 1 Introduction

Two years ago, Anna, a graduating PhD in Economics at Penn State University was considering a job at the University of Washington. Where did her first job interview take place? Not in Washington, not online and not even in Pennsylvania. The answer is: San Diego, California. Bart, a young economist from the University College of London (UCL), was interested in the same position as Anna. His very first interview took place in San Diego, too. And what about Colin, Bart's graduating colleague at UCL? He wanted to stay in the UK and applied for a job in Liverpool. Strangely enough, he was interviewed in San Diego, too. Anna, Bart and Colin are fictitious candidates, but that global wandering to San Diego in 2020 was not.

To be sure, the reason is not related to San Diego in particular, but to the current recruitment system in the economics profession. This system follows a standardized process, where most graduating PhDs seeking jobs in academia, government, or companies are initially pre-screened in a short interview (25-35 minutes), and subsequently invited to give a seminar at the recruiting institution for the decisive set of interviews (known as "fly-out"). Pre-screening is centralized and takes place either at the Annual Meeting of the American Economic Association (AEA) or at the Annual Congress of the European Economic Association (EEA). In January 2020, the AEA Meeting took place in San Diego, and its European counterpart took place in Rotterdam a few weeks earlier. The result was a global movement of people which produced an imprecise but momentous amount of CO<sub>2</sub>-eq emissions and other pollutants, mainly through air transportation. The system has raised ecological concerns among some candidates and recruiters.

Even though individual responsibility plays an essential role in the ecological transition, market institutions can contribute a great deal to reducing emissions. The case of the job market for economists is paradigmatic. The use of video platforms, although technically possible, is rare. On the one hand, candidates are discouraged from asking for online interviews,

because, in doing so, they could introduce a comparative disadvantage to their competitors (recruiters tend to prefer face-to-face) and they would send a mixed signal about the number of interviews to which they have been invited at the annual meeting. On the other hand, recruiters have similar incentives to favor face-to-face interactions and to showcase their name among the list of employers. Each recruiter has a limited number of available interviews slots at each annual meeting, thus recruiters that are interested in next-door candidates might end up interviewing them on the other continent – which is what happened to Colin in our initial example. Overall, neither the candidates nor the recruiters have an incentive to deviate from the *status quo*: this is what economists would designate as an equilibrium. An ecologically unsustainable one.

The COVID-19 pandemic brought an unexpected disruption to this system. In 2020-2021, the international job market for economists was held entirely online. This event drew attention to the possibility of organizing the future recruitment standards in a more sustainable way in a post-pandemic world.

Herein, we present an original analysis and map out some potential solutions. Using a new high-quality dataset, our study estimates the environmental cost of in-person pre-screening for the 2019-20 edition of the international job market for economists. Previous research has estimated the environmental impact of academic activities. The main stream focuses primarily on the carbon footprint of conference participation ([Spinellis and Louridas, 2013](#); [Astudillo and AzariJafari, 2018](#); [Jäckle, 2019](#); [Burtscher et al., 2020](#); [Klöwer et al., 2020](#); [van Ewijk and Hoekman, 2021](#)), sometimes adding energy consumption ([Ørngreen et al., 2019](#)), time lost ([Ong et al., 2014](#)) or local pollutant effects ([Nevrlÿ et al., 2020](#)). An alternative approach uses the ecological footprint by considering the land surfaces needed to provide the goods and services necessary for the conference and to absorb the resulting waste ([Rickard, 2006](#)). The overall impact of an event (i.e. all the stages from the *ex ante* organisation to the subsequent impacts) is sometimes approached thanks to life cycle assessments ([Toniolo et al., 2017](#); [Neugebauer et al., 2020](#); [Tao et al., 2021](#)) or the ecological footprint ([Stiel and](#)

[Teuteberg, 2015](#)). Another strand of the literature considers the environmental impact of a research centre / a university / a research project as a whole and over a given period, generally through the prism of the carbon footprint ([Achten et al., 2013](#); [Arsenault et al., 2019](#); [Jahnke et al., 2020](#); [Ahonen et al., 2021](#); [Aujoux et al., 2021](#)). Finally, an article details the carbon footprint of all the stages of a scientific publication, from the early research stage to publication, with a life cycle assessment approach ([Song et al., 2016](#)).

Here, we contribute to the literature in two directions. We propose the first evaluation of an institutionalized professional job market, and we offer a comprehensive perspective by including many external costs (related to CO<sub>2</sub>-eq and local pollutant emissions, and covering climate change, accidents, air pollution, noise, congestion, well-to-tank, habitat), as well as private costs and time lost. We contrast this overall assessment against three counterfactual scenarios: an alternative in-person system, a hybrid system (where videoconferences are used for some candidates) and a fully online system (as it happened in 2020-21 due to the COVID-19 pandemic). To clarify, our estimates refer to the pre-screening phase only: the environmental impact of the entire recruitment process (including the fly-out phase) is inevitably larger.

