Matching asylum

Towards a fairer distribution of refugees

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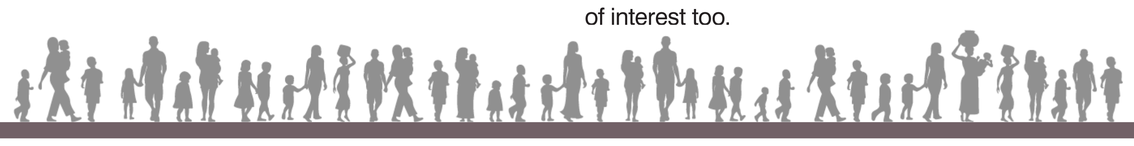
In economic or game theoretic terms the distribution of asylum seekers over host countries is a matching problem, and it may be (and has recently been) argued that implementing a matching system will substantially improve on the status quo of both asylum seekers and host countries. However, the proposals in the literature remain vague with respect to how such a system should be designed. The aim of this paper is to answer the question of whether the refugee-country market should be modelled as a College Admissions Problem or as a School Choice Problem. It is also shown more generally what the problems are that may be expected once a matching system is implemented.

How many and who?

There is heated academic and public debate over how keys for the distribution of refugees or asylum seekers over possible host countries can be designed fairly, and whether or not a (con-)federation like the EU should impose binding quotas for refugee reception. What figures less prominently in the debate is the question, not of *how many*, but of *who*. Both questions must be addressed: even if some states or a confederation of states come to an agreement on binding quotas, the question of which refugees get assigned to a given country in order to fill its quota is yet to be answered.

Moreover, note that the two questions are connected in important ways. For example, if a state has good experiences with the integration of a certain group of refugees, it may be willing to accept more refugees in the future. Furthermore, if a state has a fixed budget for receiving refugees, when receiving a group of refugees whose expected costs for that country are lower than the average (eg, because they speak the country's language so no language courses must be provided), its quota may be increased. So even if the policy maker is really concerned with quotas, the second question is of interest too.



Descriptive vs. normative considerations

In game theoretic terms, the question of how to efficiently distribute refugees over countries for asylum is a *bipartite, many-to-one matching problem*:

- a market which is defined through two disjoint sets: asylum seekers and states;
- members of the first are to be distributed over the members of the second;
- members of the market have preferences over (groups of) members of the other side of the market.
- Relative to the preferences, matchings may satisfy certain properties: stability (a given matching is regarded unstable if a refugee is matched to a country far on the bottom end of her preference relation, while a state she prefers would actually like to offer her asylum), *Pareto-efficiency, optimality, strategy-proofness of the associated mechanism*.

A *normative* question is whether it would be *beneficial* (for the refugees, or the participating states) to design and implement a matching system which algorithmically matches refugees with countries, and *how it should be designed*.

Is asylum a college admissions problem or a School choice problem?

CA Model

Matching market as College Admissions model: (C, R; **P**), where

- $C=\{c_1, \dots, c_m\}$ set of countries,
- $R=\{r_1, \dots, r_n\}$ set of refugees, and
- $\mathbf{P}=\{P(c_1), \dots, P(c_m), P(r_1), \dots, P(r_n)\}$ set of *complete, transitive, strict* preference lists, for each country over R, and for each refugee over C.

There is $E \subseteq R \times C$ of acceptable refugee-country pairs. Acceptable countries for refugees: $A(r_i) = \{c_j \mid (r_i; c_j) \in E\}$.

Assignment M: a subset of E. Say equivalently that r_i is assigned to c_j and that c_j is assigned to r_i under M if $(r_i; c_j) \in M$. The set of assignees for a given $a_k \in R \cup C$ is denoted by $M(a_k)$.

Refugees can be unassigned so $M(a_k) = \emptyset$, or otherwise assigned. Similarly, a country $c_j \in C$ is undersubscribed if $|M(c_j)| < q_j$, and full if $|M(c_j)| = q_j$.

Def: A matching M of refugees with countries is an assignment with

- $|M(r_i)| \leq 1$, for all $r_i \in R$, and
- $|M(c_j)| \leq q_j$, for all $c_j \in C$.

SC Model

Matching market as School Choice model: can be attained from a College Admissions model (C, R; **P**): restrict **P** to range over the set of refugees only. Countries cannot state their preference relations, but are endowed with priorities instead, which induce pseudo preference lists $Ps(c_j)$, for each country $c_j \in C$.

CA and SC models: differences

In CA, states are considered to be economic agents. In SC they aren't: they do not state preferences; instead, pseudo-preferences are imposed that reflect the policy choice of a higher-level institution – such as the UNHCR, or the government of the confederation to which it belongs – and may comprise factors such as urgency, dependants in that country, local proximity, languages spoken, etc. Moreover, states cannot strategise in SC, nor is their welfare measured and taken into account.

So the question of whether to model the distribution of refugees over host countries as a CA or as an SC problem is equivalent to the question of how much freedom is given to a state in deciding whom to provide with asylum.

On the face of it, it seems more realistic to model states as agents with preferences – and hence, to impose the CA model – because their governments clearly have preferences in issues of immigration. Moreover, since the CA model might then appear more attractive to national governments (because their preferences are taken into account), this may make it easier in practice to introduce a CA model as an immigration policy whenever states can voluntarily choose to participate in the system.

I argue, however, that the normative question of whether to model the refugee-country market as a CA or as an SC problem should be decided in favour of the SC model because there are structural disadvantages of the CA and advantages of the SC model which I take to be decisive.

