JOURNAL OF PUBLIC ECONOMIC THEORY
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Submission Number:JPET-08-00191

Resource Allocation in Public Agencies: Experimental Evidence

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Abstract

Many organizations, including philanthropies and public agencies, require their employees to make resource allocation decisions that are intended to serve a broad social purpose or mission. In most cases the criteria on the basis of which scarce funds are to be allocated are imprecisely specified, leaving agents with considerable discretionary power. This paper reports results from a field experiment that explores the manner in which such power is exercised. Using a sample of public servants working in education, health, child care and nutrition programs in Colombia, and a sample of potential and actual beneficiaries of such programs, we attempt to identify the set of recipient attributes that induce the most generous responses from officials. This is done using a design we call the "distributive dictator game" which requires officials to rank recipients, with the understanding that a higher ranking corresponds to an increased likelihood of getting a voucher convertible into cash. Interpreting the ranking as the outcome of a random utility model, we estimate the effects of recipient attributes using a rank-order logistic regression. We find that women (especially widows), individuals with many minor dependents, refugees from political violence and the unemployed are universally favored. We also find significant interaction effects between ranker and recipient attributes, with rankings varying systematically by ranker age and gender.

This material is based upon work supported by the Behavioral Sciences Program at the Santa Fe Institute and the Inter-American Development Bank. We thank Catherine Eckel for many helpful discussions and suggestions for improving the experimental design, Natalia Candelo and Sandra Polonia for outstanding research assistance, and Christina Fong, Jack Knetsch, Juan Pablo Mendoza, John Miller, and Pieter Serneels for comments on an earlier version.
Citation: Juan Camilo Cardenas and Rajiv Sethi, (2012) "Resource Allocation in Public Agencies: Experimental Evidence", *Journal of Public Economic Theory*, Vol. 12 No. 4 pp. 815-836.
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Submitted: September 18, 2008. **Published:** March 08, 2012.

"... how does a good and honorable person make a resource allocation decision? Do you weigh a hand that's missing more than a leg? Someone who's starving versus a sick child? In a much less dramatic way, that's what the last 18 months have been for us."[1]

1 Introduction

Many organizations require their employees to make resource allocation decisions that are intended to serve a broad social purpose or mission. Philanthropies, foundations, non-profits and public agencies are prominent examples. In general, the criteria on the basis of which scarce funds are to be allocated are imprecisely specified, leaving agents with considerable discretionary power. The manner in which this power is exercised depends on the agent's private assessment of which recipient claims are most worthy or deserving of support. In the case of public agencies providing social services, an important policy question concerns the alignment of agent preferences with the official rationale for transfers. If public officials have preferences that are not aligned with stated policy objectives, the policy may be undermined or, at best, diminished in effectiveness.

This paper is an attempt to identify agent preferences using evidence from an experiment involving actual public officials and eligible recipients of state transfers in Bogotá, Colombia. The officials recruited for the experiment were drawn from a variety of social programs such as education, health, day care and nutrition. A set of likely transfer recipients were also recruited, with widely varying attributes along a number of dimensions. Each official was confronted with detailed information about a set of possible recipients and was asked to rank them, with the understanding that higher ranked individuals had a greater chance of obtaining a monetary payment at the end of the experiment. Officials received a fixed payment for participation (independent of their decisions) and each recipient was ranked by several different officials. The resulting data were then used to draw inferences about the particular recipient attributes that were rewarded with higher rankings, and hence higher expected payments.

In order to assign to each potential recipient a score indicating the likelihood of being highly ranked, we use the Plackett-Luce model for the statistical analysis of ranking data (Plackett 1975, Luce 1959). These scores correspond to probabilities with a clear economic interpretation, and allow us to describe in an intuitive way the manner in which the ranking varies with a particular attribute such as age, marital status, or gender. Interpreting the ranking as the outcome of a random utility model, we then estimate the effects of recipient attributes using a rank-order logistic regression (Beggs et al., 1981). This allows us to determine which collection of attributes were deemed by public officials to be the most deserving.

We find that some recipient attributes are universally favored. Rankings tend to favor women

[1] Larry Brilliant, director of the philanthropy Google.org (quoted in Rubin, 2008).

(especially widows), individuals with minor dependents, the unemployed, and individuals who have been displaced by political violence. This is the case regardless of whether rankers were actual public officials or drawn from a control group, and regardless of specific ranker characteristics. However, there are also interesting interaction effects between ranker and recipient attributes. For instance, better educated recipients receive more favorable treatment from older rankers than they do from younger ones, and female recipients receive more favorable treatment from women than from men. The finding that significant interaction effects exist between ranker and recipient attributes implies that the demographic characteristics of public officials can have major distributive consequences. Changes in the age distribution or gender composition of the population of officials can increase access to resources for some groups of recipients, while diminishing access for others. Our results suggest that such effects should be given explicit consideration in bureaucratic hiring and monitoring decisions, and more generally in the design and implementation of public policies.

As observed by Levitt and List (2007), a successful field experiment requires careful selection of representative participants and appropriate framing of decisions. Our participants were drawn from four social services areas (education, health, nutrition, and child care) and we knocked on the doors of the relevant agencies to recruit public servants who deal with the poor on a daily basis. The resulting sample included nurses, teachers, secretaries, guards, and clerks. Our recipients were recruited from the very places where they apply for welfare programs and benefits, such as community kitchens, registry offices, and day care centers. Our payoff structure and framing were designed to simulate an environment that is routinely faced by our subjects in their daily lives. In other words, our experiment should be a familiar activity to both recipients and rankers. Levitt and List (2007) are also concerned with the degree of scrutiny faced by experimental subjects, since this could be a decisive factor affecting their decisions. We believe that our design allows for the degree of scrutiny that any public official would expect to face in making allocation decisions of this kind. Decisions involving discretionary power are typically made in private, unobserved by peers and co-workers, but with final outcomes visible to selected outside observers. With the experimenter in the role of the outside observer, these features are replicated in our experimental design.

