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The effectiveness of transplant legislation, procedures and management: Cross-country evidence

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ABSTRACT

This article investigates the impact of legal determinants of cadaveric and living donor organ transplantation rates using panel data on legislative, procedural and managerial aspects of organ transplantation and procurement, government health expenditures, enrollment rates, religious beliefs, legal systems and civil rights and liberties for 62 countries over a 2-year period. Under living donor organ transplantation, we found that guaranteeing traceability of organs by law or performing psychiatric evaluation to living donors has a sizeable, negative impact on living transplant rates once the remaining determinants of living transplantation have been controlled for. Under cadaveric transplantation, our findings do not suggest an unequivocal and positive association between presumed consent, donor registries and cadaveric transplant rates. However, legally requiring family consent or maintaining written procurement standards for deceased donors has a sizeable, negative impact on cadaveric transplant rates. The latter finding suggests that informing families rather than asking for consent may be an effective strategy to raise procurement rates while respecting patient autonomy. Finally, we confirm that predominantly non-Christian countries have significantly higher living but lower cadaveric transplant rates.

1. Introduction

Transplantation is a well-known and routine treatment today for patients suffering from end-stage organ failure. While the demand for transplants increases sharply, the supply of organs stagnates, widening the gap. The severe shortage of deceased donors is a major constraint toward procurement. The reason is that medical eligibility of a deceased donor requires the individual to die under circumstances that would render her organs suitable for transplantation, brain-death being the most vital requisite among them. The low likelihood of brain-death puts a natural upper limit to the number of deceased donors. Not only this limit is most likely to be unattainable but also considerably lower than expected due to legislative, procedural, managerial and organizational problems in procurement and transplantation.

In response to persistent rise of human organ shortage, a growing number of empirical studies on the determinants of donation rates appeared in the literature. These empirical endeavors investigated whether the differences in the procurement rates across countries/states could have stemmed from differences in default rules and other legal, social, political and religious institutions. While Johnson and Goldstein [1], Gimbel et al. [2], Healy [3], Abadie and Gay [4] and Neto et al. [5] focused on the effectiveness of default rules (presumed vs. informed consent legislation) using an international dataset, Bilgel [6] focused on the interactions between presumed consent, family consent and donor registries; Anbarcı and Çağlayan [7] investigated the impact of rule of law, income inequality and religion on the composition of living and cadaveric transplants.[1] The body of empirical evidence on the effectiveness of

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[1] For theoretical analyses see Cameron and Forsythe [8], Fevrier and Gay [9], Abadie and Gay [4] and Anbarcı and Çağlayan [10].

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default rules concurs that presumed consent legislation may be effective in relieving chronic organ shortages, with an estimate ranging from 3.5 to 28.3 percent depending upon model specification, estimation method and inclusion of countries. On the other hand, empirical studies by Boulware et al. [11], Wellington and Sayre [12] and Bilgel [13] aimed to identify the factors that influence living donation rates and in particular the effectiveness of living donor compensation/reimbursement legislation using state-level data in the U.S. All three studies find that donor compensation at the state level does not sustain overall living donation rates.

This article investigates the impact of time-invariant observable country heterogeneity on donor organ transplantation rates by employing a cross-country regression analysis. This heterogeneity is accounted by a number of country-specific characteristics representing legal requirements, medical praxis and management of the processes in transplant medicine. They contain binary information on whether certain procedural, medical or legal standards with respect to transplantation and procurement are upheld. We hypothesize that they may not only affect quality-related outcomes such as quality-adjusted life years or graft/patient survival but also quantity-related outcomes such as organ procurement rates or living and cadaveric transplantation rates. To the best of our knowledge, empirical studies that aim to measure the effectiveness of various aspects of law in transplant medicine are non-existent due to so-far-limited data availability. By employing a rich set of qualitative policy variables which have not been considered previously to model living or cadaveric donor organ transplant rates, we aim to decompose country heterogeneity and draw conclusions regarding inequitable or ineffective legislative actions.

