





Alvin Roth

In “normal” markets, prices adjust to equate demand and supply; the market clears. This simple premise is at the core of economic thought. But with surprising frequency, prices are not enough and can even be irrelevant. These markets are broken in the sense that price adjustment won’t clear them, and economists have long struggled to understand efficient allocation in such cases.

Alvin Roth began studying these “broken” markets in the 1970s. Decades later, in 2012, this body of work was recognized with the Nobel prize. By extending theory developed by mathematician Lloyd Shapley, his Nobel co-recipient, Roth had “generated a flourishing field of research and improved the operation of many markets,” said the Nobel committee. “An outstanding example of economic engineering.”

Roth’s theoretical, empirical and experimental research has transformed how medical residents find jobs, parents find good schools for their children and renal patients find kidneys that save their lives. Economics is often deemed impractical—too abstract from the real world to have pragmatic importance. Roth’s career is solid refutation of that notion.

Inspired by Shapley’s mathematical proof with David Gale that stable matches—those in which currently paired partners see no benefit from a different match—*can* exist in theory, Roth discovered that the mechanism used successfully since the 1950s to match U.S. medical residents with hospital jobs was quite similar to the Gale-Shapley algorithm. This careful analysis led to a 1995 invitation from doctors who had found that the growing number of married couples seeking hospital posts undermined the existing algorithm. No longer were matches stable. Roth helped redesign the algorithm, used with success ever since.

Similar analysis and redesign have been at the heart of Roth’s work, applied to kidney donations, public schools, law student clerkships and a wide variety of health care labor markets. Others have extended it into financial intermediation, Internet advertising auctions and even dating services. He addresses many of these topics in the following conversation, along with the success of experimental economics, the ubiquity of “repugnant” markets and the vital importance of coffee.

PHOTOS BY PETER TENZER

MATCHING MARKETS

Region: Perhaps we could begin with some general background on matching markets. In your Nobel lecture, you said, “You can’t just tell Google that you are showing up for work. They have to hire you.”

Roth: They do indeed.

Region: And you continued: “Matching markets are markets in which you can’t just choose what you want (even if you can afford it). You also have to be chosen.”

That suggests that prices alone don’t clear markets in certain cases. Could you elaborate on which markets that applies to, and why prices don’t equate supply and demand in those situations?

Roth: Well, it might be easiest to first talk about commodity markets because they are markets where we think price *does* do all the work. It takes a lot of design to make something into a commodity market.

Take wheat, for example. God makes wheat, but the Chicago Board of Trade makes #2 hard red winter wheat. It has a lot less variance than wheat. You know what you’re going to get and, therefore, you don’t have to care who you’re buying it from. You don’t have to inspect it. But before wheat was commodified, you had to have someone look at the wheat to see what you were buying. Similarly, before coffee was commodified in Ethiopia, you needed a man in Addis Ababa tasting the coffee; now you don’t.

In those markets, you can make an offer to the entire market. I want #2 hard red winter wheat from whomever; it doesn’t matter who I get it from.

But, of course, labor markets aren’t like that, and many other markets aren’t like that—because you care not just about the price, but also about who you’re dealing with. What that means is, if everyone has a different price—if dealing with you is so nice that I’m willing to

ON MATCHING MARKETS

There isn’t a sharp line between matching markets and commodity markets. There are markets where price does all the work: the New York Stock Exchange, for instance. The labor market is very personal, but price also matters a lot, so it’s somewhere in the middle. For school choice and kidney exchange, we don’t let prices work at all.

pay a higher price rather than deal with someone else—there’s no longer a small-dimensional vector of prices that organizes the market, like a price for each kind of wheat.

Instead, it’s personalized prices, maybe *doubly* personalized prices. How much will Google pay me to work for them? How much would I need to take their offer, rather than a different salary from Facebook?

The space of prices is larger, so even if you tried to organize the market entirely through prices, you would need to see many, many more prices than you do in the market for coal, where you only need a price per ton for each grade of coal.

There isn’t a sharp line between matching markets and commodity markets. I think there is sort of a continuum. There are markets where price does all the work: the New York Stock Exchange, for instance. Its job is to define at any moment the price at which supply equals demand for each of a bunch of financial commodities. The labor market is very personal, but price also matters a lot, so

it’s somewhere in the middle of the continuum. For school choice and kidney exchange, we don’t let prices work at all. And lots of markets fall somewhere between kidney exchange and the market for wheat.

Region: Would marriage be a matching market where price plays no role—at the kidney exchange end of the continuum?

Roth: Marriage is very much a matching market. You care who you’re matched to, and you can’t just choose who you want to be matched to; your proposal has to be accepted. And, yes, while prices play a role in so many things, a marriage is a very complex relational contract and it’s hard to specify it with prices.

