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**Monograph:**

Anbarci, N. and Caglayan, M. (2007) Do Institutions, Inequality and Religious Beliefs Affect Cadaveric versus Live-Kidney Harvesting. Working Paper. Department of Economics, University of Sheffield ISSN 1749-8368

Sheffield Economic Research Paper Series 2007009

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# **Sheffield Economic Research Paper Series**

**SERP Number: 2007009**



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**May 2007**

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# Do Institutions, Inequality and Religious Beliefs Affect Cadaveric *versus* Live-Kidney Harvesting

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April 29, 2007

## Abstract

Using an unbalanced annual dataset from 63 countries over 1998-2002, we show that improvements in equality and rule of law in developing countries encourage cadaveric kidney transplants. Religion also plays an important role in that relationship.

JEL classification: I18, O18

Keywords: Cadaveric *vs.* live kidney transplants, inequality, rule of law, religion.

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# 1 Introduction

Improvements in surgical technology and transplant immunology have led to long waiting lists for cadaveric and live kidneys since the second part of the 1970s. Unfortunately, live kidney donors may not always donate their organ to the intended patient because of blood type and/or immunological incompatibilities. Also an upper limit on the number of cadaveric transplants is set by the number of brain-dead organ donors.<sup>1</sup> Yet, increases in cadaveric kidney harvesting can keep the the waiting list under control.

In this paper, we examine the role of institutions, inequality and religion on cadaveric *versus* total kidney transplants using information on 5 year averages obtained from 63 countries over 1998–2002. To gauge the robustness of our findings and to guard against potential misspecification of our model, we employ per capita total, private and public medical expenses. We particularly find for developing countries that improvements in equality and rule of law encourage the cadaveric to total kidney transplant ratio. Religion also plays an important role in that relationship.

Section 2 lays out the background information and our hypothesis. Section 3 presents our data and empirical findings. Finally, section 4 concludes.

## 2 Background

Currently there is no established and effective organ market system with desirable properties<sup>2</sup> than the unregulated and informal system which is in place in some countries. However, for reasons that will be clear below, the medical community worldwide is firmly against the purchase and sale of organs, and the principles laid down by the international bodies have made their way into national law. Yet, despite the existence of such laws, brokers can generally tease the poor to donate their kidneys in return for some cash as low as \$1000.<sup>3</sup> Bardhan (2005) indicates that this may be a special problem in

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<sup>1</sup>In the U.S., the upper limit for cadaveric kidneys is between around 14,000-15,000 (Sheehy et al., 2003).

<sup>2</sup>Roth, Sonmez and Unver (2005) suggest a centralized clearinghouse to establish a sufficiently thick market so that double and triple coincidences of wants—incompatible patient-donor pairs exchanging kidneys with other such pairs—can be identified and carried out.

<sup>3</sup>Only in Iran and the Philippines kidney sales are legal. The Philippines allows residents to sell a kidney to a countryman if no broker is involved (Jimenez and Bell, 2001).

poor countries where public information is weak, many people are uneducated and superstitious, and there is a surfeit of touts, middlemen and operators trying to manipulate the potential donor to make hasty uninformed decisions. Here, it seems taking out certain options from the choice set might be a good idea.

## 2.1 Lack of Enforcement and Inequality

Enforcement in developing countries has been weak and misplaced due to the presence of a big gulf between laws that are in the statute books and their enforcement. Buscaglia and Stephan (2005) point out the gap between ‘law in the books’ and ‘law in action’. They report empirical evidence that the most unprotected segments of population consider lack of legal information, economic factors, fear of abuse of authority as well as corrupt practices as main obstacles to access to justice. Also, there is a deficiency in every citizen’s expectations about others’ compliance, which forms the foundation of the rule of law.

Not surprisingly, loopholes that enable kidney sales in the developing world also exist even in highly developed countries such as the United States. Kates (2002) reports existence of an international transplant mafia based in the former Soviet Union capitalizing on America’s organ-shortage crisis by smuggling live donors into the country to sell their lungs and kidneys. Also, the life-and-death dilemma creates serious ethical and legal problems for medical staff. For instance doctors report that they cannot turn over every rock looking for trouble before going ahead if the circumstances seem reasonable. In cases when organ traffickers are faced with an investigation, the accused always makes the donor pose as a relative of the recipient and produces documents in support.

