

ESF Strategic Workshop on

Matching in the EU: Market Failures and Solutions

Bellaterra (Spain), 15-17 November 2012

Convened by:
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Scientific Report

EXECUTIVE SUMMARY

The ESF SCSS Exploratory Workshop EW11-208 entitled **Matching in the EU: Market Failures and Solutions** was held in the Institute for Economic Analysis (CSIC), Bellaterra, Spain between November 15th and November 17th, 2012.

Since the actual workshop presentations took place on one single day (November 16th), we conveniently decided to informally meet and get together on the afternoon of the day that preceded the workshop. This made sure most participants arrived on time, despite the chaos in air traffic caused by the general strike in Spain on November 14th.

The workshop was exploratory and novel as it focused on the frontiers at the interface of matching theory, laboratory experiments, empirical analysis and market design / policy making. The goal was to bring together active researchers from different fields to systematically explore the current European practices in student admissions (primary, secondary, and higher), entry-level professional labour markets, and other matching markets. The core goals of the workshop were to find out

- which clearinghouses and decentralized matching markets are at work in the EU;
- what are the economical and social implications of the different policies;
- which problems (if any) are experienced by the matching schemes;
- how market failures can be solved; and
- how cultural differences between different EU countries do or should play a role in the redesign of the matching markets that experience failures.

Twenty-seven participants (from ten European countries) representing twenty-one universities and research institutes attended the workshop which was conducted throughout in English. The participants were drawn from a range of academic disciplines including economics, computer science, mathematics, sociology and education economics and all had a keen interest in the topic with many being recognised experts in the field. The cross-national and interdisciplinary characteristics of the participants facilitated a vibrant and productive exchange of information and ideas which resulted in stimulating discussion and the identification of a number of key research themes which will underpin plans for furthering the research endeavour begun during the workshop.

The atmosphere at the workshop was convivial and respectful and the conference lunch and the two conference dinners organized by the convenors played a key role in developing a positive working atmosphere and in facilitating extensive exchange of information about the practice of matching in the EU. Furthermore, the small size of the workshop optimized opportunities for participant involvement and for the adoption of an interactive format which promoted in-depth discussion. Feedback from participants confirmed that that workshop provided an academically stimulating forum, was well-organized and enjoyable.

Overall the workshop highlighted the very critical need for involving policy makers and raising awareness regarding possible improvements in the practice of matching. The workshop also stressed the value of an interdisciplinary and cross-national approach to investigating the topic.

As convenors, we gratefully acknowledge the support we have received from the European Science Foundation to organise this event. We look forward to further cooperation with the ESF, either in the form of applying for a collaborative research project or through other initiatives.

SCIENTIFIC CONTENT

The workshop started off with a welcome by the convenor (**Flip Klijn**) with some practical information and a mention of the recent 2012 Nobel prize in Economics for two US matching researchers. His main message was to organize ourselves, increase visibility, and work on (the many) possible applications that the diverse aspects of different countries in the European Union call for.

Immediately following the welcome, there was a presentation by **Javier Esparcia** from the ESF Standing Committee for Social Sciences (SCSS) mainly about the working and structure of funding schemes of the European Science Foundation. This was very helpful for participants as it provided clear information about possibilities to obtain future funding for the organization of workshops, conferences, and more generally, research projects.

The seven scientific presentations were organized in two morning and two afternoon sessions. Each session dealt with a specific topic.

The first morning session consisted of two presentations about student sorting. The first presentation was by **Caterina Calsamiglia**, which was the only change in the originally planned programme due to a cancellation of a flight (because of the general strike in Spain one day earlier). Caterina Calsamiglia discussed the local case of school choice in Barcelona. School choice expansions have been one of the most widely used and questioned policy in education. In practice, school choice typically means that parents are asked to list their preferences over schools for their children. The literature has shown that under the so-called Boston mechanism parents may not have incentives to provide their true preferences. Unfortunately, it is also not clear what parents should (optimally) do. This presentation explained how a change in the neighbourhood design in Barcelona can be exploited to infer information about the parents' strategies. Among others, it provided evidence that parents almost always rank first the so-called neighborhood school, for which they have highest priority and which is a school determined by the local government.

The second presentation was given by **Simon Burgess**. He provided an

analysis of school admissions data from Brighton (UK). The local authorities had recently changed the assignment procedure by introducing a lottery system. Simon Burgess first explained the impact of the boundaries of so-called catchment areas. More precisely, under some assumptions, the study he presented estimates the strategic behaviour of the parents under different lottery set-ups. Finally, Simon Burgess showed how different set-ups affect the resulting school compositions and travel distances.