Many, many markets are not decided only by prices. And there are some markets where we don’t allow prices to play a role at all.

STABILITY, PREFERENCES & SCHOOL CHOICE MECHANISMS

Region: One of your early papers—it might be the first with “matching” in its title—is your 1982 article “The Economics of Matching: Stability and Incentives.” In it you demonstrate, I believe, that it’s not possible to design a stable matching procedure in which all parties reveal their true preferences. You can get one or the other—either stability or true revelation—but not both.

On the other hand, you find that you can obtain stable outcomes if you limit the goal of true preferences to just one side of the match. How do these findings, which I hope I’ve summarized accurately, help in the design of good matching markets?

Roth: Well, let me say first that as we’ve begun to explore large markets, we’ve come to understand those results differently and better. But the reason it’s nice to be able to make it completely safe for people to reveal their true preferences is that then you can give them very simple advice.

Think about school choice mechanisms. When we talk about whether a mechanism is simple, we want to distinguish whether it's simple to describe or simple to engage with. There are some mechanisms that are simple to describe, but are difficult to engage with. An example is the school choice mechanism that a number of American cities used: the "immediate acceptance" mechanism once used in Boston.

Boston was one of the cities where school district leaders knew that parents had information about which schools would be good for their kids, so they wanted to assign children based partly on where parents wanted them to go. But what they decided to do, very benignly, to have a very simple mechanism, was to say, we'll ask parents for rank-order lists: "What's your first choice, second choice, third choice?" And we'll give as many people as possible their first choice.

Then, when a school has more people indicate it as their first choice than it has places for, we will have a priority system. Children who have older siblings going to the school get top priority; maybe children who live nearby will get some priority. Otherwise, we'll have a lottery. But we'll only use priority when a school is oversubscribed by people who ask for it as their first choice.

And then, after we've given as many people as possible their first choice, we'll do the same thing with the remaining people. We'll give as many people as possible their second choice using priority only to break ties when there aren't enough spaces and so forth.

So that choice mechanism, the old Boston mechanism, is very simple to describe. It's clearly benign in intent. But it made it very difficult for parents to know how to fill out their rank-order list. It wasn't safe for them to put down their true preference because if they didn't get their first choice, there was a good chance that their second choice might have filled all its places with people who asked for it as their first choice.

ON STABILITY, PREFERENCES & SCHOOL CHOICE MECHANISMS

The old Boston mechanism made it very difficult for parents. It wasn't safe for them to put down their true preference because if they didn't get their first choice, their second choice might have filled all its places. [Parents] had to think, "What school should I list as my first choice that I can actually get assigned to?" That's a very different question than which kindergarten teacher is the best with shy boys.

Region: And so parents strategized, right? They didn't necessarily state their true preferences because they knew doing so might result in bad school assignment outcomes for their children.

Roth: Yes, even if you had very high priority, you had to think, "What school should I list as my first choice that I can actually get assigned to?" That's a very different question than which kindergarten teacher is the best with shy boys, or whatever your particular problem is.

So, one advantage to changing to a system where we can prove it is safe for you to state your true preferences is that we can say to families, "You needn't worry that if you don't get your first choice, you will have any less chance of getting your second choice. Your chance of getting your second choice will be just as good as if you had listed it as your first choice, once you don't get your first choice."

With this system, you can now give families simple instructions that make it easy for them to convey to the school system the schools they really want—not the schools they think they have a good chance of being assigned to. That gives families an easier chance of getting the school they actually want.

It also gives the school systems data on which schools people really want. They might discover after changing the choice mechanism that there was some school that previously, with the old mechanism, many people listed as their first choice that now no one lists as their first choice.

Region: The flaws in the initial Boston mechanism came to light in the early 2000s, I think, and you and your colleagues were brought in to address those weaknesses.

Roth: Right. The old Boston system was the subject of an article by Atila Abdulkadiroğlu and Tayfun Sönmez. Around the same time, I'd been engaged with Atila and Parag Pathak in redesigning New York City's school choice system. Those events combined in various ways to get us all an invitation to talk to Boston public schools.

Since then, Parag Pathak and Atila Abdulkadiroğlu have gone on to become very deeply engaged in school choice. Not only have we helped design school choice systems in other cities, but Parag and Atila together with Josh Angrist and others have been taking very seriously the data that arise from these systems, for two reasons. One is that you can now get reliable information about which schools parents like, not just which ones they think they can get, as I mentioned.

But also, because there's some randomization in which kids get assigned to which schools when schools are oversubscribed, they can use that randomization to start making sensible inferences from the data about the effect of getting the school you want. They can do regression discontinuity studies; they can do

other things to not just help parents put their kids in schools they like, but to see what is the effect of doing that.