It is known that organs from executed prisoners in China are systematically used.<sup>4</sup> Furthermore, most open or covert organ sales in developing countries appear to involve voluntary sales of kidneys by poor farmers to wealthier urban residents. Thus, it is straightforward to detect the magnifying role of *inequality* apart from the key role of ‘lack of rule of law’ in raising the commercial live-donor transplants in many developing countries.

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Evidence from Iran and the Philippines suggests that it is generally the poor who sell their kidneys.

<sup>4</sup>A report in October 2000 in the Yangcheng Evening News said that middlemen post advertisements on China’s auction Web sites.

Inequality and weak institutions can decrease cadaveric donations through another channel as well. To gain access to the waiting list, a patient must demonstrate the ability to pay transplant-associated costs, which are rather high. Many insurance companies and government programs do not cover these costs fully; this situation is worse for less-than-wealthy individuals in countries with weaker institutions which also manifest themselves in rather low levels of collective action. Since cadaveric transplantation mainly depends on public altruism to make organs available, in an unequal society with weak institutions it may not be a reassuring public policy to ask everyone to donate but to give organs only to those who can afford to pay.

## **2.2 Religious Beliefs Affecting the Cadaveric Ratio**

There are extreme differences in cadaveric kidney harvesting regarding the religious beliefs of the societies. The ratio of cadaveric transplants to all transplants among Islamic countries, though may be as low as nil, is generally positive yet significantly lower than those countries where the prevalent belief is Christianity.

In the Middle East, religious precepts discourage, if not prohibit, cadaveric organ donation. Islamic teachings strongly emphasize the need to maintain the integrity of the body at burial (the body is considered the cover that needs to protect the invaluable soul); although many religious leaders have approved organ donation as a gift of life, others continue to object to it (see Rothman et al., 1997).

Israelis, in contrast, reject the principle of brain death (equating it with murder), thereby making organ retrieval almost impossible. Paying for an organ has become common in Israel that there have been instances in which a patient has elected not to accept the offer of a kidney donation from a well-matched relative. Finkel (2001) reports an Israeli patient claiming why one should risk harm to a family member while it is possible to purchase a kidney from someone who is impoverished and living in a foreign land.

## **3 Data**

We obtained data on cadaveric and live kidney transplants from the International Registry Organ Donation Transplantation database for 63 coun-

tries over the period 1998–2002.<sup>5</sup> The data include Bahrain, Bangladesh, Egypt, Iran, Jordan, Kuwait, Lebanon, Malaysia, Pakistan, Saudi Arabia and Turkey with Islam, and Israel with Judaism and Islam as the prominent religious beliefs. For the remaining countries, Christianity is the dominant religion.<sup>6</sup> For each country, we extract PPP adjusted GDP (calculated at 1995 prices in US dollars) from the World Development Indicators and population data from the US census bureau IBD database. Information on income inequality (Gini) is obtained from the World Income Inequality Database. Data on rule of law (ROL) are constructed merging the indices provided by Knack and Keefer(1995) and Kraay, Kaufmann and Mastruzzi (2005), which are accessible through the World Bank databases.

Table 1, Panel A shows that the average number of live transplants is approximately 245 and that of cadaveric transplants is 494. If one were to concentrate on B countries where beliefs generally disapproves of the use of organ transplants, the annual average number of live transplants would shoot up to 362 cases and that of cadaveric kidney transplants would drop to a dismal 57 cases a year. If we look at the remaining countries, on average, cadaveric kidney transplants dominate that of live transplants by 564 to 226 cases.

Panel B provides basic statistics on the remaining variables of interest. The average Gini index is 38 for the sample that excludes B countries and 41 for the B countries, indicating that on average inequality is higher in B countries. Average per capita income is lower and rule of law is weaker in B countries in comparison to the remaining countries.

### 3.1 Empirical Analysis

Given Gini and ROL indices do not change much over time, we construct 5-year averages and implement the following model to explore the impact of religion, rule of law and inequality for low- and high-income countries on the cadaveric to live kidney transplant ratio.

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<sup>5</sup>See [www.tpm.org/registry/reg\\_mondo.asp](http://www.tpm.org/registry/reg_mondo.asp).