The second morning session consisted of a single presentation by **Ayse Yacizi**. Her work is motivated by a phenomenon observed in many centralized matching markets. An (important) example is the assignment of medical graduates to residency programs. Hospitals in rural areas are typically less preferred than those in urban areas by medical graduates, i.e., they are ranked below urban hospitals in a typical student's preference list. Also, graduates from relatively successful programs are more popular among hospitals. Rural hospitals often complain that their positions may not be filled by the stable centralized mechanism in use and that they may not be assigned popular graduates. The so-called rural hospital theorem established in several matching models states that the number of medical graduates assigned to a hospital and the set of graduates assigned to a hospital in a rural area do not vary across stable mechanisms. This shows that even though stability is an important requirement for the successful working of centralized markets it does have a negative and inherent impact for a part of the involved agents. The presentation made clear how pervasive this phenomenon is for a large class of preferences in a general many-to-many matching model.

The first afternoon session consisted of two presentations about randomization as a tool to obtain a fair matching procedure. The first talk on this topic was given by **Yinghua He**, using the assignment of students to schools as a leading example. Students are endowed with cardinal preferences and schools with ordinal ones, while preferences of both sides need not be strict. Partially based on the concept of competitive equilibrium from equal incomes, Yinghua He proposed a new mechanism in which students face different prices depending on how schools rank them. The mechanism improves upon existing ones as it always produces fair and ex ante efficient random assignments and stable deterministic assignments if both students and schools are truth-telling. In fact, a student's incentive to misreport vanishes when the market becomes large, given all other students are truthful. Yinghua He also discussed its application in more general school choice setting with group-specific quotas.

The second presentation in this session was by **Eun Jeong Heo**. She takes a new approach to probabilistic assignment problems where a set of objects are assigned to a set of agents. Her focus is on ordinal solutions that take agents' strict rankings over objects as input. An agent evaluates a set of lotteries based on the first-order stochastic dominance (sd, henceforth) relation. Because of the incompleteness of this relation, there are two notions of Pareto improvements: (i) sd-comparable improvement and (ii) sd-uncomparable improvement. The literature considers the first notion, while Eun Jeong Heo adopts the second notion by introducing strong sd-efficiency: there should be no sd-uncomparable improvement. Since randomization is used as a tool to achieve fairness, an

important question is whether there are any non-degenerate probabilistic rules satisfying strong sd-efficiency. Eun Jeong Heo provided a positive answer by showing that the novel class of so-called pairwise-diluted sequential priority rules satisfy the requirements.

After the coffee break the second afternoon session consisted of two presentations around the topic of college admissions procedures. In the first presentation, **Antonio Romero-Medina** presented a sequential admission mechanism where students are allowed to send multiple applications to colleges and colleges sequentially decide the applicants to enroll. He explained that by imposing irreversibility and sequentiality on agents' decisions, truthful behavior becomes a dominant strategy for colleges and the induced mechanism implements the set of stable matchings in subgame perfect Nash equilibrium. He also provided a similar analysis for the mechanism where colleges make proposals to potential students and students decide sequentially.

The last presentation of the workshop was given by **Zsuzsanna Jankó**. The main focus of this presentation was the extension of well-known results to a more general model where agents can have ties in their preferences. The model she presented is inspired by the centralized mechanism that is employed in the college admissions scheme of Hungary. She introduced a new stability concept (called "score-stability") and explained a generalization of the scoring method (from the Hungarian college admissions scheme) to so called "loser-free" choice functions. This generalization is useful to study for instance labour markets in which firms do not have strict preference orderings.

ASSESSMENT, OUTCOMES, AND FUTURE DIRECTIONS

In the period between the approval of the ESF workshop and when it took place, some of the involved researchers started to contact people to already build up and organize a network on matching. One of the important initiatives in this respect was carried out by Estelle Cantillon and Dorothea Kübler, who submitted a proposal to COST in summer 2012. Unfortunately, the proposal was not approved.

The brainstorming session in the afternoon of November 16th, 2012, was opened by Dorothea Kübler who posed several questions that were related to our ongoing attempts to organize the network of matching researchers. The questions were closely related to / triggered by the failed COST research proposal: (1) did the proposal make sense? (scope, goals, means); (2) how should we address the comments received by the COST referees?; and (3) next steps for the network.

On the scope of the network

The participants liked the proposal's scope and goals, and they overall agreed with the proposed means. On scope, it was suggested that the allocation procedures for teachers and the Erasmus exchange program raise non-trivial questions that are interesting and should be within the realm of the network.