So all of a sudden there's an avenue of empirical research opening up, which Parag and Atila are leading participants in, which is going to really change our understanding of how families and students and schools interact with each other.

Region: Going back to Boston in particular, I think they adopted the "deferred acceptance mechanism" that you have worked on. Were you able to evaluate whether and how that improved outcomes?

Roth: That's the project that Atila and Parag with various colleagues, among them Josh Angrist, are pursuing now. We can see some improvements. We can see that preference lists got longer than under the old immediate acceptance algorithm that Boston used to use. In that system, the school system would first give as many people as possible their first choice, as many people as possible their second choice, et cetera.

So there wasn't much point in submitting a rank-order list of more than, say, three schools, because if you didn't get your top three schools, then the only schools available to you were going to be schools that still had places empty after everyone else had gotten their top three schools. And those were going to be a hard set of schools to deal with and to think about in advance, so there was no point in putting down your fourth and fifth choices. If those were pretty popular schools, they would surely be filled.

So, one of the changes we noticed after changing the system to make it safe to put down true preferences is that the choice lists got longer. It now made sense for families not just to focus on which school they could get as their first choice. The school they could get as their first choice under the old system might now be their third choice. Maybe it was a great half-day kindergarten, but they'd

ON MATCHING RESIDENTS AND HOSPITALS

Doctors finally decided to have a centralized clearinghouse. This was voluntary. But, in fact, both applicants and employers submitted rank-order lists and took the suggestions that the match gave them. They've had very high success rates. For a couple of decades, most doctors got their jobs that way. With some modifications, it's still working.

really like to put their kid in an all-day kindergarten. But they didn't have high priority for the all-day kindergarten, so it was risky. But wouldn't it be great if their kid *was* in an all-day kindergarten?

Now they can say: First choice is an all-day kindergarten, second choice is a different all-day kindergarten. Third choice is the half-day kindergarten that I'm across the street from. We started to see kids getting assigned to a popular half-day kindergarten as their third choice, which could never have happened before. In New York City, they also used the preference data as part of their process of figuring out which schools to close.

MATCHING RESIDENTS AND HOSPITALS

Region: I'd like to ask about a different market you've worked on. In 1984, you wrote about the evolution of the labor market for medical interns and residents. That was really pathbreaking both for medicine and for economics because

it provided clear analysis of an important market where good matches are paramount, but difficult to achieve. Could you describe briefly some of the initial problems with the internship programs that started in, I believe, the early 1900s?

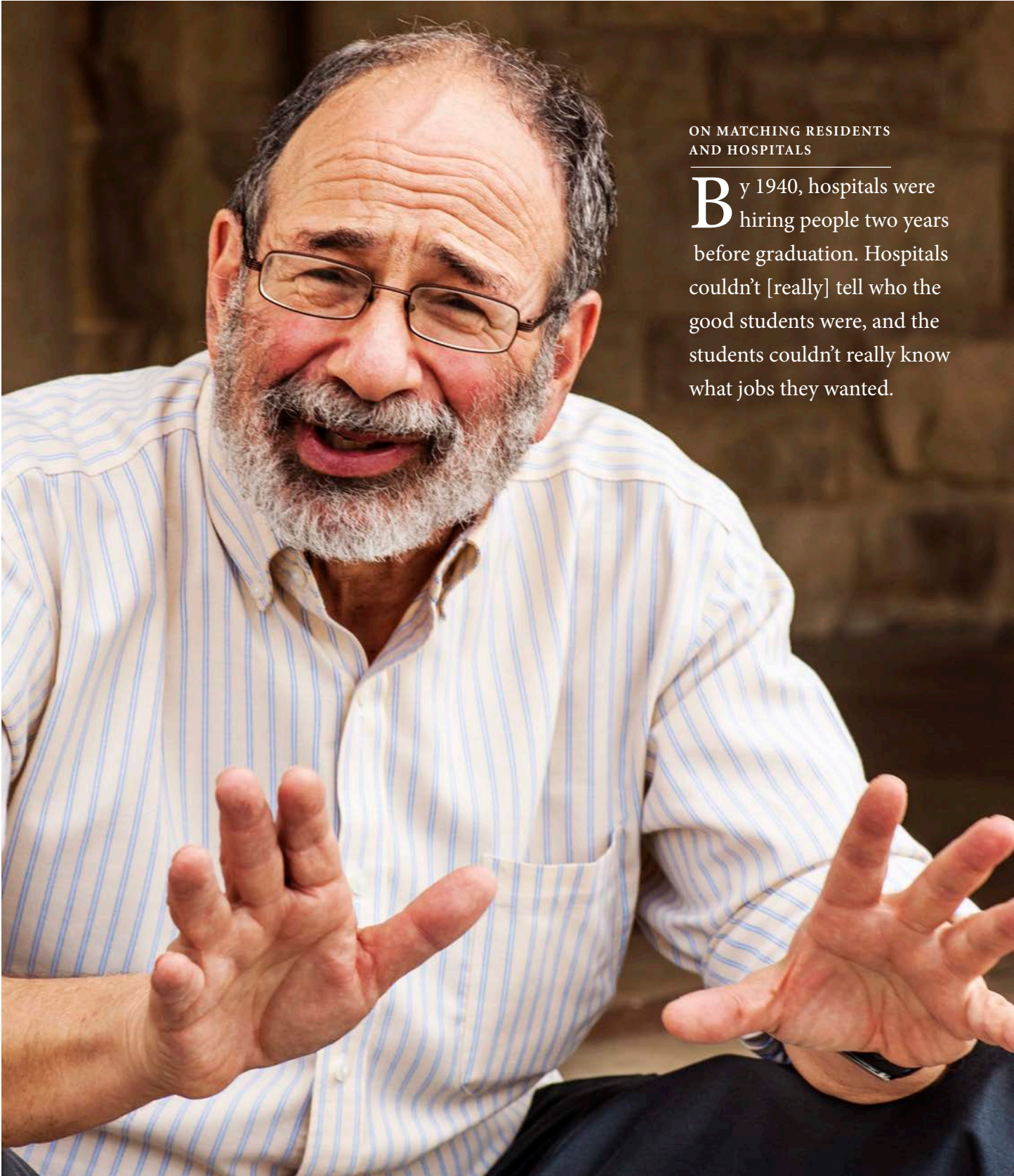
Roth: Medical internships started in the early 1900s. But the medical match arose only in the 1950s because of a very troubled history that turned out to be typical of many markets and that has helped us understand more about how markets work.