<sup>6</sup>Argentina, Australia, Austria, Belgium, Brazil, Canada, Chile, Costa Rica, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Georgia, Germany, Greece, Hong Kong, Hungary, Ireland, Italy, Japan, Latvia, Lithuania, Luxembourg, Malaysia, Malta, Mexico, Moldova, Netherlands, New Zealand, Norway, Panama, Peru, Philippines, Poland, Portugal, Romania, Singapore, Slovak Republic, Slovenia, South Africa, Spain, Sweden, Switzerland, Taiwan, UK, USA, Ukraine, Uruguay, Venezuela.

$$CR = \alpha_0 + \alpha_1 Belief + \gamma_1 GDP + \beta_1 Gini_{Low} + \beta_2 Gini_{High} + \eta_1 ROL_{Low} + \eta_2 ROL_{High} + \epsilon, \quad (1)$$

where CR denotes the cadaveric to total kidney transplants ratio. Belief is a dummy which takes 1 for B countries where belief system traditionally does not approve the use of cadaveric organs transplant. A country is placed in the low (high) income group if her GDP per capita is below (above) the 40th percentile for each year. Hence, this split can allow us to see the significance of inequality and rule of law in relation to CR for low and high income countries.<sup>7</sup> In all models, we report robust standard errors.

Column 1 in Table 2 shows that Gini and ROL play an important role for the low income countries: the Gini40 coefficient takes a negative sign and the ROL40 coefficient takes a positive sign implying that improvements in equality and rule of law would lead to an increase in the CR ratio. The same coefficients for high-income countries (Gini60 and ROL60) are insignificant. This finding is not too surprising as the ‘cadaveric kidney’ to ‘live-kidney ratio’ for developed countries is high to start with. Interestingly, belief takes a negative coefficient signalling the low harvesting of cadaveric kidney transplantations in B countries. Finally, income does not play a significant role; splitting income into low and high categories does not make a difference, either.<sup>8</sup>

To gauge the robustness of our findings, in columns 2-4 we tabulate our results incorporating per capita data on public, private, total medical expenses into the initial model. In column 5, we introduce per capita public and private medical expenses simultaneously. In all cases results are similar to that in column 1; along with religion, Gini and ROL play an important role for the low income countries. Finally, in column 6, we keep the structure of the model as in column 5 but remove Israel from data. This omission does not alter our findings. Overall, these results confirm and support the claim that improvements in equality as well as rule of law could lead to higher use of cadaveric kidney transplants.<sup>9</sup>

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<sup>7</sup>The 40-60 split provides a sharper categorization between income groups in comparison to splitting the data using the mean GDP figures. Results for the mean split are similar to those we report and are available from the authors.

<sup>8</sup>We have allowed GDP40 and GDP60 in the regressions but their coefficients were never significant.

<sup>9</sup>We carry out a similar exercise computing 3-year averages as well. Results from this set is similar to those we report here and available from the authors upon request.



## 4 Concluding Remarks

Increases in cadaveric kidney harvesting can keep the waiting list under control as kidney transplantation is the preferred treatment method due to its cost effectiveness and the quality of life that the patient enjoys afterwards. Our findings based on information from 63 countries over 1998–2002, not discounting other potential policy changes, suggest that the ratio of cadaveric to total kidney transplants can increase by implementing policies which improve rule of law and equality. Our findings also suggest that, in countries where the predominant religion is Islam (and Judaism), governments and health organizations should work in tandem and encourage people to use and donate cadaveric kidneys as it may take decades to change the established norms which are imbedded in the fabric of the society.