Related literature

Various economists (Fernández-Huertas Moraga and Rapoport [2015]) and political scientists (Jones and Teytelboym [2016]) have argued that we should apply matching theory to the distribution of refugees. According to them, this would be advantageous for both refugees and the receiving countries:

For refugees: a matching system may take into account the preferences refugees have over countries, which is not the case in the current situation. For example, in the EU, the Dublin Regulation stipulates that the country responsible for the application of an asylum seeker is the country where she first entered the EU. But asylum seekers cannot usually choose where to enter the European Union, and particularly southern and south-eastern European countries are natural access points whereas central and northern European countries are not.

For countries: countries may benefit economically from the distribution a matching system produces. Suppose country A faces a high labour demand, whereas country B suffers under an overaged society and is willing to invest in the education of future labour force. A matching system produces a distribution of asylum applicants sensitive to states' preferences and may ensure that relatively many workmen get assigned to A, and families with children to B. This may make both countries better off.

However, the question of whether a matching system should be implemented cannot be settled without regards to a specific such system and a discussion of its characteristic properties. This is an important gap in the literature which I aim to fill. This paper models the refugee-country matching market as a College Admissions Problem and as a School Choice Problem, and I argue that the School Choice model is more apt for implementation.

Refugee crisis facts

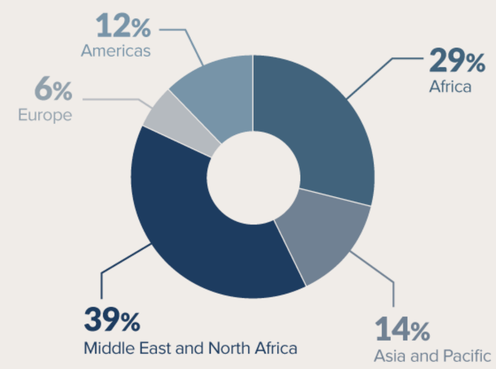
Number of asylum applications in the EU-28 from non-EU countries in 2015: almost 1.3 millions (Eurostat Asylum Statistics [2016]). This is more than twice the number of the previous year.

This was mainly a consequence of the ongoing conflicts in the Middle East: in 2015, almost 1 out of 3 first time asylum seekers originated from Syria (Eurostat), reaching a peak in the third quarter of 2015; followed by Afghanistan (14%) and Iraq (11%).

Although Europe has become the point of reference of many discussions on the refugee crisis, the crisis has reached the scale of a global humanitarian catastrophe. According to UNHRC (the UN Refugee Agency), the number of forcibly displaced people worldwide in 2015 equalled 65.3 million, which is the highest number since records began.

Asylum policy has become a central theme in the agendas of both home and foreign affairs in many states (eg the US, Australia), and is often accompanied with the emergence and rise of extreme right-wing anti-immigrant movements or parties.

At the same time, economists stress the importance of refugees as assets, and add that 'we could do a better job of integrating them into our economy' (Roth [2016]), which in turn may likely affect the way they are received.



Where are the world's displaced people being hosted?

Mechanisms

Refugees' courtship algorithm, μ^R

INPUT: A CA or SC-matching market (C; R; P).

S-1 As long as there are unmatched refugees, each of these proposes to her favourite country among those to which she has not proposed previously.

S-2 Each country tentatively accepts the proposals of the group it most prefers (in SC model: the group with the highest priority) until its quota is satisfied. The other proposers are dismissed.

S-n Repeat S-1 and S-2 until there are no more rejections.

Countries' courtship algorithm, μ^C: equivalent to μ^R, with the countries proposing and the refugees accepting/ rejecting.

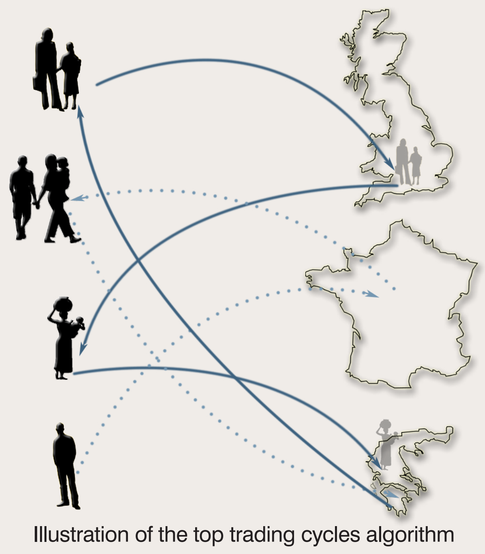


Illustration of the top trading cycles algorithm

Top trading cycles algorithm, μ^{TTC}

INPUT: A SC-matching market (C; R; P; Ps).

S-1 Each refugee points to her favourite country. Each country points to the refugee that has the highest priority. Since the number of refugees and countries are finite, there is at least one cycle. Every refugee in a cycle is assigned a place in the country she points to and is removed. The quota of each country in a cycle is reduced by one and if it reduces to zero, the country is removed.

S-n Repeat S-1 for the market that results from S-(n-1) until there are no more cycles.

Properties of the mechanisms

	CA model		SC model		
	μ^R	μ^C	μ^R	μ^C	μ^{TTC}
Strategy-proof	No	No	Yes	No	Yes
Stable	Yes	Yes	Yes	Yes	No
R-optimal	Yes	No	Yes	No	–
C-optimal	No	Yes	–	–	–
Pareto-optimal	Yes	Yes	weakly	No	Yes
" for refugees	weakly	No	weakly	No	Yes
" for countries	No	No	–	–	–

Conclusion: the SC model with either μ^R or μ^{TTC} seems most apt to be implemented as a migration policy – depending on whether stability or Pareto-optimality is considered more important in the context of the refugee match.

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