In 1900, when you graduated from medical school, you looked for a job. We're talking about graduating in June and looking for a job that starts around July. By 1930, those jobs were being filled by Christmastime (before graduation) rather than June. Medical journals from the 1930s say, "We're now hiring our new interns without knowing their class rank and other important information we might get by waiting until they graduate. We can live with that, but let's not go any earlier."

But, of course, it's hard to stop people from competing simply by asking them not to do so. By 1940, hospitals were hiring people two years before graduation. That was very inefficient. Everyone understood it was very inefficient. Hospitals couldn't tell who the good students were two years before graduation, and the students couldn't really know what jobs they wanted. They didn't yet have much experience with different medical specialties.

Region: This reminds me of athletic drafts going on as early as high school.

Roth: That's right. This unraveling process, this process of making offers earlier and earlier, turns out to be common to many markets. Athletic drafts are actually an attempt to control unraveling. Baseball players, who get hired through a draft, don't get hired at age 10; it's where there's no draft that future women tennis players are moved to Florida from the Czech Republic when they're 10 years old and sign professional contracts. Ath-



ON MATCHING RESIDENTS
AND HOSPITALS

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letic drafts were partly attempts to put limits on the competition to hire athletes earlier and younger. Still, lots of markets go very early.

One market I've enjoyed studying is post-season college football bowls, and how the teams that will play in them are chosen. A playoff was introduced recently, but there's been a lot of evolution in how bowl games were arranged. In the 1990s, the NCAA tried to enforce a date called Pick'Em Day before which bowls shouldn't pick teams. Pick'Em Day was not even at the end of the regular season; it was two games before the end. But they couldn't enforce that. Bowl contracts were being signed *four* games before the end of the season.

That meant that while Notre Dame, say, might be the number one team in the country four games before the end of the season, they could just drop out of the rankings entirely if they lost two of those last games.

It was very hard to have good bowl games under those conditions and, for years, that market modified itself in various ways. There was the Bowl Championship Series, for example; there were all sorts of things. This year had a new iteration, in which four teams were chosen for a playoff. So, they've been trying harder and harder to get a bowl game where the number one team plays the number two team. But that's very much harder to do the earlier you decide which teams are going to play each other.

Region: So the unraveling seen with medical residency offers is present in many markets.

Roth: Right, medicine had that problem in the 1940s, and other markets have those problems. For instance, if you're a new law graduate from a fancy law school ...

Region: Could you first tell us about medical schools and the algorithm insti-

tuted to solve the matching problem?

Roth: OK. In the early '40s they had this serious unraveling. Around 1945, the medical schools intervened and managed to control the dates at which contracts were signed for post-graduation employment. The medical schools are a third party: They're not the doctors, they're not the hospitals, so they weren't suffering from the competitive self-control problem that kept forcing hiring earlier. By not releasing transcripts, not releasing letters of reference, they managed to get control of the date and move it back into the senior year of medical school. That prevented unraveling, but then they had terrible exploding offer problems—job offers that were retracted if not accepted quickly.

