A Modern Design for University Admissions in the UK

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These slides as well as the details of our design can be found at

https://sites.google.com/site/aytekerdil/

Department
for Education

Post-Qualification Admissions Reform

Government consultation

Launch date 21 January 2021
Respond by 13 May 2021

" ... explore a PQA system for higher education, where students would receive and accept offers after they have received their A level (or equivalent) grades.

... explore proposals to remove the unfairness that exists in the current system of admissions."

What do we expect the system to achieve?

(1) **Fair matching**, i.e., better qualified applicants should not miss out on their preferred choices at the expense of less qualified applicants.

(2) Promote student choice and support aspirations.

(3) Help universities meet their target student numbers.

(4) Practical and cost-effective framework.

The current system fails on all four!

A rough timeline of the current system

Applications (5 courses per student) via UCAS.

Universities evaluate applications based on predicted grades,

Offers made. Usually conditional on meeting certain A-level results, but increasing use of unconditional and conditional-unconditional offers.

Students can hold at most two offers (*firm* and *insurance*).

Universities are told whether their offers are held and if so in what terms.

A-level results released. Universities confirm (or withdraw) their offers.

Adjustment and late clearing.

Where does the current system *obviously* fall short?

Fair Allocation:
Better qualified applicants should not miss out on their preferred choices at the expense of less qualified applicants.

BUT IN MANY OCCASIONS:

If $Bob \succ Ann$ in predicted grades

$$\implies \quad \text{Bob gets the offer in Ann's expense.}$$

Although $Ann \succ Bob$ in actual grades.

Hence inaccurate assessment can lead to unfair allocation!

These obvious shortcomings fuel much of the debate

Obvious unfairness of using predicted grades $\implies$ Obvious solution!

"*Universities should make offers only after A-level results!*"

Thus the focus on *Post-Qualification Admissions*, that is, PQA.

Is changing the timeline enough though?

Despite a centralised framework (UCAS) to organise admissions, decision making remains highly decentralised.

Lack of coordination between universities when making offers.

Hard to predict which offers will be accepted.

Universities CANNOT reliably control their student intake numbers.

$$\Longrightarrow \quad \textcolor{red}{\text{Market Failure}} \quad \Longleftarrow$$

$\Longrightarrow$ incentives to circumvent rules or transact outside the system.

Congestion $\implies$ inefficient and unfair allocation

Three universities: London, Manchester, Newcastle

Each with one seat.

Four students: Ann, Bob, Chris, Dan

Students' Preferences			
Ann	Bob	Chris	Dan
L	L	L	L
M	M	M	M
N	N	N	N

Course Admission Rankings		
L	M	N
Ann	Ann	Ann
Bob	Bob	Bob
Chris	Chris	Chris
Dan	Dan	Dan

Each student and university knows only their own preferences.

Without coordination... if each university makes two offers

Students' Preferences

Ann	Bob	Chris	Dan
L	L	L	L
M	M	M	M
N	N	N	N

Course Admission Rankings

L	M	N
Ann	Ann	Ann
Bob	Bob	Bob
Chris	Chris	Chris
Dan	Dan	Dan

Each university makes two offers $\implies$ Ann gets offers from L, M , N.
Bob gets offers from L, M , N.

Others don't get any offers.

Resulting match $\begin{pmatrix} \text{Ann} & \text{Bob} & \text{Chris} & \text{Dan} \\ L & L & - & - \end{pmatrix}$

London has too many students.   Manchester and Newcastle have none.
Chris & Dan unmatched despite two vacancies in M and N.

Market failure can persist or even get worse

When markets fail, actors circumvent or transact outside the system.

In order to lock students early in the calendar, some universities started making conditional-unconditional offers:

"Here's a conditional offer. But if you list our course as your firm choice, then we will convert your offer to an unconditional offer."

→   Severely restrict student choice.

→   Amount to "pressure selling".

→   Disincentivise student learning and pursuit of aspirational choices.

→   Unfair allocation.

In 2019, almost two in five applicants received an offer with an unconditional component and 60% of these unconditional offers were conditional-unconditional offers.

Half of applicants with such offers said it would have an impact on which course they selected as their first choice.

With PQA things can get worse

Post-qualification admissions will narrow the window of communication to a few weeks in August.

$\rightarrow$ **We can expect significantly more congestion...**

. . . unless we get market clearing right!

Design lessons

▶ Take universities' need to meet their targets seriously.

▶ Ensure system does not leave any advantageous opportunities to transact outside the system.

▶ Be cautious about *unintended consequences*.

$\longrightarrow$ We need:

Fast & Efficient & Fair
Market Clearing

Gale and Shapley's Deferred Acceptance Algorithm

Given
- students' preference rankings over courses,
- universities' admission rankings over applicants,
- target student numbers for each course.

Step 1: Each student "applies" to their first choice course. Each course tentatively assigns its seats to its applicants one at a time in the order of its course admissions ranking. Any remaining applicants are rejected.

Further steps: Each student who was rejected in the previous step applies to their next choice if one remains. Each course considers the students it has been holding together with its new applicants, and tentatively assigns its seats to these students one at a time in the order of its course admissions ranking. Any remaining applicants are rejected.

END: Stop at the end of the step where no student application is rejected. Make the tentative assignments final.

Facts about the algorithm

Automated, speedy simulation of an idealised scenario of negotiations leading to a **fair** and **efficient** matching.

Fact 1. The outcome is fair (i.e., no student misses out on a course at the expense of a less qualified student).

Fact 2. The outcome is student-optimal among all fair matchings.

Fact 3. It is in the best interest of applicants to reveal their preferences truthfully (regardless of what other students reveal).

Fact 4. Transacting/matching outside the system doesn't pay off.

The Basic Outline of Our Proposal
based on Post-Qualification Matching (PQM)

STUDENT APPLICATIONS   (Usually by Jan 15)

↓

PRELIMINARY ASSESSMENT

Universities assess applicants on the basis of available information to form *preliminary course admission scores*.

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A-LEVEL RESULTS   (Early August)

↓

MAIN MATCHING ROUND   (Mid-August)

MAIN MATCHING ROUND   (Mid-August)

(1) On a UCAS platform, students list all courses they have already applied to in order of their preference.

(2) Universities integrate A-Level results into their preliminary admission scores, and finalise their *course admission rankings*.

(3) UCAS runs the deferred acceptance algorithm to identify for each applicant their most preferred choice for which they can qualify.

What's next?

A full-fledged design will also need to address:

- ▶ contextual assessment,
- ▶ early offers to applicants applicants with special needs,
- ▶ additional applications following the release of A-level results,
- ▶ late clearing of vacancies due last minute dropouts, etc.

The devil is in the detail!

See how we accommodate all of these in our paper:

"**A Modern Design for University Admissions in the UK**"