## References

- [1] Bardhan, P. (2005), 'Law and Economics in the Tropics: Some Reflections,' *International Review of Law and Economics*, **25**, 65-74.
- [2] Buscaglio, E., and P.B. Stephan. (2005), 'An Empirical Assessment of the Impact of Formal versus Informal Dispute Resolution on Poverty: A Governance-Based Approach,' *International Review of Law and Economics*, **25**, 89-106.
- [3] Finkel, M. (2001), 'This Little Kidney Went to Market,' (The New York Times, May 27, 2001).
- [4] Jimenez, M., and S. Bell. (2001), 'Americans Buying Kidneys in Manila,' (Chicago Sun Times, July 22, 2001).
- [5] Kaufmann, D., A. Kraay, and M. Mastruzzi. (2005), 'Governance Matters IV: Governance Indicators for 1996-2004,' The World Bank.
- [6] Kates, B. (2002), 'Black Market in Organ Transplants,' (New York Daily News, August 25, 2002).
- [7] Knack, S., and P. Keefer. (1995), 'Institutions and Economic Performance: Cross-Country Tests Using Alternative Institutional Measures,' *Economics and Politics*, **7**, 207-227.
- [8] Roth, A. E., T. Sönmez and M. U. Ünver. (2005). 'Efficient Kidney Exchange: Coincidence of Wants in a Structured Market,' NBER Working Paper 11402.
- [9] Rothman, D.J., E. Rose, T. Awaya, B. Cohen, A. Daar, S.L. Dzemeshevich, C.J. Lee, R. Munro, H. Reyes, S.M. Rothman, K.F. Schoen, N. Scheper-Hughes, Z. Shapira, and H. Smit. (1997), 'The Bellagio Task Force Report on Transplantation, Bodily Integrity, and the International Traffic in Organs,' *Transplantation Proceedings*, **29**, 739-745.
- [10] Sheehy, E., S.L. Conrad, L.E. Brigham, R. Luskin, P. Weber, M. Eakin, L. Schkade, and L. Hunsicker. (2003), 'Estimating the Number of Potential Organ Donors in the United States,' *The New England Journal of Medicine*, **349**, 667-674.

Table 1: Basic descriptive statistics

Panel A						
	Full Sample		B countries		Full Sample less B	
	Live Transp.	Cadaveric Transp	Live Transp.	Cadaveric Transp	Live Transp.	Cadaveric Transp
Average	245	494	362	57	226	564
Std. dev	786	1238	508	50	822	1321
Min	0	0	1	0	0	0
Max	6178	8938	1585	189	6178	8938
N	246	246	34	34	212	212

Panel B									
	Full Sample			B countries			Full Sample less B		
	Gini	ROL	GDP	Gini	ROL	GDP	Gini	ROL	GDP
Average	38	4	15848	41	3	10011	38	4	16797
Std. dev	9	1	9784	4	1	5815	9	1	9977
Min	23	2	1143	31	2	1502	23	2	1143
Max	61	6	53385	47	4	20339	61	6	53385
N	237	253	243	21	34	34	216	219	209

Notes: B countries are Turkey, Bahrain, Pakistan, Saudi Arabia, Malaysia, Lebanon, Jordan, Kuwait, Iran, Egypt, Bangladesh and Israel.

Table 2. Results using 5-year averages

	1	2	3	4	5	6
Mgdp	0.001 [0.07]	-0.000 [0.009]	0.001 [0.007]	-0.000 [0.008]	-0.000 [0.007]	0.000 [0.007]
Mgini40	-0.015 [0.006]**	-0.013 [0.006]**	-0.013 [0.007]*	-0.014 [0.006]**	-0.011 [0.006]*	-0.012 [0.006]*
Mgini60	0.004 [0.007]	-0.005 [0.007]	0.008 [0.008]	0.005 [0.008]	0.009 [0.008]	0.007 [0.008]
Mrol40	0.168 [0.087]*	0.165 [0.089]*	0.189 [0.090]**	0.179 [0.090]*	0.178 [0.091]*	0.184 [0.090]**
Mrol60	-0.025 [0.064]	-0.023 [0.074]	-0.017 [0.064]	-0.016 [0.071]	-0.024 [0.069]	-0.017 [0.067]
Public health expense	-	0.019 [0.027]	-	-	0.019 [0.029]	0.013 [0.030]
Private health expense	-	-	0.028 [0.077]	-	-0.028 [-1.00]	-0.028 [0.027]
Total health expense	-	-	-	-0.003 [0.023]	-	-
Belief	-0.444 [0.101]***	-0.417 [0.103]***	-0.439 [0.097]***	-0.444 [0.106]***	-4.14 [0.101]***	-0.463 [0.121]***
R-squared	0.49	0.50	0.50	0.49	0.51	0.51
N	54	50	50	50	50	49

Notes: \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1% . Robust standard errors in parenthesis.