2 Literature

A concern with the public spiritedness of civil servants has a long history in the social sciences, dating back at least to the 1861 publication of John Stuart Mill's *Considerations on Representative Government*. More recently, scholars in the field of public administration have attempted to identify various dimensions of "Public Service Motivation" or PSM using interviews, survey data, and qualitative as well as quantitative methods (Perry and Wise 1990, Brewer et al. 2003, Moynihan and Pandey 2007). The consensus emerging from this work is that public servants are often motivated

by pro-social concerns, and gain considerable satisfaction from their participation in the delivery of essential services. This can result in better outcomes for service recipients than would be the case if public officials were motivated exclusively by economic reward. For instance, according to the 2004 *World Development Report*, many frontline service providers, "often the majority, are driven by an intrinsic motivation to serve" and manage to "deliver timely, efficient, and courteous services, often in difficult circumstances" (World Bank, 2004, p.4). The behavior of public officials is clearly conditioned by both economic incentives and professional norms.[2]

Gregg at al. (2008) provide recent econometric evidence using panel data on the nature and extent of pro-social behavior among public servants in Britain. Using unpaid overtime as a measure of pro-sociality, they examine the behavior of workers in four types of organization: non-profit caring and non-caring sectors, and for-profit caring and non-caring sectors. (Caring sectors are those that provide health, education and social services.) Their findings suggest that pro-sociality is concentrated in the caring non-profit sector. They go on to explore two distinct mechanisms through which such a concentration could arise, both based on the non-contractibility of effort. The "organizational form" hypothesis (Francois, 2000) argues that workers who care about the welfare of service recipients will be less inclined to choose high effort levels in for-profit organizations, since they expect profit maximizing managers to adjust other inputs in response, resulting in higher profits rather than better service delivery. This problem does not arise in non-profits, so workers can be confident that increased effort will benefit service recipients rather than residual claimants. The "mission matching" hypothesis (Besley and Ghatak, 2005), in contrast, argues that workers with heterogeneous preferences will be sorted across organizations in such a manner as to achieve congruence between worker preferences and organizational mission. Since the for-profit sectors are not mission oriented, those who care about the welfare of service recipients will be overrepresented in the non-profit caring sector. By exploiting the panel nature of the data Gregg et al. are able to conclude that mission matching rather than organizational form drives the concentration of pro-sociality in the non-profit caring sector.

Even when public officials are motivated largely by a commitment to service, however, they are often forced to make judgements that grant resources to some potential clients while denying them to others (Lipsky 1980, Meyers and Vorsanger 2003). The extent to which "street-level bureaucrats" have discretionary control over the allocation of resources is considerable, especially when there is severe resource scarcity in the face of strong client demand. Such conditions necessitate the

[2]The *World Development Report* also notes that providers "are often mired in a system where the incentives for effective service delivery are weak, wages may not be paid, corruption is rife, and political patronage is a way of life". Such incentive structures can sometimes overwhelm the pro-social motivation of public servants. For instance, Lindelow and Serneels (2006, p.2234) identify the "erosion of trust and professional norms" as a contributing factor in accounting for the widespread incidence of "absenteeism and shirking, pilfering drugs and materials, informal health care provision, illicit charging, and corruption" among a group of health care workers in Ethiopia.

rationing of funds and services, and officials who determine program eligibility or benefit levels accordingly have substantial control:

> "Given their position at the interface of the state and the citizen, and their opportunities to exercise discretion, front-line workers exert influence well beyond their formal authority. They operate, in Michael Lipsky's (1980) term, as bureaucrats who not only deliver but actively shape public policy outcomes by interpreting rules and allocating scarce resources. Through their day-to-day routines and the decisions they make, these workers in effect *produce* public policy as citizens experience it." (Meyers and Vorsanger, 2003, p.246)

Meyers and Vorsanger (2003, p.249) go on to note that "studies of welfare workers, rehabilitation counselors, police and teachers provide numerous examples of the exercise of 'positive discrimination' to assist those individuals that they consider most in need or most deserving of assistance."

But on what basis are some individuals be considered more deserving than others? An extensive literature in psychology has addressed precisely this question (Cook 1979, Feather 1992, Fong 2001, Appelbaum 2001). Individuals routinely distinguish between the deserving and the undeserving poor, based on certain systematic criteria. Most important among these is the *attribution of responsibility*: those whose poverty is perceived to arise from misfortune are generally thought to be more deserving of assistance than those whose condition is ascribed to poor judgement on their own part. This is especially the case when the judgements resulting in poor outcomes entail violations of mainstream norms or are made by stereotyped or stigmatized groups (Jencks 1992, Gans 1995). Hence poor individuals who are physically handicapped, ill, or widows with children are often judged to be more deserving than single mothers in their teens or able bodied men (Appelbaum 2001).

The experimental economics literature on charitable giving is vast, and usually involves some variant of the dictator game (see Andreoni 2007 for a survey). This includes a few field experiments with actual members of vulnerable groups placed in the role of recipients. Brañas (2006) highlights the critical role of framing, credibility and the target group in such settings. When dictators were asked to make transfers (in cash or medicines) to recipients who were actually poor, altruism increased substantially relative to levels typically observed in the canonical dictator game. Fong (2007) explored the responsiveness of students at Carnegie Mellon University and the University of Pittsburgh to empathic relations with recipients who were recruited at a child care center in Pittsburgh serving low-income mothers. Her results suggest that donations to these deserving individuals are dependent on the perceived worthiness of the recipient by the donor. In general, the reasons of why someone is poor (e.g. lack of effort versus lack of luck) seems to determine

donations along with the degree of humanitarianism and egalitarianism of the donor, measured through survey questions. Other experimental works where the recipients of transfers involve actual charities include Eckel and Grossman (2006), Eckel et al. (2005), and Carpenter et al. (forthcoming).

A few recent experimental studies involving actual or potential public servants have been conducted, with a view to exploring the tension between individual material incentives and the public interest. Barr et al. (2004) conducted an experimental study of Ethiopian nursing students who were likely candidates for civil service jobs in the health sector. In their "Public Servant's Game" some players had the opportunity to capture private rents by appropriating public resources at some cost to the community. Other subjects played the role of community members with the capacity to elect monitors, who in turn could expose the opportunistic behavior of public servants. Their results indicate that public servants did expropriate resources quite often, and that such expropriation decreased if they were subject to community monitoring or paid higher wages.

In a related experiment, Alatas et al. (2006) worked with Indonesian public servants and a control group of students. Their design involved a sequential game with three player roles: a firm, a government official and a citizen. The firm could offer a bribe to the government official, who could accept or reject it. If the bribe was offered and accepted, both players increased their earnings but decreased substantially the earnings of the citizen, who could then decide whether or not to punish this behavior. Punishment reduced the payoffs of all parties, including the citizen who chose to impose it. The authors found that students assigned to the role of the firm offered bribes more frequently and in larger amounts relative to the public servants assigned to the same role. In the role of the government official, students accepted bribes more readily than did public officials assigned to that role. Nevertheless, 47% of the public servants offered a bribe in the experiment and 30% accepted bribes. In the role of the citizens, the public officials punished somewhat more frequently than did students assigned to this role, although the difference was not found to be statistically significant.

While there have been experiments with practising public officials, and experiments with individuals from economically vulnerable populations, we know of no prior study simultaneously involving both of these groups. Furthermore, experiments with public officials have focused on resource appropriation for personal gain rather than resource allocation among potential recipients. Our design involves the matching of public officials with actual or potential welfare recipients and does not allow for the appropriation of funds by the official. This allows us to gain a better understanding of the attitudes of the former with respect to the attributes of the latter.