## 2 Methodology and Data

Most pre-screening interviews are organized via [Econ Job Market](#), a non-profit online platform which kindly agreed to share its anonymized data with us. The dataset includes 3,001 interviews arranged by a hundred institutions with 1,356 candidates, both at the EEA Congress in Rotterdam and the AEA Meeting in San Diego. For each annual meeting, we know the place of departure of the candidates (inferred from their IP address), the recruiters (from their institutional affiliation) and the place of arrival (conference venue). We complement the dataset with the official list of recruiters (Rotterdam) and the list of recruiters scraped from the web (San Diego), and we prudently assume each recruiting committee to be composed of only two people. Although not all interviews are arranged via [Econ Job Market](#),

we estimate that the database covers about 95% of candidates in Rotterdam and 80% in San Diego (see Supplementary Information).

Estimation details are in the Supplementary Information. The CO<sub>2</sub>-eq emissions cover transport (by train when the travel duration is under six hours, by plane otherwise, [Jäckle, 2019](#); [Neugebauer et al., 2020](#)) and electricity consumption ([Kamiya, 2020](#)). We consider that only a fraction of the time spent in transportation is not productive (waiting, transit, transfers and boarding procedures). We compute the overall economic impact from several sources. For the external costs, a distinction is made between carbon footprint-related (climate change) and other external effects (accidents, air pollution, noise, congestion, well-to-tank, habitat). They are expressed in euro per passenger-kilometer for train and aircraft ([European Commission, 2019](#)), and in euro per kWh for electricity consumption ([European Commission, 2020](#)). Time lost in transportation is valued at the median after-tax wage rate, with different country-specific wages for recruiters and candidates ([European Commission, 2007](#); [Data Commons, 2022](#); [Indeed, 2022](#); [Payscale, 2022](#)). For private costs, we consider an average ticket price per travelled kilometer for train ([European Commission, 2016](#)) and plane ([Rome2Rio, 2018](#)), and an average expense per night for accommodations ([Where and When, 2022](#)). When in doubt, we adopt the most conservative assumption in our calculations. Hence, these figures are likely underestimating the actual environmental and economic costs.

### 3 Results and Alternative Scenarios

To attend pre-screening interviews at the 2019-20 AEA and EEA meetings, participants covered over 22 million kilometers, equivalent to more than 550 times the circumference of the earth. We find that the meetings generated 4,817 tons CO<sub>2</sub>-eq. Recruiters attending the AEA meeting are twice as numerous and more often come from other continents than those attending the EEA meeting, which explains why they represent the highest CO<sub>2</sub>-eq share (Figure 1). The total CO<sub>2</sub>-eq emissions associated with these few days of interviews

conducted in Rotterdam and San Diego exceeds by a factor 10 the typical total emissions of these cities during the same period (Moran et al., 2018). The average individual CO<sub>2</sub>-eq emissions of the participants were about 2.15 tons CO<sub>2</sub>-eq per person, equivalent to one-third of the average annual carbon footprint of a European and 13% of an American (World Bank, 2021). When adding up economic costs to the monetary value of environmental externalities, we estimate the economic impact of the 2019-20 AEA and EEA meetings at €4.45 million. This is almost ten times more than if we accounted for the carbon footprint only (see Figure 1). Below, we contrast the 2019-20 situation with three alternative ways to organize the job market pre-screening phase.

**Scenario 1. Doubled sessions. If all recruiters conduct interviews at both annual meetings while candidates only go to the closest meeting, the associated emissions would increase.**

Many candidates attended both the American and European meetings, while most recruiters attended only the closest event. Given that there are more candidates than recruiters, it is natural to wonder if the market should rather require the latter to travel. Indeed, if all recruiters conduct interviews at both annual meetings, candidates could attend only the closest meeting. Is this a good idea? The answer is, maybe surprisingly, no. The estimated cumulated emissions, displayed in the second column of Figure 1, are even higher than in 2019-2020. This happens because not all participants - either candidates or recruiters - attend both meetings in the current system. Instead, Scenario 1 would require all recruiters to do so.

Admittedly, not all recruiters would want to attend both meetings. For instance, in 2020, many recruiters at the meetings in San Diego interviewed only American residents, in a sort of national sub-market within the international job market. However, splitting the pool of recruiters between those willing and unwilling to attend both meetings does not seem feasible in practice. Most recruiters cannot forecast the nationality of the interviewees in advance, thus making fairly complicated to decide if it is worth attending both meetings. This decision

bears important financial costs, and could discourage recruiters from offering interviews to candidates from another continent. In conclusion, Scenario 1 would not help.