In 1945, they first said, "Don't make offers before a certain date, and leave those offers open for 10 days." So, suppose you got an offer from your third choice job, and your second choice said to you, "Stay calm; you're high on our waiting list. As soon as we get some rejections, we'll make you an offer." Well, you could afford to wait, since you had 10 days. But if everyone waits, then the waiting lists don't move.

So bad things happened on the 10th day—for instance, you might wait until almost the last minute and finally accept the offer from your third choice job, only to get an offer from your second choice just a little later. Maybe you accepted that one, too, and stalled a little before calling back your third choice and telling them you weren't coming, during which time everyone on their waiting list would have taken a job. The powers-that-be saw that the 10th day was chaotic, and so in 1946, they said, "You only have to leave offers open for 8 days ..." Needless to say, that didn't help.

Eventually, they couldn't agree on any amount of time that offers had to be left open. People would be getting calls that said, "This is such-and-such internship program. We're making you

an offer, but you have to tell us yes or no on the phone, because if we let you think about it, all the other candidates we want to make offers to if you say no will have taken other positions."

Fortunately, that problem has now been solved in the medical residency market, but it's happening right now with law clerks. So this isn't an ancient problem; it's still very present in other markets.

Region: I believe you've worked on this with Judge Posner.

Roth: Yes. Federal judges have tried over and over again, maybe a dozen times in the last 30 years, to deal with unraveling in the market for law clerks. They develop rules that they then cheat on. Right now, they're in a period of no rules. They just abandoned their most recent set of rules because everyone was cheating. So they're back to making very early exploding offers. If you're a law student who is going to get an offer of a clerkship, it will come sometime well before you graduate, and it will be earlier this year than it was last year.

Region: So you could be a 2-L.

Roth: Yes, it'll probably be in your second year. Some judge will make you an offer, and you will most often accept it on the spot because that's part of the deal for getting the interview. So you won't get to consider a lot of offers.

That's what was happening in medicine from 1945 to 1950 or so. The doctors finally decided to have a centralized clearinghouse. Their basic idea was that instead of students getting offers one at a time and having to say yes or no without being able to consider other offers, they were going to ask them to consider all the offers they might get—from all the positions they had interviewed for—in advance.

So they would elicit from students a rank-order list of the positions at which they'd interviewed. These positions had

salaries that were part of the job description, so the salary was already known. That wasn't going to be part of a market-clearing mechanism.

Similarly, they asked the internship residency programs to rank the people they interviewed. The initial algorithm for dealing with all these rank-order lists had some flaws that were quickly detected. After that false start, they got an algorithm that worked for a long time.

When I say “worked,” I mean all this was voluntary. The people running the match had no compulsory power. Applicants and employers didn't have to submit rank-order lists or wait until the time of the match. But, in fact, both applicants and employers submitted rank-order lists and took the suggestions that the match gave them—that is, the match would come out and say you've been matched to this hospital, the hospital should now please send a contract to the students they've been matched with and the students should return them and go to work there. And in July when you see which doctors are at which hospitals, it's the doctors who got matched to those residencies.

They've had very high success rates. For a couple of decades following the introduction of this system, most doctors got their jobs that way. With some modifications, it's still working.

KIDNEY DONATIONS

Region: Let's shift to another market in which you've been heavily involved: better kidney transplantation, through kidney exchange and the creation of donor chains. Would you give us some background on the problem and how your matching procedure has helped to address it?

Roth: This is work that lately I've been doing with Itai Ashlagi, and Mike Rees and his medical colleagues, but I began with Utku Ünver and Tayfun Sönmez, and Frank Delmonico and his medical colleagues.

ON KIDNEY DONATIONS

Sometimes you're healthy enough to give someone a kidney, but you can't donate to the person you love because kidneys have to be medically matched. That's where kidney exchange comes in. That's a simple exchange. It involves four operations, and they have to be done simultaneously—it's against the law to give “valuable consideration” for a kidney.

There's a worldwide shortage of kidneys for transplant. It's the treatment of choice for end-stage renal disease, but many people in the United States and elsewhere die each year because organs aren't available. Kidney dialysis enables people to stay alive while waiting for an organ.

Right now in the United States, we have 100,000 people on the waiting list for a deceased donor organ; we only do about 11,000 transplants of deceased donor kidneys each year, so they are in very short supply. But *deceased* donor kidneys are not the only source because healthy people have two kidneys and can remain healthy with just one. We do about 7,000 living donor kidney transplants in the United States, so they are in short supply too.

