Empirical Evidence on Public Goods and Externalities

Econ 525
Farnham and Gugl
Recall some basic theoretical predictions about public goods

• Nash equilibrium (NE) with voluntary contribution involves sub-optimal contribution to the public good, relative to Pareto optimum (PO)

• Contributions to public good will be diminishing in price of public good; increasing in income (if normal)

• Increased group size reduces Nash equilibrium contributions of individuals (usually)

• At least partial crowd-out of private contributions by govt contributions
Experimental Evidence

• One way to test these (and other) theories is in the lab
  – Lab experiments can be tightly designed to control environment and institutions and isolate behaviour that might be difficult to tease out of observational data
  – Typical set-up involves bringing a bunch of undergrads into a computer lab, and having them play Prisoner’s Dilemma type games on a computer

• Much of the review that follows is from Ledyard (1994)
Basic PG contribution game

• Example: A player is given $10 to play with. Told that they are playing with one other person (who they don’t typically meet or see)
  – Can play two options: 1) Keep the $10;
    2) Contribute the $10 to the group.
  – If the individual keeps the $10, her payoff is $10.
  – If she contributes the $10, the group gets her $10 plus $5 contributed by the experimenter.
  – At the end of the game, both players walk away with whatever they choose to keep plus their share (1/2) of the group pot.
Basic PG contribution game

- This is a prisoner’s dilemma; find the NE and the PO.

<table>
<thead>
<tr>
<th>Player 1</th>
<th>Contribute</th>
<th>Keep</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contribute</td>
<td>(15, 15)</td>
<td>(17.50, 7.50)</td>
</tr>
<tr>
<td>Keep</td>
<td>(7.50, 17.50)</td>
<td>(10, 10)</td>
</tr>
</tbody>
</table>
Variants on PG contribution game

- More players (effect of group size?)
- Contact between players (e.g., discussion)
- Continuous contributions (not all or nothing)
- Observable contributions (peer pressure)
- Different distributions of initial wealth
- Different types of players
- Multiple rounds (learning? does cooperation improve or deteriorate?)
- Mechanisms to induce cooperation
Some Predictions

• Economists who believe people are individually rational and selfish would predict NE outcome (complete free-riding)

• Psychologists and sociologists often assume that social norms or altruism will lead to significant contributions
  – Note: Altruism is not inconsistent with rationality. It’s just often not assumed by economists.
  – With sufficient altruism, PO is supported in equilibrium.
Some Findings

• Marwell and Ames (1981)
  – Subjects were high school and university students
  – Basic game involved initial endowment of tokens
    • Individual payoff to a token was 1 cent
    • Group payoff was 2.2 cents
    • Contact by phone/mail (impersonal)
  – Setting was varied (by payoff amount, unequal returns to public goods, unequal endowments)
  – Biggest free-riders were 1st year economics grad students! (20% contribution to PG, vs. 40-60% for others)
Some Findings

• Ledyard (1994) summarizes some basic findings from the literature
  – In one-shot games subjects generally contribute about halfway between PO and NE
  – Contributions decline with repetition (suggests learning, or punishment of freeriders)
    • Near full free-riding after about 10 iterations, with small groups
  – Face-to-face communication improves rate of contribution
Why do contributions decrease over time?

• Learning?
  – Players take time to understand payoffs and strategies.
  – Repeated play may lead players to figure out that selfish action is individually rational.

• Strategy?
  – Pays to maintain cooperation. Players may cooperate early on (to signal reciprocal altruism), in hopes that others cooperate (reciprocate altruistically).
  – Cooperation likely to break down if
    • Someone defects and others punish
    • End of sequence of games nears (in final period everyone should defect; returns to cooperation diminish as end approaches)
Why do contributions decrease over time?

- Andreoni (1988) tries to distinguish between learning and strategy
  - Strangers and Partners
    - Partners play together in the same group repeatedly
    - Strangers get reassigned to a new group in each iteration
  - Might expect strategy to evolve with partners (since signals of reciprocal altruism carry over from one round to the next)
    - Expect to see learning in both groups
    - Only strategy in partners group
      - Expect more cooperation with partners
Why do contributions decrease over time?

• Surprisingly, more cooperation is observed with strangers (Andreoni, 1988)! Flies in the face of the strategy hypothesis.

