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The Supply Side of Organ Allocation

Abstract: The benefits of a large organ pool accrue not only to the actual organ recipients themselves, but to others as well due to the insurance it provides against having to wait 'too long' for an organ transplant. We argue that this public good character of a large organ pool makes it economically and ethically justifiable to design a market mechanism that boosts the number of donors. Most importantly, such a mechanism has the potential to substantially alleviate the troubling equity and efficiency problems on the demand side while, at the same time, being entirely independent of the allocation algorithm used for the distribution of organs.

1. Introduction

From an economic point of view, the fundamental difficulties inherent in organ allocation originate on the supply side of the problem. To see why, imagine a world in which the supply of organs exceeds the demand for them. In such a world, there would be no need for waiting lists, and hence, there would be no trade offs between equity considerations, such as waiting times, and efficiency considerations, such as locating the best biological matches possible. Therefore, if it were possible to substantially increase the supply of organs,[1] the difficult and troubling allocation problems on the demand side would be dramatically alleviated, and might even disappear altogether.

Virtually all contributions to the present issue of *Analyse & Kritik* deal exclusively with the distribution side of the problem and take the supply of organs as given. The prevalent idea seems to be that organ supply is exogenous and therefore independent of the organ allocation problem. For that reason, the allocation algorithm can be disentangled from the supply side. Furthermore, if both sides of this market were treated in a simultaneous manner, it would be very difficult to stick to the principles of efficiency and fairness incorporated in the Wujciak-algorithm presently used by Eurotransplant.

As we argue below, we agree with this approach. If we restrict ourselves to situations where organ recipients are urgently waiting for donated organs, then considering the supply of organs as given seems to be an economically reasonable approach to take. It is the case, however, that the benefits arising from larger organ supplies accrue not only to the actual organ recipients themselves, but to others as well. A larger organ pool provides insurance against having to wait 'too long' for an organ transplant for those people who are currently healthy. Based

[1] Our analysis will be restricted to cadaveric (dead) donors.

on this understanding of the 'good organ', we propose that a price mechanism be implemented in order to boost the supply of available organs. Since additional organs increase efficiency and any transplantation reduces the waiting lists, we think the supply side deserves much more attention than it is receiving presently.

2. In What Sense are Organs Different from Other Goods?

Obviously, organs can not be sold and bought like regular private goods in bilateral trading. In order to characterize the specific economic properties of the organ market, therefore, it might be helpful to look first at the demand side and to distinguish between healthy people and those who are in need of an organ transplant. From the point of view of the healthy people, demand is not directed at a single organ but at a large pool of potential donors. This pool has the features of a pure public good. That is, from an *ex ante* point of view, no one will be excluded from the possibility of receiving an organ from this donor pool, and any increase in the number of available organs in this pool will increase the probability of actually obtaining one in the case of illness for everybody. For those who actually are in need of an organ transplant at a specific point in time, however, an organ is a private good. Most papers in this issue are concerned with this *ex post* situation characterized by a given supply and a given number of people on a waiting list competing for the available organs. Our alternative view in this comment, however, is the *ex ante* situation in which the organ pool is characterized by its public good character. The advantage of this distinction between *ex ante* and *ex post* is that it allows us to concentrate on the central question how to increase the number of organs in the pool, alleviating the *ex post* allocation problems, and, at the same time, keeping the problematic discussion of the *ex post* allocation problem as discussed in this issue separate.

3. The Club Solution

Presently, the supply of organs is based solely on personal feelings of altruism and volunteerism. This works best within families, but it does not work satisfactorily in the market for cadaveric organs, the market we focus upon in this comment. So what additional mechanisms to boost organ donation are conceivable? Kliemt (this issue) proposed a club, consisting of organ donors and recipients. This scheme is based upon the principle that potential donors deserve to have a higher probability of receiving an organ transplant than do nondonors.

While this proposal has some appeal, we share the objections raised by many of the respondents to the survey of Ahlert, Gubernatis and Klein (this issue). This mechanism is based on reciprocity, a concept that has proven to be useful in many other economic contexts, but one that might be inappropriate here. The reason is that reciprocity always has two sides, one is rewarding people that observe a norm, and the other is punishing people who violate that norm. Punishing a patient who was not willing to be an organ donor by withholding a

potentially lifesaving organ is akin to the 'death penalty'. To many people, the idea of a death penalty sentence is repugnant, regardless of the suit.

Interestingly, historically in Germany emergency medical assistance was primarily organized as a club (see Bruckmeyer 1931; Brinkmann 2001). Only club members were entitled to receive the live saving assistance in an emergency situation. This solution, however, did not prove to be viable because the decision to let nonmembers die was just not acceptable. The natural solution was to put the public in charge of providing universally accessible emergency treatment for everyone. Publicly provided emergency medical assistance is a public good, that is, it provides insurance against an inadequate provision of medical care when it is needed. A large donor pool, in the same manner, can also be regarded as a form of insurance to the general public.

4. Separation of Supply and Demand in the *ex post* Market

If the goal of organ allocation is to ensure medical efficiency and equity, as is expressed in most papers in this issue, the demand and supply side of the *ex post* organ market must be strictly separated. The reason for this is that efficiency and equity can only be ensured by an institution such as Eurotransplant (see Kliemt as well as Hild in this issue), that possesses the information necessary to efficiently and fairly allocate the organs that are available. Information concerning the number of biological matches in conjunction with the waiting lists of all patients is simply not available at the individual level of the donors, patients, or even at the medical treatment facilities themselves. Furthermore, this information cannot be efficiently processed by price mechanisms, as is often the case in large markets for private goods, because the willingness/ability to pay of most patients is likely to be constrained by their financial resources. For that reason, a price system would favor the rich at the expense of efficiency and equity. Therefore, for the *ex post* allocation of single organs (the allocation of donated organs from people that are already dead to waiting transplant candidates), the mechanism implemented by Eurotransplant seems to be well suited. We illustrate in the next section that it is possible to increase the supply of organs in the *ex ante* market without interfering with (but alleviating) the ethical difficulties that exist in the *ex post* market.