Region: Prices aren't permitted to do the work in this case.

Roth: Right, prices don't do the work here. It's against the law everywhere in the world except the Islamic Republic of Iran to pay people to donate kidneys. Incidentally, I've spent a lot of time think-

ing about what I call “repugnant transactions,” trying to understand what's involved in that. But prices are not legally allowed to clear this market.

The law says that a kidney must be a gift. If someone you love needed a kidney and you were healthy enough to give a kidney—if you don't have diabetes or high blood pressure or protein in your urine—then you could give someone you love your kidney.

Except that sometimes you're healthy enough to give someone a kidney, but you can't donate to the person you love because kidneys have to be medically matched. That's where kidney exchange comes in. It could be that you're healthy enough to give a kidney but can't give to the person you love, and I'm healthy enough to give a kidney but not to the person I love. But you could give a kidney to the person I love, and I could give a kidney to the person you love.

That's a simple exchange. It involves four operations, and they have to be done simultaneously. Because it's against the law to give “valuable consideration” for a kidney, you can't write a contract saying, “You guys give us a kidney today, and we'll give you one tomorrow.” So when we helped our surgical colleagues organize kidney exchanges, these were always done simultaneously, which means even a simple exchange needs four operating rooms, four surgical teams. It needs a lot of stuff, so it's a highly congested market; each transaction is hard to do. Obviously, you could get more transplants if it weren't so difficult, if you could do bigger exchanges.

Incidentally, this is a market that we can think of as a barter market, which is what William Jevons discussed when he talked about needing a “double coincidence of wants” to get barter going. You need someone who needs the kidney you have *and* who has the kidney you need.

Region: And, of course, that double coincidence of wants is part of the rationale for money's existence.



Roth: Absolutely. When Jevons was talking about money in the 1800s, his idea was that money was a market-design solution to the difficulties of barter. It allowed you to sell what you had and use the money to buy what you wanted.

Region: But money is not involved in kidney exchanges, and therefore ...

Roth: When my wife and I moved to Stanford, we sold a house in Boston and bought a house in California. We didn't have to swap houses. There would be a much, much different real estate market if it were against the law to use money to buy houses. But that's our situation with kidneys. It's against the law, for reasons that are worth understanding.

Often when you talk to economists, they say "isn't that crazy" and maybe it is. But if it's crazy, it's a craziness shared around the world. The only explicitly legal market for kidneys is in Iran. Everywhere else, it's against the law to buy or sell kidneys for transplant. There are black markets, of course. Some of them work very badly indeed. There are real worries about vulnerable people who might mistakenly sell their kidneys, not have good contracts to assure them of postoperative care, things like that.

Region: And the urban legends about waking up in a bathtub full of ice, missing a kidney?

Roth: Those urban legends are mostly legends. It takes a lot of matching before your kidney can be used, so the chance someone can slip you some drugs and take your kidney and use it I think are just that: legends. But there *is* a black market for kidneys. In Azerbaijan, for instance, one could buy a kidney, and a hospital where that could happen was pointed out to me when I traveled there.

Region: Fortunately, you're creating a legitimate kidney market.

ON PROPOSALS TO INCREASE ORGAN DONATION

Israeli organ donation legislation gives priority to registered donors and next of kin who donate organs. Early indication is that it is having a good effect and, if so, it's one of the few I've seen that has a big positive effect.

PROPOSALS TO INCREASE ORGAN DONATION

Region: Various proposals have been suggested to increase organ donation, from small nudges on driver's license applications to monetary incentives to rewards like prioritization on recipient lists. Which schemes seem to work best?

Roth: I was on a conference call this morning with a bunch of collaborators on a project to understand the early results of the Israeli change in organ donation legislation that gives priority to registered donors and next of kin who donate organs. Early indication is that it is having a good effect and, if so, it's one of the few I've seen that has a big positive effect.

Many of the other interventions are more complex. One reason is there's a difference between registrations and transplantations. In much of the world, not only do we ask people to register to be organ donors, but we also ask their next of kin for consent before we go ahead. How you ask and what kind of consent you get interact with each other.

It turns out to be hard to significantly increase deceased donations partly because, in the United States at least, we're already doing a good job of getting deceased donors. Very few deceased people

are eligible to give their organs. You have to die in a pretty special way, on a ventilator basically, so that your organs keep getting oxygen after you're dead. That's actually quite rare.

About 45 percent of Americans are on organ donor registries, and a very high percentage of those, if they die in an eligible way, get donated. The transplant coordinators approach the family and say, "You know that they're an organ donor." They start the conversation that way even though they're going to need consent, and they get it with a very, very high success rate.