• If explanation for declining cooperation over repeated games is all learning, might expect no difference between Partners and Strangers environments
  – One possibility is that the Strangers environment is noisier, and hence learning occurs more slowly (so contributions stay higher for longer)
  – Croson (1996) finds opposite: that Partners cooperate more than Strangers
  – No clear pattern after several attempts at replication
Other determinants of contributions?

• In addition to repetition, other key factors in the level of PG contributions found in the experimental literature are
  – the marginal per capita payoff to public good provision
  – communication
  – provision thresholds
Marginal per capita payoff to contributing to the PG matters

• Even players who don’t play the Nash equilibrium appear to respond rationally to the marginal return to contributing to the PG
  – Palfrey and Prisbrey (1993)
  – Suggests incentives may be tweaked to motivate contributions (e.g., through mechanism design)
Group Size

• Non-cooperative behaviour should be more difficult for players to detect in large groups which may increase free-riding incentive
  – Can think of this as reducing the marginal per capita payoff to contributing
  – Experiments don’t actually find much evidence that group size increases free-riding
    • Though due to expense, most experiments involve small groups of players.
Communication matters

• Isn’t talk cheap?
  – One would think claiming to plan to play “cooperate” wouldn’t convince anyone else to cooperate.
  – But communication between players seems to increase cooperation
  – Some games involve multiple equilibria
    • e.g., games with threshold provision of a public good
    • This situation is better thought of as a game of Chicken
    • Coordination may sustain cooperation better than in Prisoner’s Dilemma
Crowding Out

- BBV (1986) predict somewhere between partial and full crowd-out from government contribution to the public good. Can be tested in lab settings.
  - Andreoni (1993)
    - Sets up players with 7 tokens that can be used to contribute to public or private good.
    - Payoffs defined to generate NE of 3 tokens contributed; Outcome efficient if everyone contributes 6 tokens.
    - Some treatments involve no government intervention
    - Others involve government taxing everyone two tokens and contributing to public good
Crowding Out

• Andreoni (1993):
  – In theory, crowd-out should be full. Government is inducing contribution below the Nash equilibrium level, and players are free to add additional contributions to the public good
    • If someone was already playing the NE of 3 tokens for the public good and govt forces them to contribute 2, we’d still expect them to contribute an additional token to the public good, but no more than that.
    • Yet Andreoni finds contributions rise overall when government taxes people to provide the public good
    • ~70% crowd-out; in studies of real world setting, crowd-out is usually thought to be more like 30%
Altruism

• One pretty clear message from the experimental literature is that people appear more altruistic than economists typically assume
  – Even playing against strangers they will never meet, people tend to contribute above the NE.
  – Note that this is not necessarily irrational. There are at least two ways we can think of people getting utility from giving to others
Altruism

• People may have interdependent utility functions
  – i.e., Perhaps, *ceteris paribus*, I’m happier the happier are the people around me

• Or people may experience impure altruism, where they don’t really care about the people around them, but they feel good as a result of doing nice things for those people
  – Andreoni refers to the “warm glow” that people receive when contributing to the public good
Altruism plays a role, but does not explain overall pattern of behaviour

• Ledyard (1994) notes 3 basic types of players in these experiments
  – ~50% hard core rational Nash equilibrium players
  – ~40% rational players who are motivated in part by self-interest, altruism, sense of fairness, norms, etc.
  – ~10% apparently irrational players (little sense of consistent motivation to their play)
Altruism and self-interest are both apparent in experimental outcomes

• Ledyard notes that environment and institutions of a game can have big effects on outcomes (some games lead to outcomes much closer to the PO than others)
  – Bad news: Achieving the PO is unlikely in any realistic setting
  – Good news: Ending up at the NE is also unlikely
  – Most people (~90%?) respond to private incentives ➔ mechanism design may allow us to make useful gains in real world settings
Testing Neutrality Hypothesis

- Warr (1983) demonstrates that redistribution of income between positive contributors will not change overall contribution level with single public good.
- BBV (1986) note that redistribution from non-contributors to contributors (poor to rich) increases contributions (and vice versa).
- Maurice, Rouaix, and Willinger (2010) provide experimental evidence supporting the neutrality hypothesis.
An experiment in mechanism design—inducing contributions