**Scenario 2. Hybrid. If recruiters and candidates attend only the closest annual meeting in-person, the associated emissions would be halved.**

Candidates and employers would be allowed to attend only the closest job meeting in person, while they would be able to be interviewed online at the other meeting. Intercontinental air transportation represents the largest ecological and financial cost of this job market. Therefore, shrinking this entry would generate important benefits at the expense of minor adaptations of the current system. And the paradoxical case of a European institution interviewing a European candidate in the US (or the reverse) would be avoided. A criticism could be that the annual meetings host not only the job market interviews, but also international conferences where economists share their latest research. However, recruiters and candidates rarely benefit from the academic presentations at the meetings and even more rarely they participate as speakers. Other criticisms might address the fact that a hybrid format introduces an asymmetry between next-door candidates (interviewed in person) and remote candidates (interviewed online). Yet, this asymmetry is already present, in the form of pre-interview effort to join the meeting, like jet lag and financial costs. Time differences could be easily accommodated, since interviews usually take place over the course of the entire day.

**Scenario 3. Fully virtual (as in 2020-21 and 2021-2022). If the entire screening process takes place online, the associated emissions would nearly be eliminated.**

By far, the fully virtual scenario represents the more sustainable one, both financially and ecologically. Of course, face-to-face interaction is important and the priority of an institutionalized job market should be to generate a good match between the recruiter and the candidate. Yet, virtual pre-screening does not prevent subsequent face-to-face interaction of the shortlisted candidates at the recruiter's institution. It simply delays it to a later stage, when the probabilities of an actual match are higher. Three collateral advantages make vir-

tual interviews fairer too. First, the current recruitment system disadvantages candidates from remote areas and non-Western countries. Attendance at the annual meetings requires a considerable financial cost that only the richest sponsors can cover and that is disproportionately high for non-European and non-American candidates. Second, those with caring commitments for themselves or relatives, or with disabilities can hardly join the annual meetings. Virtual interviews would remove these financial and personal barriers (Parncutt et al., 2021; Sarabipour et al., 2021). Third, virtual interviews could be recorded and archived, allowing the recruitment committee to review them asynchronously. Research has shown that committees' fatigue (Danziger et al., 2011) and candidates' traits (Maestriperi et al., 2017) can bias the decision process, even when they should not. Recordings might prove useful for contrasting these biases.

In Figure 1, the left panel details CO<sub>2</sub>-eq emissions associated with each scenario, while the right panel presents the environmental, private and opportunity costs. The figures show that Scenarios 2 and 3 would have generated 2,749 tons and 42 kg CO<sub>2</sub>-eq, respectively. In contrast to the €4.45 million comprehensive assessment of the 2019-20 meetings, alternative Scenarios 2 and 3 would have reduced these values to €2.62 million and €57, respectively. The largest savings are associated with travel and accommodations expenditures, and with climate-related costs.

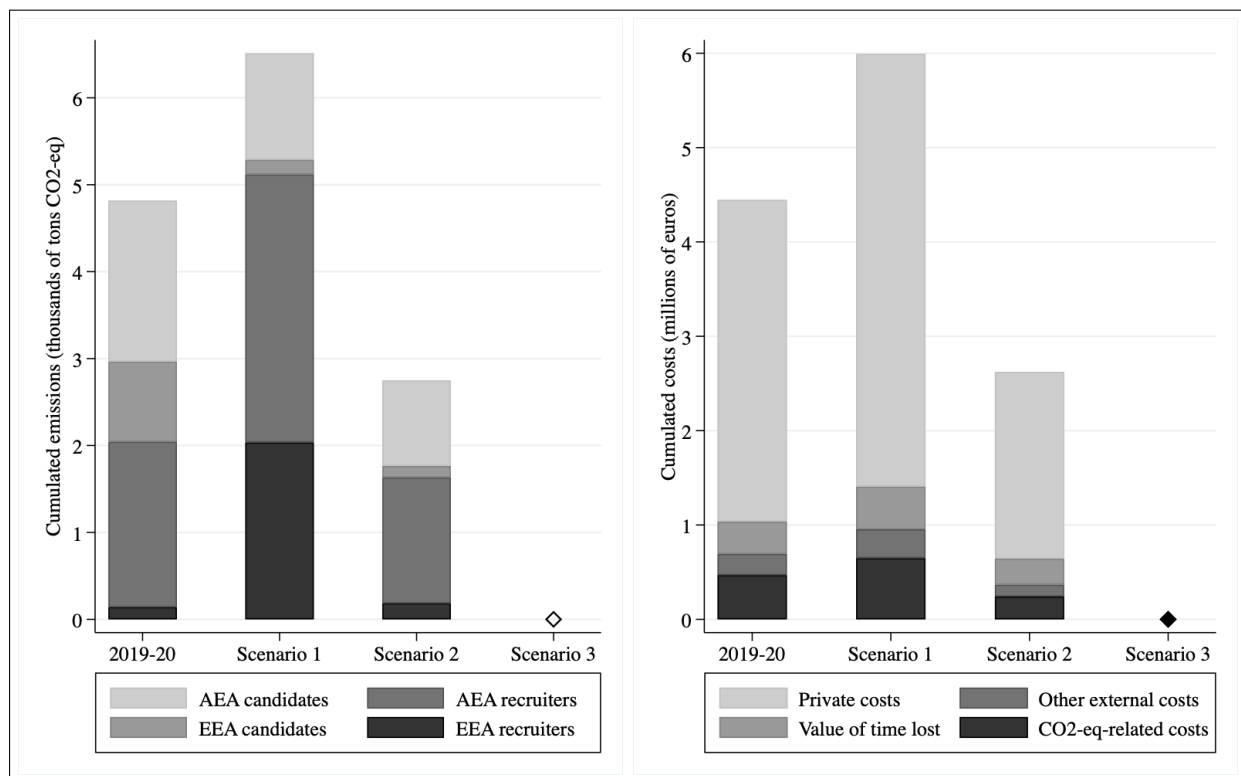
These results highlight a beneficial aspect of the COVID-19 pandemic for this professional job market. Switching from in-person to fully virtual interviewing saved thousands of tons of CO<sub>2</sub>-eq emissions and millions of euros for institutions. In the future, maintaining a fully virtual format would replicate this benefit annually and pave the way to a sustainable recruitment process.