If someone isn't on the organ donor list, then they say, "What do you think about organ donation?" In Massachusetts, the New England Organ Bank indicates they got about half of those to give consent. That means we're getting almost 100 percent of the registered donors who are almost half the population, and half of the unregistered donors, so we're getting almost 75 percent of all eligible donors.

It would be great to get more deceased donor organs, but there aren't that many that we're missing. There are other questions about the usage of donated organs. Not every donated organ that is "harvested," as they say, gets transplanted.

The situation is different for different organs. There are many people who need kidneys because dialysis can keep you alive for a long time while waiting for a new kidney. We do about 17,000 kidney transplants a year in the United States, about 11,000 deceased donor and 6 or 7,000 living donor transplants. Ten percent of living donor transplants are through kidney exchange now.

But hearts, I think we're talking fewer than 500 transplants a year. So there's a real shortage and a real need. It would be good to get more deceased donation. It'll also be good to have other advances. There will start to be artificial hearts; instead of pumping up and down, they go around and around. As those get better, there will be more hope for people who need new hearts.

Maybe we'll have stem cell therapies to grow new organs, maybe something else. I expect that my grandchildren will come to regard transplantation as an ancient, primitive form of medicine. They'll say, "Tell me again, Grandpa, you used to cut the organs out of dead people and sew them into sick people?"

Region: It almost sounds archaic now.

Roth: Yes, but of course it's miraculous. It makes people much better. But it's hard to do; it takes all sorts of advanced technology. Wouldn't it be better just to be able to build a new organ when you needed it?

EXPERIMENTAL ECONOMICS

Region: I'd like to talk a bit about experimental economics. You've been a huge proponent and practitioner of experiments in economics, but in a 2010 paper you wrote that experimental economics hadn't lived up to its promise in some respects, that it's still struggling. For example, the majority of economics departments don't have experimental economists or labs.

Why do you think that's the case? More importantly, in what respects *has* experimental economics succeeded?

Roth: Oh, I think experimental economics is a giant success story. It turns out economics as a profession is very open to new ideas. You know, I got my Ph.D. in 1974 not in economics, but in operations research, so economics was also welcoming to varieties of people.

In the time that I've been thinking about economics professionally, game theory has entered economics in a big way; experimental economics has made very substantial inroads into economics. Market design is starting to do so, as well.

When you try to do something new in economics, it often feels that things are slow and frustrating. If you measure them referee-report-by-referee-report, it seems like economics is incredibly

ON BREAKTHROUGHS IN PITTSBURGH

A lot of what makes a department a good place to work is that when you're onto something you're excited about and you walk out the door of your office and tell one of your colleagues about it, he's excited to hear about it, too. He says "That's great. Let's go have a cup of coffee, and you can tell me about it."

conservative. But when you look over a period of decades, economics is really open to new things, and experimental economics is one of the things that has entered quite a bit.

It's true that many economics departments do not have experimenters, but there aren't so many major economics journals that don't publish experiments, for instance. So I think experiments have made giant inroads in economics, and they are incredibly useful.

I wouldn't say that experimental economics hasn't lived up to its promise, although I think there's still room for growth. But I think that our understanding of what is the promise of experimental economics may have matured. There was a time when experimental economics looked like it was going to become a separate subject in economics rather than a tool that economists use.

I think that the way to view experimental economics is a little bit like the way we view econometrics. There are econometricians who specifically study econometrics, but all economists think about data and need to have tools to allow us to learn from data. Similarly, I think experimental economics isn't a

subject. It shouldn't be that experimental economists are those economists who study the ultimatum game. It should be experiments are tools that sometimes allow you to get answers to questions that you can't get in other ways.

Region: Have results from experimental economics helped propose and develop new ideas and theory?

Roth: Absolutely. For example, you see a lot of theory these days about preferences for fairness. These preferences show up in lots of ways, including in the general political discussion on income inequality. But you can study them very clearly in the laboratory and start to formulate what is it about income inequality and other kinds of inequality that might enter directly into your preferences. That's been a lively area in which theorists have looked closely at experimental results and proposed theories that in turn can be tested.

Region: And you're doing it with coercive pay.

Roth: Coercive pay is a tricky one. One possible question is, do high payments harm the quality of your decision-making? Could I tempt you so much with high pay that you rush into making decisions and do less due diligence?

Many economists think the idea of coercion is foreign to ideas of revealed preference. But we have consumer protection laws that say if you buy an expensive car on a Sunday, and on Tuesday you want to change your mind, you should be allowed to. So we have this idea that salesmen might be able to sell you things, we talk about high-pressure sales. And that means something like coercion.

We think that you might, in the presence of the salesman, sign a contract that when you went home you would regret. You haven't necessarily received new information, but you've had more time to think about it. We have a lot of consumer protection laws in many states that if you

buy a big-ticket item like a car, you can change your mind within a short period.