• Falkinger, Fehr, Gächter, and Winter-Ebmer (2000) do experiments to test a simple public goods provision mechanism proposed by Falkinger (1996)
Pivotal Mechanism

- Elegant theoretical solution
- Difficult to explain to people
- “[…] considerations such as simplicity and stability to encourage trust, goodwill and cooperation, will have to be taken into account” Laffont (1987, HB of PE p. 567)
- Just because mechanism does well in theory does not mean it does well in experimental settings
- Factors like “confusion” may impede efficient outcome.
Experimental Setting

- Have a control and treatment group
- Control group plays voluntary contribution to the public good game
- Treatment group faces Falkinger’s mechanism
- All other features are the same
- Vary group size, pay off functions
- NE sometimes at the boundary of strategy space, sometimes in the interior
Falkinger Mechanism

- Each individual gets a reward or pays a penalty depending on the deviation of his/her contribution from the mean contribution.
  - If contribution is above mean $\Rightarrow$ reward
  - If contribution is below mean $\Rightarrow$ penalty
- Theoretical result: NE is efficient. Result does not depend on quasi-linear prefs, either.
### Experimental Set-up

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Number of groups</th>
<th>Group size (n)</th>
<th>Marginal rate of substitution between $c_i$ and $G$ ($MRS^i$)</th>
<th>Tax/subsidy parameter ($\beta$)</th>
<th>Endowment ($y$)</th>
<th>Equilibrium prediction</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1</td>
<td>11</td>
<td>4</td>
<td>0.4</td>
<td>0.0</td>
<td>20</td>
<td>$g_i = 0, \forall i$</td>
</tr>
<tr>
<td>M1</td>
<td>18</td>
<td>4</td>
<td>0.4</td>
<td>0.7</td>
<td>20</td>
<td>$g_i = 20, \forall i$</td>
</tr>
<tr>
<td>C2</td>
<td>9</td>
<td>8</td>
<td>0.2</td>
<td>0.0</td>
<td>20</td>
<td>$g_i = 0, \forall i$</td>
</tr>
<tr>
<td>M2</td>
<td>9</td>
<td>8</td>
<td>0.2</td>
<td>0.9</td>
<td>20</td>
<td>$g_i = 20, \forall i$</td>
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<tr>
<td>C3</td>
<td>2</td>
<td>16</td>
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<td>0.0</td>
<td>20</td>
<td>$g_i = 0, \forall i$</td>
</tr>
<tr>
<td>M3</td>
<td>2</td>
<td>16</td>
<td>0.1</td>
<td>1.0</td>
<td>20</td>
<td>$g_i = 20, \forall i$</td>
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<tr>
<td>C4</td>
<td>18</td>
<td>4</td>
<td>$[1/(5 - 0.1c_i)]$</td>
<td>0.0</td>
<td>50</td>
<td>$g_i = 10, \forall i$</td>
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<tr>
<td>M4</td>
<td>18</td>
<td>4</td>
<td>$[1/(5 - 0.1c_i)]$</td>
<td>2/3</td>
<td>50</td>
<td>$g_i = 30, \forall i$</td>
</tr>
<tr>
<td>C5</td>
<td>5</td>
<td>4</td>
<td>$[1/(A_i - 0.1c_i)]$</td>
<td>0.0</td>
<td>50</td>
<td>$g_L = 11, g_H = 9$</td>
</tr>
<tr>
<td>M5</td>
<td>5</td>
<td>4</td>
<td>$[1/(A_i - 0.1c_i)]$</td>
<td>2/3</td>
<td>50</td>
<td>$g_L = 39, g_H = 21$</td>
</tr>
</tbody>
</table>

*a In C5 and M5, $g_H$ ($g_L$) denotes the equilibrium contributions of subjects with a “high” (“low”) valuation of the private good. Subjects with a high (low) valuation of the private good have $A_H = 5.1$ ($A_L = 4.9$).
More on the experiment