For this purpose, we compiled two mutually non-exclusive datasets to analyze the impact of legal determinants of living donor organ transplantation (hence LDOT) rates and cadaveric donor organ transplantation (hence CDOT) rates using panel data on legislative, procedural and managerial aspects of organ transplantation and procurement, government health expenditures, enrollment rates, religious beliefs, legal systems and civil rights and liberties for 62 and 53 countries respectively for the period 2008–2009. Each dataset contains a specific set of information on country characteristics and a common set of control variables whose impact is not of primary interest, namely, health expenditures, enrollment rates, civil right and liberties, legal system and religious beliefs.

The findings of the analysis suggest that countries in which traceability of organs for transplantation is guaranteed or assured by law exhibit lower LDOT rates; bypassing psychiatric evaluation of living donors or allowing unrelated persons to donate under special pre-requirements translates into significantly higher LDOT rates; and legally requiring family consent or maintaining written standards for cadaveric procurement has a sizeable, negative impact on CDOT rates. However, a likely positive association between presumed consent, donor registries and CDOT rates is proved to be equivocal. We also find confirmatory evidence that countries with a majority of non-Christian religious adherents have significantly higher living but lower cadaveric transplant rates, emphasizing the impact of cultural differences on organ donation.

Section 2 introduces the data, Section 3 presents the results of the analysis and performs a robustness check, Section 4 discusses the limitations of the study and the policy implications of the findings, Section 5 concludes.

2. Data source and descriptive statistics

The data cover Argentina, Australia, Austria, Bolivia, Brazil, Brunei, Bulgaria, Canada, Chile, Colombia, Croatia, Cuba, Cyprus, Czech Republic, Dominican Republic, Estonia, Finland, France, Georgia, Germany, Ghana, Greece, Guatemala, Hungary, India, Iran, Ireland, Israel, Italy, Japan, Kenya, Kuwait, Latvia, Libya, Lithuania, Luxembourg, Malaysia, Mexico, Nepal, Netherlands, New Zealand, Nigeria, Norway, Oman, Pakistan, Panama, Paraguay, Portugal, Qatar, Romania, Saudi Arabia, Slovak Republic, Slovenia, South Africa, Spain, Sudan, Switzerland, Sweden, Syria, Thailand, Turkey, United Kingdom, Uruguay and Venezuela.

Data on total population and primary and tertiary gross enrollment rates are obtained from the World Bank.[2] Data on the number of living and cadaveric donor organ transplants are compiled from the Transplant Procurement Management (TPM), International Registry of Donation and Transplantation (IRoDaT).[3] The number of living and cadaveric transplants are divided by the population and multiplied by million to obtain the living and cadaveric transplant rates per million population (pmp) respectively. Data on purchasing power parity adjusted per capita government health expenditure is obtained from the World Health Organization (WHO) Global Health Observatory Data Repository.[4] Information on consent legislation comes from Abadie and Gay [4]; Bilgel [13] and from Tungsiripat and Tangcharoensathien [14]; Lim [15]; Larijani et al. [16]; El-Shoubaki et al. [17]; Albar [18]; Álvarez et al. [19]; WHO [20] and the Latin American and Carribean Transplant Society for countries whose information were missing.[5] Consent legislation variable takes the value of 1 for countries which enacted presumed consent and 0 for countries which enacted informed consent legislation. The data on civil rights and liberties is compiled from Freedom House.[6] Data on legal systems and religious beliefs is collected from the CIA, World Factbook.[7] The legal system variable takes the value of 1 for common law countries and 0 otherwise. The variable on religious beliefs takes the value of 1 if the majority of the population in country i is non-Christian and 0 otherwise.

[2] http://data.worldbank.org/indicator [accessed 11.01.12].
[3] http://www.tpm.org/ [accessed 09.01.12].
[4] http://apps.who.int/ghodata [accessed 09.01.12].
[5] http://www.stalyc.net [accessed 11.01.12].
[6] The civil liberties index comprises of freedom of expression and belief, associational and organizational rights, rule of law, personal autonomy and individual rights. In the sample, the total number of points awarded to civil rights and liberties corresponds to a point between 7 and 1, 1 being the highest and 7 being the lowest level of freedom. See http://www.freedomhouse.org [accessed 10.01.12].
[7] http://www.cia.gov/cia/publications/factbook [accessed 11.01.12].