And, of course, that's meant to reduce the possibility of coercion. It's meant to not give salesmen the incentive to fool you in certain ways. If you were coerced, it's meant to give you time to reflect. In medicine, too, there are lots of laws that have phrases like "informed consent."

But as we better understand what uninformed consent is, we might be able to design markets that will more usefully address the concerns that people have about coercion. Again, for economists it's very funny to think about high pay as being coercive. If I offer you \$10 million for your house, you're going to go home and say to your wife, "Good news, we just sold the house."

If she says, "Did you think about it" and you say, "No, it seemed to me I really didn't have a choice," we wouldn't want to count that as coercion; it's "congratulations. You sold your house for way above what you thought you could get for it, and now you'll easily find another house."

BREAKTHROUGHS IN PITTSBURGH

Region: One last question, if I might. Many of your major breakthroughs occurred when you were at Pittsburgh. What was it about the research environment there that was so conducive to Nobel-winning work?

Roth: Well, Pittsburgh was a lot of fun. The living was easy. I walked to work. I'd walk with my kids to school and drop them off and walk on into work. My colleagues and I spent a lot of time drinking coffee and talking about economics.

The mathematician Alfréd Rényi is said to have said that a mathematician is a machine for turning coffee into theorems. Maybe economists turn decaf into models.

There were lots of people to talk to at Pittsburgh. It was a fruitful time. And it was a very good department. I think a lot of what makes a department a good

place to work is that when you're onto something you're excited about and you walk out the door of your office and tell one of your colleagues about it, he's excited to hear about it, too. He says "That's great. Let's go have a cup of coffee, and you can tell me about it." So there's the positive reinforcement you get just from having people think, "Isn't that great you're excited about something. You're thinking about something interesting." It makes places fun to work.

Here at Stanford, I try to organize regular coffees—I did this at Harvard and I do it here—regular coffees with students interested in different things. We have a Tuesday morning coffee for experimental economics and a Thursday morning coffee for market design. I think that a lot of intellectual interaction arises out of social interaction. You have to be talking to people before you're talking about work.

Region: Wonderful. It's been a pleasure talking with you. Thank you.

—*Douglas Clement*
March 11, 2015

More About Alvin Roth

Current Positions

Craig and Susan McCaw Professor of Economics, Stanford University, since 2013; Senior Fellow, Stanford Institute for Economic Policy Research, since 2013; McCaw Senior Visiting Professor of Economics, 2012

Senior Fellow, Stanford Institute for Economic Policy Research, since 2013

George Gund Professor of Economics and Business Administration Emeritus, Harvard University, since 2012; George Gund Professor of Economics and Business Administration, 1998-2012

Research Associate, National Bureau of Economic Research, since 1998

Previous Positions

A.W. Mellon Professor of Economics, University of Pittsburgh, 1982-98; Professor of Business Administration, Graduate School of Business, from 1985; Fellow, Center for Philosophy of Science, from 1983

Professor, Department of Business Administration and Department of Economics, University of Illinois, 1979-82; Associate Professor, 1977-79; Assistant Professor, 1974-79; Beckman Associate, Center for Advanced Study, 1981-82

Professional Affiliations

Member, Kidney Paired Donation Pilot Program Strategic Planning Team, Organ Procurement and Transplantation Network/United Network for Organ Sharing, since 2011; At Large Representative, 2009-11, 2012-14

Director, Market Design Group, since 2009

Chairman of the Board of Directors, Institute for Innovation in Public School Choice, since 2006

Member, Advisory Board, New Orleans Program for Kidney Exchange, since 2008; New England Exchange, 2006-11

Honors and Awards

Member, National Academy of Sciences, elected 2013

Economic Theory Fellow, Society for the Advancement of Economic Theory, 2013

Fellow, American Association for the Advancement of Science, elected 2012

Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel (with Lloyd Shapley), 2012

Fellow, American Academy of Arts and Sciences, 1998

Alfred P. Sloan Research Fellow, 1984-86

Fellow, Econometric Society, elected 1983

Guggenheim Fellow, 1983-84

Publications

Prolific author of books and other published research in the fields of game theory, market design and experimental economics, with significant contributions toward applying theory to real world problems. He blogs daily at marketdesigner.blogspot.com. His most recent book, written for non-economists, is *Who Gets What—and Why: The New Economics of Matchmaking and Market Design*, an Eamon Dolan Book, Houghton Mifflin Harcourt, Boston, New York, 2015

Education

Stanford University, Ph.D., operations research, 1974

Stanford University, M.S., operations research, 1973

Columbia University, B.S., operations research, 1971

For further background, visit

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