• Individuals in first experiment played 10 times.
• Some groups were always control group, others always treatment group and some were first control and then treatment group
• Individuals did not know who the other players in their group were (ever!)
• After each round, players were informed of the average contribution of the other group members, their own income (consumption of the private good), as well as their income from the public good.
<table>
<thead>
<tr>
<th>Group</th>
<th>Mean Period 1–10</th>
<th>Mean Period 8–10</th>
<th>Median Period 8–10</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>18.2</td>
<td>19.2</td>
<td>20</td>
</tr>
<tr>
<td>2</td>
<td>19.1</td>
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<td>3</td>
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<td>4</td>
<td>16.4</td>
<td>17.3</td>
<td>20</td>
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<tr>
<td>5</td>
<td>16.0</td>
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<td>18</td>
</tr>
<tr>
<td>6</td>
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<tr>
<td>10</td>
<td>19.2</td>
<td>18.3</td>
<td>20</td>
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<tr>
<td>11</td>
<td>15.9</td>
<td>16.4</td>
<td>19.5</td>
</tr>
<tr>
<td>12</td>
<td>19.1</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td><strong>Total for groups 1–12</strong>a</td>
<td><strong>18.1 = 90.5 percent</strong>b</td>
<td><strong>18.6 = 93 percent</strong>c</td>
<td><strong>20 = 100 percent</strong>d</td>
</tr>
<tr>
<td>13</td>
<td>18.8</td>
<td>19.8</td>
<td>20</td>
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<tr>
<td>14</td>
<td>18.3</td>
<td>19.9</td>
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<td>15</td>
<td>14.5</td>
<td>15.7</td>
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<td>16</td>
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<tr>
<td>17</td>
<td>17.1</td>
<td>17.9</td>
<td>17.5</td>
</tr>
<tr>
<td>18</td>
<td>15</td>
<td>17</td>
<td>18.5</td>
</tr>
<tr>
<td><strong>Total for groups 13–18</strong>e</td>
<td><strong>16.9 = 84.5 percent</strong>f</td>
<td><strong>18.3 = 91.5 percent</strong>g</td>
<td><strong>20 = 100 percent</strong>h</td>
</tr>
</tbody>
</table>
Conclusion on experimental performance of mechanism

• In each of the implemented economic environments the mechanism caused an immediate and large shift towards an efficient solution.
  – Little practical experience with the mechanism is necessary to induce a significant and large increase in contributions.

• Long-run behavior:
  – In the control group there is a steady decline in contributions over time and towards the end the free-riding equilibrium exerts a strong drawing power.
  – In the treatment group contributions are relatively stable over time with more contributions in later periods. There is no overcontribution in treatment group.
Non-experimental empirical studies—charitable giving

• In many cases, charities supply a public good or a good that has positive externalities associated with it
  – Many studies focus on individual behaviour w.r.t. charitable giving to glean evidence on private contributions to public goods
  – Charities are arguably a major element in the social safety net, so they’re interesting in and of themselves to public economists and policymakers
Charitable Giving in Canada

• 84% of Canadians over age 15 made a financial contribution to a non-profit or charitable organization in 2010
  – Total individual giving was $10.6 billion
  – Average annual donation $446 (about 1% of average income)
  – Median annual donation $123
  – 40% of money given was given to religious organizations
  – See Stats Canada (2012) for details (including giving in BC)
Charitable Giving in US

• More studies have focused on US giving
• Andreoni (2007) provides some detail
  – US giving was about 2% of national income in 2005; around 70% of Americans report giving to charity

• There appears to be a U-shaped pattern in giving if we look at contributions as a percent of income (List, 2011)
  – Poor give a lot; middle income give less; rich give a bit more than middle income
Charitable Giving in US

• Explanations for U-shaped pattern of giving
  – Poor give a lot to religious organizations; percent of contributions to religious groups falls as income (and education) rises
  – Some big low-income contributors are actually quite wealthy (retirees, etc.)
Patterns in Charitable Giving

• Note that both Canadian and US numbers fly in face of some the theoretical predictions we’ve seen.
  – as $N \rightarrow \infty$, contributions $\rightarrow 0$ (free-rider incentive should dominate in large economies)
  – Also poor--according to most of the models we’ve looked at--would be expected to contribute less than rich
Motivation for Giving

• Thus even this most basic empirical evidence suggests people’s giving is motivated by more than the size of the public good they receive
  – Likely they get personal satisfaction from giving
  – e.g. “Warm glow” (Andreoni 1989, 1990)
  – If giving is motivated by personal gain (beyond that coming from public good provision) then giving has private good properties
    • We can think of private contributions to a public good as themselves private goods with a positive externality
Some econometric studies

• The response of charitable giving to various shocks is one way to test various theories of public goods.
  – We’ll review just a few of these studies here.
Do Government Grants Crowd Out Private Giving?