On the best way to address the referees' critiques

Participants agreed that getting undergraduate students involved as workshop participants did not make sense but suggested that there were other ways to get their input. However, surveys are a possibility. Also, closer contacts with education ministries or international organizations (OECD, Eurydice, EURASHE, AHEA) might be helpful because of their role in collecting data and the current perception that these organizations do not pay enough attention right now to allocation procedures (and so do not collect information on these). Bringing people from these organizations to the network might be useful to raise awareness. At the very least, it would be good to get them involved in policy roundtables that we might want to organize in future workshops.

Finally, it was noted that we have already quite a bit of policy experience and we should leverage it more. There was also an interesting discussion on the need to raise awareness about the importance of allocation procedures. Policy-makers need to realize that they have a problem and we individually have a role in raising awareness about this, through the analysis of existing systems and the media.

The ESF representative mentioned that it is useful, both for participants and funders, when workshops such as this one, end with some concrete recommendations and output. One participant mentioned the successful newsletter that the Coalition Theory group edits after each workshop. That one is done by a professional (and paid) editor but Ph.D. students could also be used as rapporteurs. A website with a list of experts would be useful.

On collaboration with other networks

Dorothea Kübler identified two related networks (the US-based NBER Market Design group and the COST-funded COMSOC) that have some overlap with our approach. However, the main difference with these other networks is that we try to focus on applications and aim to involve different disciplines, such as sociology and education economics. There seemed to be agreement that pairing some events might sometimes be a good idea. However, we cannot expect to be free-riding on funding from these networks. Participants were not aware of any education or sociology research network that could share our interest in allocation procedures, but there certainly are education and labor economists at IZA with close interests. Participants from sociology and education economics committed to help in identifying researchers in their respective fields who could be interested in the activities of the network.

On future activities

We are planning to have another workshop in May 2013, probably in Brussels. We discussed the idea of focusing the theme a bit more or having one or two more focused sessions. This would help participants to get a more holistic view of the problem at hand and facilitate the reaching of concrete recommendations.

FINAL PROGRAMME

Thursday 15 November 2012

Afternoon *Arrival and get-together, Campus UAB, Bellaterra*
21.00 *Dinner in downtown Barcelona*

Friday 16 November 2012

09.00-09.10 **Welcome by Convenor**
Flip Klijn (Institute for Economic Analysis (CSIC), Bellaterra, Spain)

09.10-09.30 **Presentation of the European Science Foundation (ESF)**
Javier Esparcia Pérez (ESF Standing Committee for Social Sciences (SCSS))

09.30-11.00 Morning Session I: Student sorting

09.30-10.15 **Presentation 1 "What School do Parents Choose under the Boston Mechanism? Evidence from Barcelona"**
Caterina Calsamiglia (Universitat Autònoma de Barcelona, Spain)

10.15-11.00 **Presentation 2 "Estimating the Impact of a New Admissions Lottery on School Sorting"**
Simon Burgess (Bristol University, Bristol, UK)

11.00-11.30 *Coffee / Tea Break*

11.30-12.30 Morning Session II: Filled slots in entry-level professional labour markets

11.30-12.15 **Presentation 3 "A Many-to-Many Rural Hospital Theorem"**
Ayşe Yazıcı (Durham Business School, Durham, UK)

12.15-12.30 **Discussion**

12.30-14.00 *Lunch*

14.00-15.30	Afternoon Session I: Fairness through random matching
14.00-14.45	Presentation 4 "Competitive Equilibrium from Equal Incomes for Two-Sided Matching" Yinghua He (Toulouse School of Economics, Toulouse, France)
14.45-15.30	Presentation 5 "Strong Efficiency for the Probabilistic Allocation Problem" Eun Jeong Heo (University of Bonn, Bonn, Germany)
15.30-16.00	<i>Coffee / tea break</i>
16.00-17.30	Afternoon Session II: College admissions procedures
16.00-16.45	Presentation 6 "Non-Revelation Mechanisms in Many-to-One Matching Markets" Antonio Romero-Medina (Universidad Carlos III, Madrid, Spain)
16.45-17.30	Presentation 7 "Choice Function Based Two-Sided Markets" Zsuzsanna Jankó (Eötvös Loránd University, Budapest, Hungary)
17:30-19.00	Discussion on follow-up activities/networking/collaboration
19.00	<i>End of workshop and departure to Barcelona city center</i>
21.00	<i>Dinner in downtown Barcelona</i>

Saturday 17 November 2012

Morning *Departure*

FINAL LIST OF PARTICIPANTS

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Number of participants: 27

Country of Origin:

France: 2
Denmark: 1
Switzerland: 2
Belgium: 5
Germany: 3
UK: 3
Portugal: 1
Spain: 6 (including ESF rapporteur)
Hungary: 3
Slovak Republic: 1

Gender:

Female: 11
Male: 16