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An Index of Donor Performance

By David Roodman

Abstract

The Commitment to Development Index of the Center for Global Development rates 22 rich countries on the "development-friendliness" of their policies. It is revised and updated annually. The component on foreign assistance combines quantitative and qualitative measures of official aid, and of fiscal policies that support private charitable giving. The quantitative measure uses a net transfers concept, as distinct from the net flows concept in the net Official Development Assistance measure of the Development Assistance Committee. The qualitative factors are: a penalty for tying aid; a discounting system that favors aid to poorer, better-governed recipients; and a penalty for "project proliferation." The charitable giving measure is based on an estimate of the share of observed private giving to developing countries that is attributable to a) lower overall taxes or b) specific tax incentives for giving. Despite the adjustments, overall results are dominated by differences in quantity of official aid given. This is because while there is a seven-fold range in net concessional transfers/GDP among the scored countries, variation in overall aid quality across donors appears far lower, and private giving is generally small. Denmark, the Netherlands, Norway, and Sweden score highest while the largest donors in absolute terms, the United States and Japan, rank at or near the bottom. Standings by the 2009 methodology have been relatively stable since 1995.

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An Index of Donor Performance

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Rich nations are often compared on how much they share their wealth with poorer countries. The Nordics and the Netherlands, it is noted, are the most generous with foreign assistance, while the United States gives among the least aid per unit of gross domestic product. Two major international consensus documents issued in 2002, the reports of the International Conference on Financing for Development, in Monterrey, Mexico, and the World Summit on Sustainable Development, in Johannesburg, call on donors to move toward giving at least 0.7 percent of their national income in aid, as few now do. (UN 2002a, p. 9; UN 2002b, p. 52)

The measure of aid implicitly or explicitly referenced in all these comparisons and benchmarks is "net overseas development assistance" (Net ODA), which is a measure of aid quantity defined by the donor-funded Development Assistance Committee (DAC) in Paris. DAC counts total grants and concessional (low-interest) development loans given to developing countries, and subtracts principle repayments received on such loans (thus the "net").[2]

Yet it is widely recognized that some dollars and euros of foreign aid do more good than others. While some aid has funded vaccinations whose effectiveness can be measured in pennies per life saved, other aid has handsomely paid donor-country consultants to write policy reports that collect dust on shelves, or merely helped recipients make interest payments on old aid loans. As a result, a simple quantity metric is hardly the last word on donor performance.

This paper describes an index of donor performance that takes the standard quantity measure as a starting point. It is motivated by the desire to incorporate determinants of aid impact other quantity into the Commitment to Development Index (CDI) (Roodman 2009). The aid index was introduced in 2003 and has been revised annually. At its heart, it is an attempt to quantify aspects of aid quality. But it also introduces a novel variant on the definition of aid *quantity*, and factors in tax policies that support private giving.

[1] The author thanks Mark McGillivray, Simon Scott, and Paul Isenman for helpful comments on earlier drafts, Jean-Louis Grolleau for assistance with the data, and Alicia Bannon and Scott Standley for their contributions to the charitable giving section of this paper.

[2] DAC considers a loan concessional if it has a grant element of at least 25 percent of the loan value, using a 10 percent discount rate.

In the last four decades, researchers have taken four broad approaches to cross-country quantitative assessment of aid quality. Since at least the early 1970s, econometric studies have been done of the determinants of donors' aid allocations, factors such as recipient's poverty rate and level of oil exports (citations are below). Though often not evaluative in character, the approach offers a way to measure one aspect of aid quality, selectivity, by looking at how responsive aid allocation is to recipient need and development potential. How best to integrate such results with aid quantity into a single performance index is less obvious, however. Attempts to create a single index began with Mark McGillivray (1989, 1994), who essentially computed the weighted sum of each donor's aid disbursements to all recipients, basing weights on recipient GDP/capita as an indicator of need. The third approach is the newest and most sophisticated. Drawing on the literature on determinants of aid allocation, McGillivray, Leavy, and White (2002), formally model allocation, giving donors utility functions that depend on the commercial and geopolitical value of recipients, as well as on developmental need and potential. They then compute optimal allocations and penalize donors to the extent they deviate from optima.

The fourth tradition is harder to characterize. Easterly (2002b) measure several aspects of aid quality also quantified here; and Easterly and Pfutze (2008) go on to incorporate additional aspects. The principal contrast is in mathematical structure. Easterly's style is to use mathematical constructs that are relatively intuitive. Easterly (2002b), for instance, ranks donors on each indicator, whether of quantity or quality, then average ranks. The index described here uses more conceptually sound—though still of course debatable—structures to construct and integrate various measures. Quantity and quality, for instance, are combined multiplicatively since they do so in reality. That way, a donor that gives a total of one penny of high-quality aid, by ranking low on quantity and high on quality, would not end up ranked as average. The present approach does have a disadvantage, though, which is that the computations tend to be more complex, even if they are more conceptually defensible. In fact, Easterly (2002b) constitutes CGD's initial attempt at a design for the CDI aid component, and is an important source of inspiration for the current design.

The donor performance measure described here is closest in spirit to McGillivray's original, but more ambitious than all previous approaches in the scope of information that it combines into a single index. It factors quality of recipient governance as well as poverty into the selectivity scoring system, penalizes tying of aid, handles reverse flows (debt service) in a consistent way, penalizes project proliferation (overloading recipient governments with the administrative burden of many small aid projects), and rewards tax policies that encourage private charitable giving to developing countries.