  – Churches aid poor through donations by members
  – Does church giving respond to changes in government generosity to poor?
  – Reform cut access to welfare for many non-citizen immigrants. If govt contributions crowd out church contributions, then welfare cuts should crowd in church contributions
Do Government Grants Crowd Out Private Giving?

• Why not estimate \( c_{ikt} = \alpha + \text{gov}_{kt} \delta + X_{ikt} \beta + \epsilon_{ikt} \)?
  
  – \( c \): per member donations to churches (or spending by churches); \( \text{gov} \): county per-capita government welfare spending

• IV approach. Need exogenous shifter of \( \text{gov} \).

• Welfare reform interacted with local % non-native-born implies varied treatment across geography (arguably exogenous)
  
  – Big cuts in govt aid to poor in areas with lots of immigrants; smaller cuts elsewhere
Do Government Grants Crowd Out Private Giving?

• 1st Stage: \(govt_{kt} = X_{kt}\pi + \gamma(Post96_t * \%noncitizen_{kt}) + u_{kt}\)

• 2nd Stage: \(c_{ikt} = \alpha + g\hat{ov}_{kt}\delta + X_{ikt}\beta + \varepsilon_{ikt}\)

• Finds
  
  – crowd-out of 20-38 cents per dollar
    • This relies on extrapolation (assuming other denominations respond similarly)
  
  – OLS estimates much smaller than IV for charitable church spending
  
  – Not much difference between OLS and IV for member donations (neither statistically significant)
Does crowd out come from the behaviour of donors or fundraisers?

• Andreoni and Payne (2003)
  – The assumption has typically been that when govt contributions increase, individual donors reduce their contributions (hence crowd-out is driven by individuals—”classic crowdout”)
  – But authors note that fundraising organizations are important players—and potentially important to understanding how crowd-out works
  – Authors think of a “market for charity”--charities demand funds, individuals supply funds
  – Using panel of charities, find that fundraising effort declines in response to government grants

• Test how govt. grants to charities affect fundraising spending by charities
  – Problem with OLS: govt. spending almost certainly endogenous (e.g., govt likely to give grants where need is highest; fundraising efforts likely to be highest where need is highest)
  – Suggest that OLS estimates will be positively biased.
    • Their theory predicts a negative coeff on grants
    • Their OLS estimates yield a positive coeff on grants

• More compelling approach: 2SLS
  – Propose various instruments for govt grants:
    • Budgetary authority of congressional delegation (power ➔ pork)
    • total fed and state transfers to charities in state measured at state level (general availability of funds ➔ individual funding)
    • total NIH funding to universities in state (indication of potential govt resources leftover for charity in that state)
  This is the instrument they favour.

• $1000 government grant reduces spending on fundraising by:
  – $264 at arts organizations. Given average grant of $1.3 million to arts charity, fundraising expenditures decrease by $350k on average (50% decline in fundraising expenditures for full grant amount)
  – $54 at social service organizations (sensitive to which types of organizations are included). (implies govt grants reduce fundraising expenditures by 32% on average)
  – Some of the difference may be because social service organizations have more stringent reporting requirements and expenditures on grant accounting and reporting may get counted under fundraising expenditures.
Andreoni and Payne US study (2011)

- Follow up study (8000 charities in US, 1985-2002)
- Find crowd-out of 73%
- Substantial return to fundraising ($5 raised per $1 expenditure on margin) → charities are not net revenue maximizers
- 70% of this reduction is due to fundraising effort (rather than donor willingness to give)
- Suggest that govt could pair grants with a fundraising requirement, to lower crowd-out
  - Or require spending on services by charity to rise by 100% of the amount of the grant.
Canadian Crowd-out (Andreoni and Payne, 2011b)

• Data on over 6500 charities over 15 years (from tax filings by charities)
  – Allows authors to distinguish between different funding sources of charities
    • Gifts from individuals
    • Grants from foundations
    • Grants from government
    • Receipts from fundraising events (galas, fun-runs, concerts, etc.)
  – Allows them to measure crowd out by channel
Canadian Crowd-out (A&P, 2011b)