3 Subject Selection and Characteristics

Our sample of 463 participants included 226 people as rankers and 237 as recipients in a series of experiments played in pairs. Included among the rankers were 170 local officials from government social welfare programs, and included among the recipients were 205 eligible beneficiaries of such programs. We call these the *target* players, to distinguish them from controls (such as college students and workers in other sectors of the economy) whom we also recruited. Our controls included 56 people as rankers and 32 as recipients. In the case of public officials, the target sample refers to those employed in the public service agencies that interact directly with beneficiaries of social services, namely the poor. These include white collar and blue collar employees at four types of agencies (education, health, child care and nutrition programs), and were recruited at public health centers and hospitals, public schools, day care centers, community kitchens, and nutritional government programs. Neither the identities of the local officials nor their decisions in the experiment were revealed to any of the other players, and could not be observed by their superiors. We recruited at least two officers from each service provider visited during the process.

In the case of recipients, the target sample is composed of individuals who are currently receiving or are eligible to apply for social services from the government. These were recruited by visiting neighborhoods, community centers and municipal offices where potential beneficiaries apply for social services, or where they actually receive them. Most of the recruits were under the government welfare targeting program (SISBEN), and the pool includes ethnic minorities, people displaced by political violence, ex-combatants, street recyclers and street vendors. These are some of the most vulnerable segments of the Colombian population, and the decision to recruit them was guided by a variety of considerations. The Constitutional Court and the Ombudsman Office (*Defensoría del Pueblo*) have recorded frequent claims of discriminatory actions by state officials towards some of these groups (displaced persons, street recyclers, and ethnic minorities). Also, as a result of protracted political conflict in Colombia, individuals who have been uprooted and displaced by violence as well as ex-combatants from illegal armed groups are all currently recipients of government subsidized social services and direct transfers. We suspect that these two groups (victims and perpetrators of political violence) might provoke very different reactions from public officials when called upon to administer the provision of services and transfers.

Table 1 shows some of the characteristics of the 205 beneficiaries in our sample, and those of the 32 people who participated as recipient controls. Among target recipients, there is considerable variation in age and education levels, as well as in the number of dependents. Somewhat more than half of them are female, one-fifth identify themselves as black or indigenous, and a similar number are unemployed. Less than a tenth are formally married; most are single or in common law relationships. Almost one-third have been displaced from their homes as a result of political

violence, and almost one-fifth are former combatants in this violence. A few work in the informal sector as street vendors or recyclers.

Table 1. Characteristics of recipients in sample

	Targets ($n = 205$)				Controls ($n = 32$)			
	Mean	S.D.	Min	Max	Mean	S.D.	Min	Max
Age	32.74	13.53	16	73	22.69	3.89	18	32
Years of education	8.08	3.57	0	18	17.28	0.77	15	20
Number of dependents	1.97	1.80	0	7	0.03	0.18	0	1
Number of minor dependents	1.52	1.53	0	6	0.03	0.18	0	1
Female	0.56	0.50	0	1	0.59	0.50	0	1
Black (self-declared)	0.14	0.34	0	1	0.19	0.40	0	1
Indigenous (self-declared)	0.08	0.27	0	1	–	–	–	–
Married	0.08	0.28	0	1	0.03	0.18	0	1
Common law	0.38	0.49	0	1	–	–	–	–
Single	0.38	0.49	0	1	0.94	0.25	0	1
Widow/Widower	0.04	0.21	0	1	–	–	–	–
Displaced	0.32	0.47	0	1	–	–	–	–
Ex-combatant	0.19	0.39	0	1	–	–	–	–
Street Recycler	0.09	0.28	0	1	–	–	–	–
Street Vendor	0.07	0.25	0	1	–	–	–	–
Unemployed	0.21	0.41	0	1	–	–	–	–

Selected characteristics of rankers are shown in Table 2. Nor surprisingly, the public officials (target rankers) were more highly educated than target recipients. Their mean age was similar to the mean age among target recipients, although the age distribution among beneficiaries had greater variance and range (the oldest beneficiary was 73 years old while the oldest public official was 55). A clear majority were women.[3]

[3]Public officials were also more likely to be married, and less likely to be living with common law partners when compared with the beneficiaries in our sample; just 16% of officials were living with common law partners (compared with 38% of beneficiaries), and 25% were married.

Table 2. Characteristics of rankers in sample

	Targets ($n = 170$)				Controls ($n = 56$)			
	Mean	S.D.	Min	Max	Mean	S.D.	Min	Max
Age	34.32	8.40	17	55	25.89	8.79	17	54
Years of education	14.51	3.91	4	20	17.45	1.66	12	20
Female	0.69	0.46	0	1	0.55	0.50	0	1

In addition to the two target populations we also recruited residents of Bogotá with varying levels of education, income, occupation, and residential location to serve as controls. About half of these were college students, while the remainder were employees in private and public sector offices. A total of 56 controls were randomly assigned to the pool of public officials, and 32 to the pool of beneficiaries. Their characteristics also shown in Tables 1-2; they were typically young, unmarried, and more highly educated than targets in either group. Not surprisingly, control recipients have levels of socioeconomic well-being well above those of targets, since (by design) the targets are eligible beneficiaries of social programs while the controls are not. For the same reason, there are a number of attributes (such as ex-combatant or common law status) that are completely absent among control recipients.

4 Experimental Procedure

The two populations (officials and beneficiaries) were respectively placed in two different roles (rankers and recipients) in an experiment that we call the "distributive dictator game". Rankers allocated resources to recipients at no personal cost in accordance with the following procedure. A typical session consisted of five rankers and five recipients.[4] Each ranker was given information about each of the recipients (in a manner described below) and asked to produce a complete ordering of these individuals. This collection of rankings determined the likelihood with which each of the recipients was paid an exogenously given sum of money. Rankers made their decisions in private, unaware of the decisions made by other rankers. Once all the rankings were completed, one of these was selected at random and formed the basis for payment. An integer was drawn from a uniform distribution on the set $\{1, ..., 5\}$, and this number of recipients, starting with the highest ranked, received one voucher each. These vouchers could then be exchanged for cash at a rate of 10,000 Colombian pesos (approximately \$5) per voucher. All recipients (including those who received a voucher) were paid a show up fee of 2,000 pesos. All rankers received a fee of 10,000 pesos for

[4] All sessions had at least two and at most six rankers, with the vast majority having exactly five. The number of recipients matched with each ranker was always five.

completing the assigned task, as well as 2,000 pesos for transportation.[5] Although each recipient was ranked by multiple rankers, they could get at most one payment, and rankers were aware of this.