5. Designing the *ex ante* Market

In order to boost organ donation, a natural approach in economics would be to set up a market for organs and allow for the trading of donated organs to take place. But, of course, the market mechanism should not be setup like a traditional (bilateral) trading mechanism between organ recipients and donors in the *ex post* market, like, for example, the global online auction market for organs that was recently proposed by Kevorkian (2001).[2] As mentioned heretofore, if

[2] Also, eBay made headlines recently when users posted offerings of live human organs. The

possible, the *ex post* allocation question should be kept independent of the supply side considerations.

Rather, we propose the creation of a central (European) organization that would be empowered with the exclusive rights to purchase donor organs. The task of this organization would be to establish and extend a pool of potential donors and to consequently provide this public good for the wellbeing of all people. This publicly controlled organization would work completely independent from Eurotransplant, its counterpart on the demand side. That is, following this idea, two independent but publicly controlled organizations would be granted the sole authority to purchase and to distribute, respectively, donated organs (control is necessary to avoid the emergence of a black market).

Of course, many of the details of this market design would need to be worked out before such a system could be put in place. Most importantly, Who should pay for the donated organs if not the recipients themselves? The answer is simple. Since the existence of a large pool of organs is a benefit to everyone, and not only to the candidates for organ transplants, and since individual contributions to public goods typically lead to insufficient provision levels, public funding, special taxes, and/or compulsory insurance contributions are economically (and ethically) justified. In addition, it is very likely that the private health insurance companies would be willing to pay substantial amounts of money to support such a pool, because the transplantation of organs dramatically reduces the cost of health care. In principle, two market mechanisms are conceivable for the right to purchase donor organs (recall that we only deal with cadaveric donors, so donors are not able to sell their organs while they are living, but only to sell their rights to these organs after their death). First, a fixed price mechanism where the price depends on the expected pecuniary savings measured by, say, the difference between the medical expenses with and without the transplanted organ, or by a more sophisticated quality adjusted life years measure. Second, one could ask potential donors to submit bids, and then those bidders who are willing to accept the lowest amounts are considered first. Both ways the proposed central institution, the buyer of the organs, complements the demand side of an artificial market and provides insurance against the case where the probability of receiving an organ is unacceptably low.

While we do not want to go into excessive detail, our outline of the idea should make it clear that such a mechanism is in principle feasible. In fact, similar problems arise, for example, in the context of pollution abatement. Similar to the organ supply problem, pollution abatement is a public good that can be financed by tax payers. Firms submit bids on the amount of abatement and those firms with the lowest offered prices are paid.

As we are well aware, many people reject market mechanisms for ethical reasons. We think, however, that reasonable responses to such objections are available. Implementing a market does not imply that active participation in the market is mandatory. Everybody is free to donate their organs on a voluntary basis (as in the present situation), or not to donate their organs (without being

bidding for one kidney reached $5.8 million before eBay representatives stopped this unlawful auction.

punished as in the club situation). Furthermore, the ethical question concerning whether one should donate or sell an organ is shifted to where it seems to belong, namely to the individual potential donors themselves, in accordance with their particular religious beliefs and philosophy of life. Also, note that while the *ex post* distribution algorithm remains untouched by such an *ex ante* market on the supply side, the market promises to benefit all people, healthy and ill, by increasing the number of available organs now and in the future. Finally, it appears to be almost cynical to call the current situation, in which all organ trading is forbidden, ethical, while at the same time patients on waiting lists are dying every day because of a dramatic shortage in available organs.

6. Concluding Remarks

The goal of our comment is to call the reader's attention to the fundamental difficulties caused by a shortage of organs, originating on the supply side of the problem. It is the rationing of organs that causes so many interdisciplinary scholars to deal with organ allocation and the trade off that exists between efficiency and equity, as strikingly demonstrated in the present issue of *Analyse & Kritik*. We argue that a distinction between the *ex ante* and the *ex post* markets for organs is a useful way to conceptualize the very different characteristics of the 'good organ' depending on whether one currently needs a donated organ (private good) or not (public good). Within this framework it becomes clear that the decision made by most authors to more or less completely ignore the supply side when dealing with the distribution of organs is justified, since the organ supply problem can be and should be treated as a public good problem independent of the *ex post* allocation algorithm. We propose an *ex ante* market mechanism to increase the supply of available organs. One that is, as we see it, economically and ethically justifiable, and one that has the potential to considerably alleviate the allocation problems on the demand side by creating financial incentives to donate organs on the supply side.

We do not believe, however, that the economic approach presented here is the only possible way to close the gap that exists between the number of currently available organs and the people who badly need them. Within the next decades, biological researchers hope that organs grown from patient's own DNA can be transplanted. Psychologists suggest that an implied consent to donate organs upon death unless the individual opts out during his or her lifetime could dramatically increase the supply of organs (see the examples of Austria or Belgium). Finally, the organ supply might also be amplified by giving hospitals appropriate incentives to actively identify potential (dead) donors and to supply the public pool with the organs. Currently, no such incentives exist. Whatever the mechanism is, given the large heterogeneity of donation rates across Europe (for example, only 5–15% of all Germans signed a donor card), it seems that there is an enormous potential for increasing the supply of donor organs. It is not at all unlikely that in the future we might find that the number of available

organs (provided by willing sellers, attentive physicians, or by biological labs) vastly outnumber the patients whose lives depend upon them.

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