• Use two different provincial-level instruments for government grants
  – The total tenure of MPs in a province that are of the same party as the provincial government (argue that senior MPs will coordinate with provincial government to bring grants to province)
  – Total tenure of federal MPs in province where charity is located (seniority of MPs on its own matters for provincial grants)

• Also use one local-level instrument (dummy equal 1 if local MP of same party as provincial govt*second instrument above)
Canadian Crowd-out (A&P, 2011b)

• Estimate crowding out of around 100%
  – About 77% can be attributed to reduced fundraising by charities in response to grants; rest due to crowdout of charitable foundation giving
  – Gifts from individuals are actually crowded in by government grants
    • Does government giving serve as a signal of charity quality to these relative uninformed donors?
    • Or are individuals just unaware of these grants?
  – 75% of revenue from other charities (foundations, etc.) is crowded out by govt grants
    • Grants seem to cause these well-informed donors to shift money elsewhere
Canadian Crowd-out (A&P, 2011b)

• Note that just because a charity’s receipts are crowded out by a grant, doesn’t mean they’re crowded out of the charitable sector overall
  – Foundation contributions are heavily crowded out by government grants, but they probably just flow to another (needier) charity.
  – And if a charity reduces fundraising efforts, this might suggest other charities generate more donations from their own fundraising efforts

• Question: If crowd-out is 100%, why do charities apply for government grants?
How does group size affect contributions to a public good?

  – Exogenous reductions in group size actually reduce individual contributions
    • Chinese government blocked access to users in Mainland China in October, 2005—block lasted nearly 1 year.
    • Non-blocked Chinese-language contributors decreased content contributions by 43%, on average
    • Authors argue that individual benefits of giving (prestige etc.) declined with group size
Group Size

• Recall standard theoretical prediction on free-riding
  – Free-riding by individuals increases with \( N \) (depending on assumptions on utility function)
  – This prediction ignores certain benefits of giving
    • Warm glow, prestige from giving, etc.
    • These benefits may increase with group size

• Andreoni (2007) models a public good where private benefit of giving rises with group size; finds ambiguous group size effect on free-riding
Zhang and Zhu (2010)

• ZZ look at how individual contributions change when block is instituted
  – Pre/post comparison
  – Pre/post comparison interacting block with “social interaction”
    • measure of how much individuals interacted with others on “user pages”
    • More social people cut contributions more when block introduced
  – Also use measure of collaboration with others
    • Find those who collaborated more cut contributions more during block
Zhang and Zhu (2010)

• ZZ conclude that people receive “social benefits” from contribution to Wikipedia
  – Additional private return to contributions
  – Like Andreoni (2007)
  – Suggests group size may increase contributions to public good.

• Questions
  – How do we know “social benefits” aren’t about specialization in production; maybe I need my coauthors to produce research (or Wikipedia content). Without them, my output slows.
Zhang and Zhu (2010)

Questions

– Is Wikipedia a representative public good?
  • Would we expect to see the same effect from people riding their bikes instead of driving to work (contributing to lower carbon emissions)
  • Many donors to causes don’t have an opportunity to socialize while giving
    – People working in soup kitchens? Broom pulls?
    – Though many charities use prestige (publicizing donations) as a way to motivate contributors
Effect of Diversity on Giving (Evidence from Canada)

• Andreoni, Payne, Smith, and Karp (2011)
• Look at effects of local ethnic and religious diversity on donations to charity
  – 10 percentage point increase in ethnic diversity reduces donations by 14%
  – 10 percentage point increase in religious diversity reduces donations by 10%
  – Amounts donated are affected, but not whether people donate
Other research to check out? (we’ve barely scratched the surface here!)

• Effect of tax deductions on charitable giving
• Effect of matching gifts on charitable giving
  – Think of Canadian govt. matching contributions to Canadian Red Cross after natural disasters.
• Structure of appeals
  – Matching?
  – Leadership giving?
  – Rewards to donors
  – Behavioural stuff

A note on gaps between theoretical predictions and empirical results

• Theory often sacrifices realism for parsimony
  – That doesn’t make it bad theory, as long as we recognize it as an approximation of reality. In many cases, basic lessons can be drawn from theory, even though the theory isn’t quite right
  – In other cases, theory needs to be revised or expanded upon to take into account empirical regularities.
  – The interplay between theory and empirics in the public goods literature over the last 30 years is a nice example of how theorists can respond to what we observe in the real world.