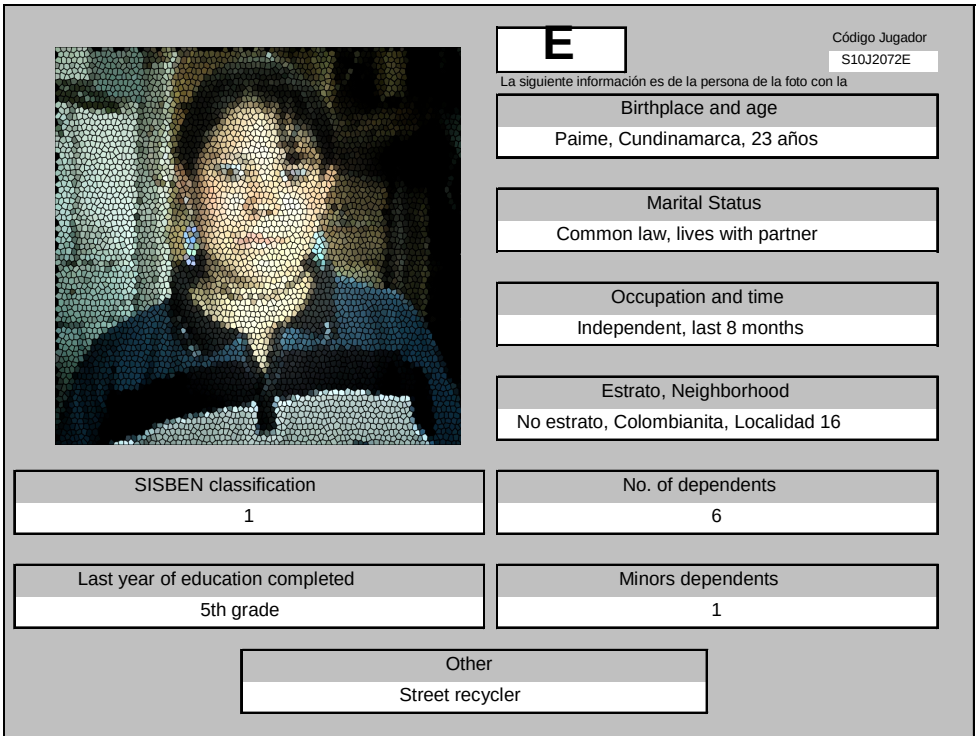

Figure 1. Sample card with English translation and photograph blurred.

Prior to making their choices, each ranker observed a set of five cards, one corresponding to each of the recipients with which they were matched. This card included a photograph of the recipient as well as basic demographic and socioeconomic attributes including age, education, neighborhood of residence, number of dependents, occupation and several other characteristics described in detail below. These cards were produced after the recruitment of the recipients, but before the recruitment of the public officials. Information on the cards accurately represented the self-declared characteristics of recipients; we did not manipulate or falsify characteristics in any

[5] For purposes of comparison, the hourly minimum wage at the time of the experiments was about 1,700 pesos. The most common cash transfer program of the government, Familias en Accion, paid a *monthly* amount of around 45,000 pesos (approximately 20 US dollars) to the lowest income households, of which our sample of target beneficiaries is representative. All players were informed that funding for the experiments came from international foundations. We do not expect "house money" effects to be a problem since the task performed by public officials resembled their routine professional activities, namely the allocation of resources funded by sources other than their own income.

way. Figure 1 depicts one of the cards used (the photograph here has been blurred to protect the privacy of the recipient, and the information has been translated from the original Spanish).

The objective of the experiment was to identify attributes that have significant effects on the manner in which recipients are ranked by public officials. Since the payments to rankers were exogenously fixed and not contingent on the rankings they produced, there was no conflict between the material self interest of the two sets of players.[6] One might therefore expect that rankers placed those recipients whom they deemed to be more worthy or deserving in higher positions in order to increase the expected value of their transfers. In order to ascertain the public officials' own conceptions of worthiness we were careful not to suggest any attributes on which the ranking ought to be based. Despite the fact that payments to rankers were not contingent on any measure of performance, we provide compelling evidence below that certain recipient attributes were systematically rewarded or punished by rankers, indicating that rankers took their task very seriously.

5 Measuring Worthiness

Since higher ranked recipients have a greater likelihood of receiving transfers relative to those who are lower ranked, one interpretation of a ranking is that it reflects the attitudes of public officials regarding the extent to which recipients are worthy or deserving of transfers. However each group of five recipients is ranked by multiple officials and (except on very rare occasions) these rankings are not identical. How might one aggregate the information in the rankings to obtain a measure of perceived recipient worthiness? The most obvious way to do this is to compute the average rank, or equivalently, the expected payoff for each recipient. This has the advantage of simplicity but treats the ranking itself as a cardinal measure. Under this procedure, an increase in rank from fifth to fourth results in a rise in measured worthiness that is identical to that corresponding to an increase in rank from second to first.

An alternative approach to assigning a score to each individual which respects the ordinal nature of the ranking data is based on the Plackett-Luce model (Plackett 1975, Luce 1959). This model views a ranking as a sequential act on the part of the decision maker, who begins by selecting the highest ranked object, then the second highest, an so on. A key assumption is the independence of irrelevant alternatives: for any two objects i and j that have yet to be ranked, the relative likelihood of being selected next is independent of the sequence of objects that have already been ranked. In this case, if p_i denotes the probability that object i is ranked first, then the likelihood of observing

[6] This is an important element of our design, intended to replicate the conditions under which allocation decisions are made by public officials in the course of their normal duties. A standard dictator game (in which payments to recipients come from the ranker's own income) would have failed to achieve this.

a sequence that has objects i and j in the first two positions is simply

$$p_i \left(\frac{p_j}{1 - p_i} \right).$$

Similarly the set of sequences beginning with ijk have probability

$$p_i \left(\frac{p_j}{1 - p_i} \right) \left(\frac{p_k}{1 - p_i - p_j} \right),$$

and so on.

Let n denote the total number of rankings of the set of r objects that are available. Each of these rankings is a sequence of length r. Let n_i denote the number of rankings with object i in the first position, n_{ij} the number with i and j in the first two positions respectively, and so on. Then, under the assumption that the process generating the data is as described above, estimates for p_i can be obtained by maximizing the following likelihood function (Plackett, 1975, p.196):

$$L(p) = \frac{(\prod p_i)^n}{\prod (1 - p_i)^{n_i} \prod (1 - p_i - p_j)^{n_{ij}} \prod (1 - p_i - p_j - p_k)^{n_{ijk}} ...},$$

where $p = (p_1, .., p_r)$ and the last product in the denominator involves sequences of length $r - 1$. This is equivalent to

$$L(p) = \frac{(\prod p_i)^n}{\prod p_i^{m_i} \prod (1 - p_i)^{n_i} \prod (1 - p_i - p_j)^{n_{ij}} \prod (1 - p_i - p_j - p_k)^{n_{ijk}} ...},$$

where the last product in the denominator involves sequences of length $r - 2$, and m_i denotes the number with object i in the *last* position.