## 4 Conclusion

Last year, the *Economist* underlined that at the 2021 AEA Meeting, held virtually, many contributions rediscussed foundational factors in the economics profession: “Just as the global



Figure 1: Overall emissions and economic assessment (by scenario).



**Notes:** This graph shows overall emissions and economic assessment with the pre-screening phase of the international job market for economists, for the academic year 2019-20, and compares them with three alternative scenarios. The left panel breaks down emissions across recruiters and candidates at the EEA and AEA meetings. The right panel breaks down costs between CO<sub>2</sub>-eq-related, other externality-related, private costs and value of time lost. In Scenario 1, recruiters go to both meetings while job market candidates only go to their closest meeting. In Scenario 2, both recruiters and candidates only go to their closest meeting. Interviews that cannot be conducted in-person are conducted online. In Scenario 3, job market interviews are conducted online. Emissions and associated costs take into account return trips. **Sources:** econjobmarket.org and personal computations.

financial crisis of 2007-09 prompted a rethink of the profession’s understanding of financial markets and macroeconomic policy, the pandemic may focus attention on other blind spots” ([The Economist, 2021](#)). We believe that the ecological impact of economists’ recruitment system is one of these blind spots, and it is urgent to rediscuss it.

Urgency comes not only from the pressing challenge of climate change, but also from the role of the pandemic in disrupting institutional inertia. In some cases, the institutional arrangement is purely a matter of coordination based on a public announcer (see [Gintis, 2014](#),

chap. 2; [Guala, 2016](#), chap. 4), rather than a matter of efficiency. The international job market seems to be one of these instances. In other words, in-person pre-screening might be a stable and widespread system not because it is the best solution, but because it is a useful convention pointed out by the job market organizers.<sup>1</sup> Indeed, the mis-matching costs due to online pre-screening of candidates is likely to be from small to negative. This is not a claim about job interviews in general, but about the specific format of the international job market pre-screening phase, which is highly standardized, short (30 minutes) and preliminary. In this case, in-person meetings seem a focal point of coordination chosen for historical reasons, not for efficiency concerns, and the choice seems to be determined by the public announcers, which are the American Economic Association and the European Economic Association.

In 2021-22, pre-screening was held again online, saving the equivalent of about 4,817 tons of CO<sub>2</sub>-eq and over €4.45 million, according to our estimations. This will also be the case in 2022-23, but it is unclear if the pre-screening will return to an in-person model in the post-pandemic world. Here, we presented two solutions to shape future recruitment standards in a more sustainable way.

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<sup>1</sup>At the cost of some game theory jargon, let us be more precise. The strategic interaction between candidates and employers in the pre-screening can be understood as part of a larger game, in which the public announcer moves first and acts as Nature by pointing at one of the several possible equilibria: namely, in-person participation, which is also a Nash equilibrium. This stable (but potentially sub-optimal) equilibrium is a correlated equilibrium of the original game ([Aumann, 1974](#)). The first move of the announcer - which, crucially, is observed by all the participants - is the correlating device ([Gintis, 2014](#), p.41).

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