The estimation of the probabilities p_i can be illustrated using a simple example. Consider the following five rankings of five objects, where each row represents the complete ordering of a *single* ranker, and different rows correspond to different rankers:

1	3	4	5	2
3	1	4	5	2
1	3	4	2	5
2	1	4	5	3
4	3	1	2	5

Here we have

$$n_1 = 2,\ n_2 = \ n_3 = n_4 = 1,$$

$$n_{13} = 2,\ n_{21} = n_{31} = n_{43} = 1,$$

$$n_{134} = 2,\ n_{214} = n_{314} = \ n_{431} = 1,$$

with all other partial sums equal to 0. Also, looking at objects in the last position, we get

$$m_2 = m_5 = 2,\ m_3 = 1.$$

Substituting this data into the likelihood function and maximizing, we obtain estimates

$$p_1 = 0.480,\ p_2 = 0.039,\ p_3 = 0.237,\ p_4 = 0.210,\ p_5 = 0.035.$$

this may be compared with scores obtained by using the rank itself as a measure.

Figure 2 shows the empirical distribution of Plackett-Luce probabilities in our sample, which is clearly skewed towards zero.

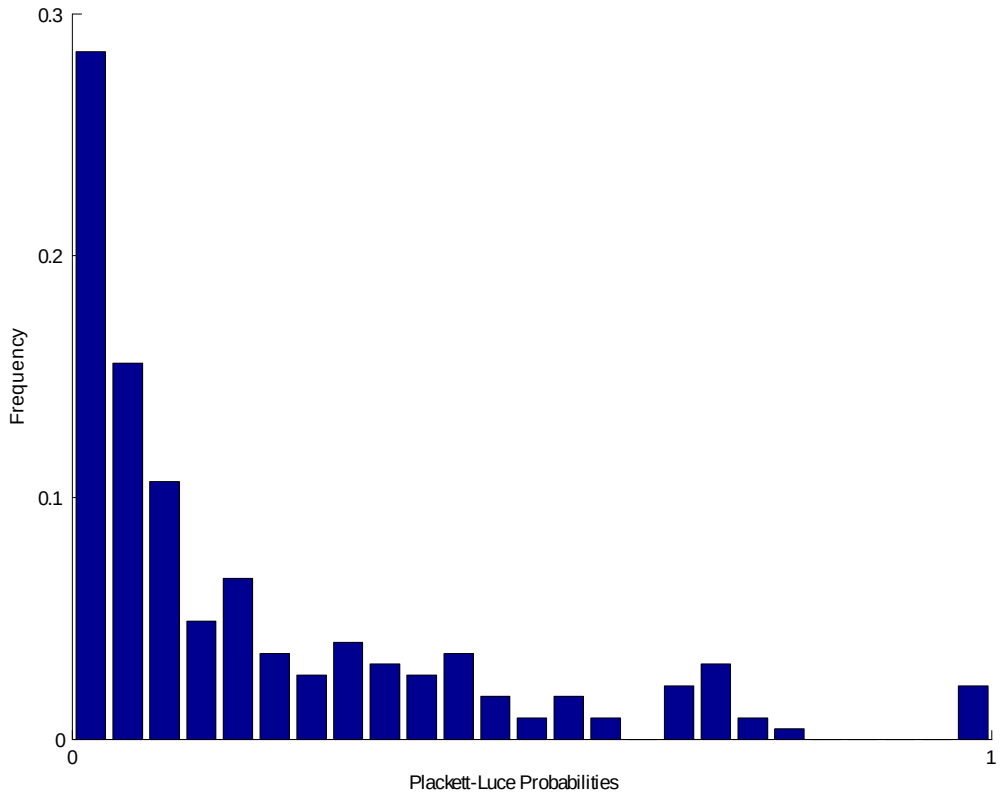

Figure 2. Sample distribution of Plackett-Luce probabilities.

The Plackett-Luce model yields estimates that are highly nonlinear in the rank itself. Moreover, since the probability assigned to any given recipient depends on the precise manner in which all other recipients in the pool are ranked, any given value of the average rank is consistent with a wide range of probabilities. This is shown in Figure 3, which illustrates the "curvature" of the (stochastic) relationship between the probability and average rank for all recipients who were ranked by precisely five rankers. Note that the probability drops sharply when an individual's average rank increases from 1 to 2, but much less dramatically for shifts in average rank from 4 to 5. This suggests that the probability might be a good measure of the degree to which attributes are

highly rewarded when the resources to be allocated are very scarce. The more limited the resources, the more critical it is to be highly ranked. In other words, the expected economic value of moving from second to first place may be substantial, while moving from fifth to fourth may have negligible benefits. Using the average ranking as a measure of worthiness does not capture this effect.

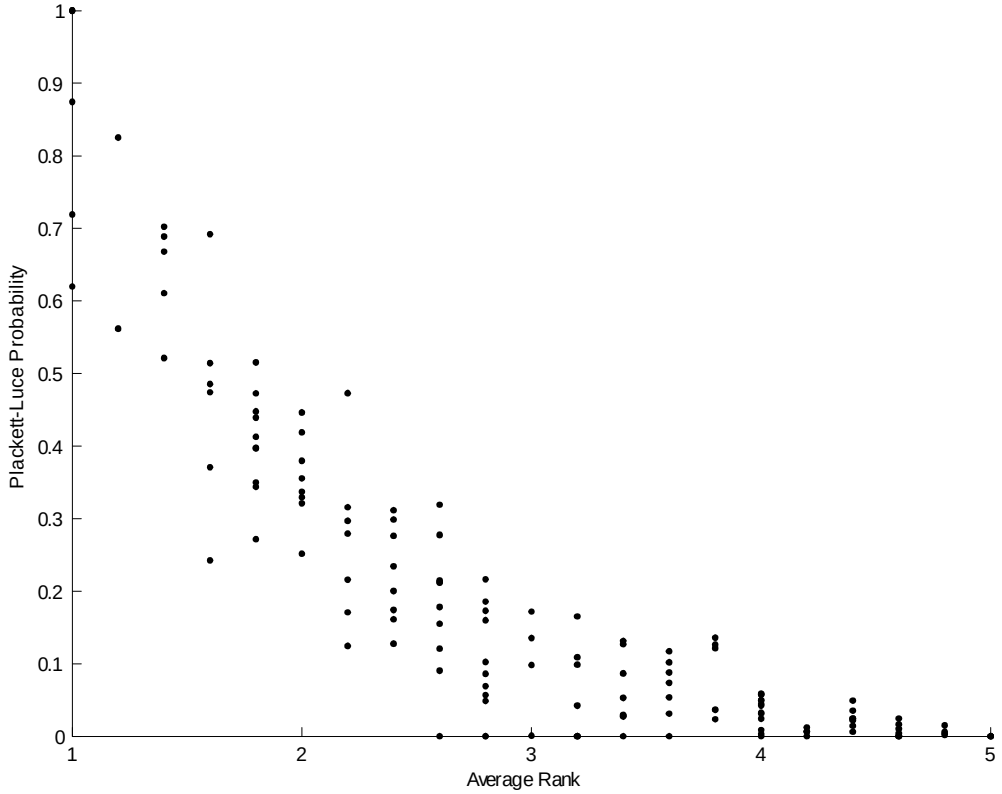

Figure 3. Plackett-Luce probabilities and average rank.

The manner in which certain recipient attributes affect the probability of being highly ranked is described in Figure 4. The top-left panel shows that recipients belonging to the target group have much higher probabilities on average than those in the control group, so rankers recognize and allocate resources to those most likely to be eligible for them in the broader social setting. The top-right panel shows that women are ranked above men on average. The bottom-left panel shows that individuals who were displaced by political violence were treated much more sympathetically by rankers on average, being more than twice as likely to be ranked first. Finally, the bottom-right panel shows a striking effect of the number of minor dependents. Rankers systematically divert resources towards those with dependent children, and do so in a manner that increases monotonically with the number of dependents.

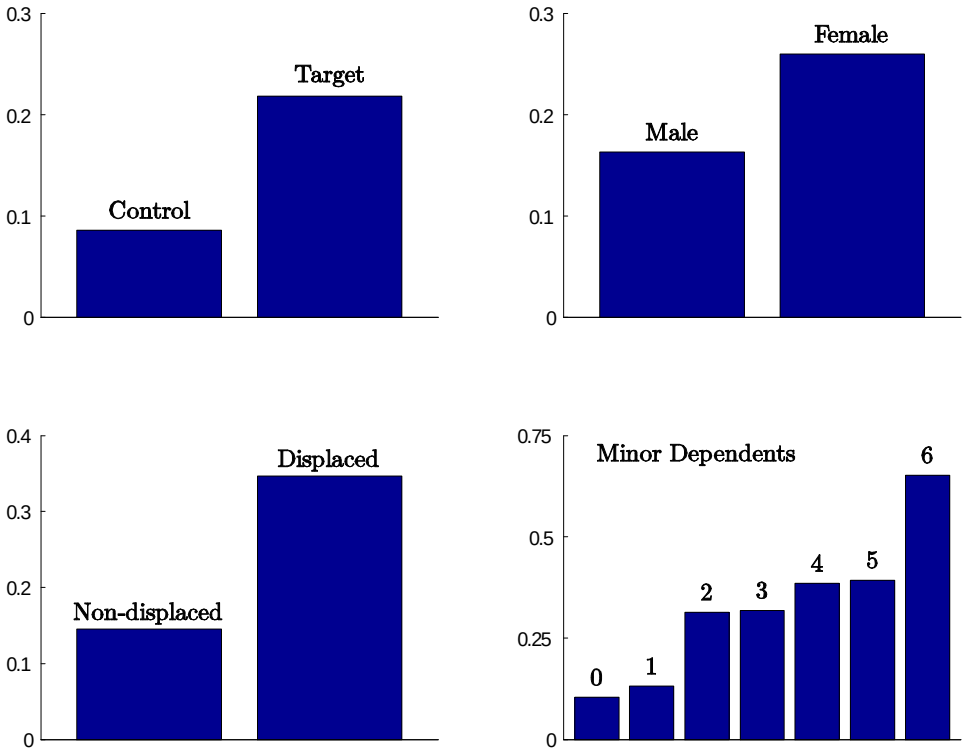

Figure 4. Plackett-Luce probabilities and recipient attributes.

The regularities shown in the figure are merely suggestive, however, and the relationship between ranker attitudes and beneficiary attributes needs to be explored in a regression context. This is done next.

6 Regression Results

The Plackett-Luce model provides a parsimonious measure of the likelihood of being highly ranked but tells us nothing about the determinants of this likelihood in relation to recipient attributes. In order to explore this relationship, we interpret the ranking as being the outcome of a random utility model along the lines of Beggs et al. (1981). Specifically, let u_{ij} denote the utility obtained by official i when recipient j is paid. This depends on a vector of attributes z_{ij} (which may include interactions between recipient and official attributes) and a disturbance term ε_{ij} as follows:

$$u_{ij} = \beta z_{ij} + \varepsilon_{ij}$$

A recipient j is ranked above recipient k by official i if and only if $u_{ij} > u_{ik}$. If the vector z_{ij} depends only on recipient attributes, we have the case of homogeneous official preferences. Some degree of

heterogeneity in the preferences of public officials can be captured by allowing for interactions between their attributes and those of recipients.

Beggs et al. (1981) derive the likelihood function for this random utility model under the assumption that the disturbances ε_{ij} are independently and identically distributed across all i and j, and take on the extreme value distribution: $\Pr(\varepsilon_{ij} \leq t) = \exp(-\exp(-t))$. This is the rank-order logit model, which we use to obtain maximum likelihood estimates of the parameter vector β.

Results for three specifications of the model are reported in the first three columns of Table 3.[7] The first two columns report the extent to which various recipient attributes are valued by control and target rankers respectively, without allowing for any interaction effects between ranker and recipient characteristics. Comparing these two columns allows us to identify criteria used by public officials that differ systematically from those used by other members of society. The third column restricts the sample to target rankers, and allows for a number of interaction effects based on ranker age and gender. This allows us to identify differences in criteria used by different demographic subgroups of public officials.

The set of explanatory variables includes a wide range of recipient attributes visible to the ranker as well as one attribute that was not visible: whether or not the *recipient* was a target or a control. Our reason for including this is to ascertain whether or not the photograph carries information that does not appear elsewhere on the card and which affects the ranker's judgment. It turns out that it does: target recipients are ranked significantly higher than controls, despite inclusion of all other information visible to rankers. Rankers appear to recognize and reward individuals who are considered by the state to be legitimate recipients of welfare services.

In addition, certain recipient characteristics result in higher rankings regardless of whether the ranker is a public official (target) or not (control). Women are generally ranked higher, especially if they are widows or have minor dependents. Unemployed recipients, and those displaced by political violence are also ranked higher by all rankers. Other recipient characteristics do not seem to significantly affect rankings regardless of whether the ranker is a target or control: race, ethnicity, common law status and education are examples.[8] Target and control rankers seem to place systematically different weights on different characteristics, however, and controls seem more sensitive to recipient characteristics overall (reflected in coefficients with larger absolute value).

[7] Variables with subscript "1" refer to attributes of rankers, and those with subscript "2" to recipients. In particular, $\text{Target}_2 = 1$ if the recipient is a target player, and $\text{Target}_2 = 0$ otherwise. Interactions with Old_1 refer to cases where the ranker's age is 34 or higher, which corresponds to those above the median among target rankers. Some recipient characteristics for which we have data (street recyclers and vendors for instance) were statistically insignificant in all treatments are have been omitted from the reported regressions.

[8] Our failure to identify systematic effects of race and ethnicity may be attributable in part to the fact that black and indigenous subjects were each a small proportion of the total recipient pool.

Table 3. Regression results

(Rank-ordered logit for Columns 1-3, ordered logit for Column 4)

	$Control_1$	$Target_1$	$Target_1$	$Target_1$
$Target_2$	1.357**	0.721**	0.758**	0.811***
$Female_2$	0.771***	0.455***	0.287	0.347
Age_2	0.026	0.015**	0.029**	0.040***
$Black_2$	0.083	0.232	0.702*	0.669
$Indigenous_2$	-0.110	0.098	-0.551	-0.220
$CommonLaw_2$	0.356	-0.048	-0.183	-0.191
$Widow_2$	2.773***	1.177**	1.184**	1.382***
$Education_2$	0.086	-0.028	-0.124***	-0.074**
$MinorDependents_2$	0.682***	0.316***	0.315***	0.317***
$Unemployed_2$	1.881***	0.312*	0.374**	0.317
$Displaced_2$	1.965***	0.331**	0.237	0.453**
$Ex\text{-}combatant_2$	1.008*	-0.261	-0.287	-0.158
Old_1*$Female_2$			-0.210	-0.306
Old_1*Age_2			0.004	-0.018**
Old_1*$Black_2$			0.346	0.261
Old_1*$Indigenous_2$			0.287	0.031
Old_1*$CommonLaw_2$			-0.276	-0.390
Old_1*$Education_2$			0.126***	0.064***
Old_1*$MinorDependents_2$			0.132	0.165*
$Female_1$*$Female_2$			0.521**	0.508*
$Female_1$*Age_2			-0.013	-0.016*
$Female_1$*$Black_2$			-0.925**	-0.058
$Female_1$*$Indigenous_2$			0.771	1.039*
$Female_1$*$CommonLaw_2$			0.392	0.342
$Female_1$*$Education_2$			0.031	0.037
$Female_1$*$MinorDependnets_2$			-0.069	-0.082
Rankers	56	170	170	–
Observations	280	850	850	850

Significant at the 1% (***), 5% (**), and 10% (*) levels

Turning to the third column in Table 3, we see evidence that the demographics of public officials do seem to affect the criteria they use in ranking recipients. The age of the ranker influences the extent to which education is valued, with older rankers (those above the median age among all public officials in our sample) responding more positively to recipient age than younger rankers. In fact, younger rankers appear to penalize older recipients while older rankers do not. There are gender differences across rankers with respect to the extent to which female recipients are favored: it appears that women are significantly favored in the rankings by female public officials but not by males. Finally, there are gender difference regarding the treatment of race: black recipients receive higher rankings from men than from women. Many of the effects identified in the first two columns are replicated: even after controlling for interaction effects, we find that women, widows, the unemployed, and those with minor dependents receive favorable treatment.

The last column of Table 3 estimates the same specification but using ordered logit. This treats each ranker-recipient pair as if it were independent observation, and (unlike the rank-ordered logit) fails to take into account that multiple observations arise from the same ranking. We report these results as a simple robustness check, in the expectation that robust effects should remain significant under this (relatively minor) mispecification. For most variables the results are broadly consistent, although the comparison suggests that the role of unemployment status and the interaction effect between recipient race and ranker gender should be treated with considerable caution.

A clearer picture of differences in ranker behavior by race and gender is provided in Table 4, which presents rank-ordered logistic regression results for various subgroups of public officials (and reproduces in the first column the results for all target rankers). Here we see again that those with minor dependents are universally favored, regardless of ranker characteristics. The sign, size and significance of many of the other effects is contingent on ranker characteristics. Female recipients are favored overall but much less so when the ranker is male. Higher levels of education are penalized by young rankers but not by older ones. Older recipients receive more favorable treatment from older rankers and men than from younger rankers and women. All rankers respond to unemployment status, but the effects are strongest when rankers are young or male. Displaced recipients are favored overall but this effect is driven largely by young and female rankers. And ex-combatants are ranked lower by most rankers although the effect is significant only in the case of young rankers.

Table 4. Regression results for ranker subsamples (target rankers only)

	All	Young	Old	Female	Male
Target_2	0.721**	0.691	0.805**	0.736**	0.703
Female_2	0.455***	0.657***	0.337*	0.700***	0.198
Age_2	0.015**	0.013	0.022**	0.012	0.031***
Black_2	0.232	-0.223	0.561**	-0.024	0.901**
Indigenous_2	0.098	-0.126	0.354	0.391	-0.739
CommonLaw_2	-0.048	0.052	-0.174	0.052	-0.289
Widow_2	1.177**	0.912	1.467*	1.043*	1.314*
Education_2	-0.028	-0.116***	0.036	-0.017	-0.060
MinorDependents_2	0.316***	0.213***	0.433***	0.291***	0.425***
Unemployed_2	0.312*	0.559**	0.387	0.244	0.545*
Displaced_2	0.331**	0.586***	-0.114	0.382**	0.127
Ex-combatant_2	-0.261	-0.592*	-0.086	-0.328	0.133
Rankers	170	84	87	119	51
Observations	850	419	431	595	255

How is one to interpret these findings? To begin with, some of the effects identified here should be considered tentative until further evidence becomes available. Subject to this caveat, there are certain recipient attributes that seem to be rewarded universally, regardless of ranker type, as well as some that are viewed differently by different ranker subgroups. To some extent this variation reflects systematic differences across rankers in conceptions of deservedness. However, given the very limited information we have about ranker characteristics, it is certainly possible that some of the interaction effects attributed to age or gender are in fact driven by some unobserved characteristics that vary systematically across subsamples. For instance, if male and female officials in our sample differ systematically with respect to ethnicity, marital status, or political preference, differences in behavior across these groups cannot simply be attributed to gender differences. Regardless of the deeper underlying cause, however, our study does provide some evidence to support the view that personal characteristics of rankers affect their treatment of recipients. One implication of this is that the composition of the population of public officials may have significant distributional effects. Further exploration of such effects is clearly warranted, since they are not typically anticipated in the design of public policies.

7 Discussion

The criteria on the basis of which public funds are to be disbursed among transfer recipients cannot be contractually specified with complete precision. Furthermore, even when the responsibilities of public officials are clearly specified in written instructions, and their behavior is regulated by laws against discrimination, monitoring of their activities is necessarily imperfect. This leaves bureaucrats with considerable discretion, and their private attitudes therefore have important distributive consequences. For instance, delays in the handling of particular claims or favoritism towards certain users is both widespread and difficult to detect. Our experimental design, and the recruitment of subjects drawn from representative populations of rankers and recipients, allowed us to identify certain key elements of their preferences.

Our results suggest that public officials tend to favor victims of prior misfortune, such as widows with minor dependents, and individuals who have been displaced by political violence. Women in general are ranked higher, after controlling for other factors. These findings are consistent with prior evidence from social psychology. More interestingly, we find significant interaction effects between ranker and recipient attributes. There is some evidence that well educated recipients fare better when rankers are old rather than young, and female recipients fare better when rankers are also female. Those displaced by political violence tend to be ranked higher, especially if rankers are young or female. Ex-combatants are ranked somewhat lower than non-combatants (holding constant other characteristics) but this effect is not statistically significant.

In some cases, the biases of public officials may reflect widely held norms that are consistent with the (often vague) official mandates under which they operate. Favoring recipients with many minor dependents may be one such example. However, there also exist subtle and complex biases in the behavior of public officials that vary with ranker attributes and which do not simply reflect widely held societal norms. This raises interesting policy questions about the manner in which rankers with varying attributes should be distributed across jurisdictions, and the extent to which they should be audited or monitored. For instance, since attributes of rankers such as age and gender affect their assessments of recipient worthiness, there may be value in having demographic diversity in the population of officials within sectors and locations. The results of audits (or experiments such as ours) could also be used to create awareness among officials of patterns of bias. To the extent that expressions of bias are subconscious, such awareness may itself result in modified behavior, especially if the criteria on the basis of which recipient claims are to be addressed are stated in clear and unambiguous terms.

While the written information on recipient cards is quite detailed, it is possible that the photographs themselves carry information about additional attributes that rankers find salient. A visual evaluation of a face has been shown to have significant effects in certain experimental set-

tings. For instance, the attractiveness of subjects appears to influence the incidence of trust and reciprocity (Eckel and Wilson 2005; Wilson and Eckel 2006). Eckel (2007) reviews a series of studies, including her own experimental work, showing how more attractive people get better treatment in court, in the labor market and in laboratory ultimatum games. Attractive subjects also trigger initially higher contributions in public goods games and are more likely to be chosen and trusted in prisoners' dilemma games. In the highly asymmetric environment considered here, attributes such as perceived vulnerability may be more salient than attractiveness. We have public officials and controls with no major socioeconomic stress ranking recipients who are in a much less secure position both inside and outside of the lab, and with no power over the payoffs to the rankers. We leave to future research the task of systematically extracting attribute information from the photographs, and exploring the effects of this information on the behavior of public officials.

References

[1] Alatas, Vivi, Lisa Cameron, Ananish Chaudhuri, Nisvan Erkal & Lata Gangadharan, (2006). "Subject Pool Effects in a Corruption Experiment: A Comparison of Indonesian Public Servants and Indonesian Students," Department of Economics - Working Papers Series 975, The University of Melbourne.

[2] Andreoni, James (2007a) "Charitable Giving." prepared for *The New Palgrave Dictionary of Economics*, 2nd Edition.

[3] Andreoni, James (2007b) "Philanthropy." in S-C. Kolm and J. Mercier Ythier, eds., *Handbook of Giving, Reciprocity and Altruism*, Amsterdam: North Holland, pp. 1201-1269.

[4] Appelbaum, L.D. (2001). "The Influence of Perceived Deservingness on Policy Decisions Regarding Aid to the Poor". *Political Psychology.*

[5] Barr, Abigail & Lindelow, Magnus & Serneels, Pieter (2004). "To serve the community or oneself - the public servant's dilemma," Policy Research Working Paper Series 3187, The World Bank.

[6] Beggs, S, S. Cardell and J. Hausman (1981). "Assessing the potential demand for electric cars". *Journal of Econometrics* 17: 1-19.

[7] Besley, T. and M. Ghatak (2005). "Competition and Incentives with Motivated Agents." *American Economic Review* 95: 616-636.

[8] Branas, Pablo (2006) "Poverty in Dictator Games: Awakening Solidarity". *Journal of Economic Behavior & Organization* 60:306-320.

[9] Brewer, G.A., S. Coleman Selden and R.L. Facer II (2000). "Public Service Motivation: Individual Conceptions of Public Service Motivation". *Public Administration Review* 60: 254–264.

[10] Carpenter, J., Holmes, J., Matthews, P. (2007). "Charity Auctions: A Field Experimental Investigation". *Economic Journal*, forthcoming.

[11] Cook, F.L. (1979). *Who Should be Helped? Public Support for Social Services.* Sage Publications.

[12] Eckel, Catherine (2007). "People Playing Games: The Human Face of Experimental Economics". Presidential Address. *Southern Economic Journal* 2007: 73.

[13] Eckel, Catherine and P. Grossman (2006). "Volunteers and pseudo-volunteers: The effect of recruitment method in dictator experiments". *Experimental Economics* 3: 1386-4157.

[14] Eckel, Catherine, P. Grossman and Rachel M. Johnston (2005). "An experimental test of the crowding out hypothesis". *Journal of Public Economics* 89: 1543-1560.

[15] Eckel, Catherine C., and Rick K. Wilson. (2005). "Detecting trustworthiness: Does beauty confound intuition?" Unpublished paper, University of Texas at Dallas.

[16] Feather, N.T. (1992). "An attributional and value analysis of deservingness in success and failure situations". *British Journal of Social Psychology*

[17] Fong, C. (2001). "Social Preferences, Self-Interest, and the Demand for Redistribution." *Journal of Public Economics* 82: 225-246.

[18] Fong, C. (2007) "Evidence from an Experiment on Charity to Welfare Recipients: Reciprocity, Altruism and the Empathic Responsiveness Hypothesis." *Economic Journal* 117: 1008-1024.

[19] Francois, P. (2000). "Public Service Motivation as an Argument for Government Provision." Journal of Public Economics 78: 275-299.

[20] Gans, H.J. (1995). The War Against the Poor: the Underclass and Antipoverty Policy.

[21] Gregg, P., P. Grout, A. Ratcliffe, S. Smith and F. Windmeijer (2008). "How Important is Pro-Social Behavior in the Delivery of Public Services?" CMPO Working Paper No. 08/197, Bristol Institute of Public Affirs, University of Bristol.

[22] Jencks, C. (1992). Rethinking Social Policy: Race, Poverty, and the Underclass. Cambridge: Harvard University Press.

[23] Levitt, Steven D. and List, John A. (2007). "Viewpoint: On the Generalizability of Lab Behaviour to the Field." *Canadian Journal of Economics* 40: 347-370.

[24] Lindelow, M. and Serneels, P. (2006). "The performance of health workers in Ethiopia: Results from qualitative research." Social Science and Medicine 62: 2225-2235.

[25] Lipsky, M. (1980). Street-Level Bureaucracy: Dilemmas of the Individual in Public Services.

[26] Luce, R. D. (1959). *Individual Choice Behavior*, New York: Wiley.

[27] Meyers, M.K. and S. Vorsanger (2003). "Street-level Bureaucrats and the Implementation of Public Policy." In B.G. Peters and J. Pierre, eds., *Handbook of Public Administration*. London: Sage Publications.

[28] Moynihan, D.P., S.K. Pandey. (2007). "The Role of Organizations in Fostering Public Service Motivation." *Public Administration Review* 67: 40–53.

[29] Perry, J.L. and L.R. Wise (1990). "The Motivational Bases of Public Service. *Public Administration Review* 50: 367-73 .

[30] Plackett, R.L (1975). "The Analysis of Permutations". *Applied Statistics* 24: 193-202.

[31] Rubin, Harriet (2008). "Google Offers a Map for Its Philanthropy." New York Times, January 18.

[32] Wilson, Rick K., and Catherine C. Eckel (2006). Judging a book by its cover: Beauty and expectations in a trust game. *Political Research Quarterly* 59:189–202.

[33] World Bank (2004). World Development Report: Making Services work for Poor People.