Because this aid measure is designed to draw entirely from available statistics, primarily the DAC databases, many important aspects of aid quality are not reflected in the index—factors such as the realism of project designs and the effectiveness of structural adjustment conditionality. Moreover, most variation in aid quality may occur *within* donor's aid portfolios rather than across donors. As a result, while there is a sevenfold

range in net aid transfers/GDP among the 22 rich countries scored here, the calculations in this paper reveal nothing like that sort of variation in aid quality across donors. Moreover, including private giving does not change this picture because it appears to be much smaller than official giving in most countries. Thus the sheer quantity of official aid is still the dominant determinant of donors' scores on this index.

Still, the measure does highlight some interesting differences among donors, and does somewhat rearrange the usual standings. Japan is especially hurt by the netting out of its large amounts of interest received (ODA is not net of interest received). Donors such as Australia and Italy are pulled low by the apparent tendency to spread their aid budgets thinly, over many projects.

This paper details the calculations and illustrates them with primarily 2007 data, which are the latest available and the basis for the 2009 index. The first six sections describe the computations involved in rating official aid programs: their final output is "quality-adjusted aid quantity" in dollars, or simply "quality-adjusted aid." They treat multilateral and bilateral donors in parallel, so that the World Bank's main concessional aid program, for instance, can be compared for selectivity to Denmark's aid program. The penultimate section describes how the quality-adjusted aid of multilaterals is allocated back to the bilaterals that fund them, in order to give national governments scores on official aid that reflect both their bilateral aid programs and their contributions to multilaterals. The last section describes how the aid index factors in tax policies that favor private charitable giving.

1. The first step: gross aid transfers

The starting point for the calculation of quality-adjusted official aid is gross disbursements of ODA and Official Aid (OA), disaggregated by donor *and* recipient. DAC reports both commitments and disbursements of ODA, but its press releases normally focus on disbursements. Similarly, I use disbursements. Dudley and Montmarquette (1976) argue that commitments better indicate donor policies, on the idea that recipient absorptive capacity limits largely explain any shortfalls in disbursements. But commitment-disbursement divergences could reflect bottlenecks or unrealism on either side of the donor-recipient relationship. Large and persistent gaps between commitments and disbursements may reflect a tendency of certain donors to promise more than they can realistically deliver, or a failure to learn from history that certain recipients cannot absorb aid as fast as donors hope. On balance, it seems best to stick with disbursements and avoid the risk of rewarding donors for over-promising aid or systematically underestimating the capacity to absorb it.

The definition of gross disbursements used here differs in one respect from DAC's. In recent years, donors have formally cancelled billions of dollars in non-ODA loans to countries such as Nigeria, Iraq, Pakistan, Cameroon, and the Democratic Republic of Congo (DRC). These OOF or "Other Official Finance" loans are ones with too small a concessional element to qualify as ODA, or that are meant for military, export financing,

or other non-development purposes. The DRC, for example, was the world's top ODA recipient in 2003, at just over $5 billion. It turns out that under a Paris Club agreement, donors cancelled $4.5 billion in outstanding OOF loans to the DRC that year. Actual transfers of money were an order of magnitude lower.

When OOF loans are cancelled, they are, in effect, retroactively recognized by the DAC accounting system as ODA grants. This is a reasonable choice *if* the original purpose of the loan was for development and it was merely disqualified as ODA because it was not concessional enough. The DAC system books the transfer at the time it is officially recognized. It would be more accurate to recognize the gradual transfer that occurs year by year as the loans become uncollectible over time. The U.S. government does something like this, regularly assessing the likely collectibility of its outstanding sovereign loans and taking on budget any drop in their apparent value.[3] DAC does not do this, perhaps in part because of the complexity, in part because past years' data would be constantly revised, and in part because accounting rules and appropriations processes within some of the donor agencies, which govern DAC, create strong disincentives for recognizing such losses.

Unfortunately, some of the resulting ODA numbers have seemed quite unrealistic in the last few years. The true, current financial value of debt cancellation for countries such as the DRC in 2003 is far less than the face value. Even Pakistan, which received $1 billion in OOF debt relief in 2003, was a Highly Indebted Poor Country going by its debt/exports ratio GDP/capita (Roodman 2001). Much of its cancelled debt may therefore have been uncollectible anyway, suggesting that the true value of the cancellation per se was far lower.

The definition of gross disbursements used here therefore excludes forgiveness of non-ODA loans. The reasoning is that the net transfers that do occur are not primarily a credit to current policy. If a Carter Administration export credit to Zaire went bad in the early 1980s, and was finally written off in 2003, the transfer that occurred does not for the most part reflect 2003 development policy.

Purging OOF loan forgiveness from ODA turns out to be complicated. The starting point is the formula for DAC's standard gross ODA[4]:

$$\text{Gross ODA} = \text{grants} + \text{ODA loans extended}$$

The term "grants" on the right contains a subtlety relating to debt relief. When DAC accounts for cancellation of ODA loans (not the OOF ones just discussed), it does so with two opposite transactions. The first is a "debt forgiveness grant," which is included under "grants." The second is an "offsetting entry for debt relief," which represents the immediate return of that grant in the form of amortization and is considered an ODA loan repayment. This mechanism prevents double-counting of forgiven ODA loans, which were already fully counted as aid at disbursement. Since the offsetting entry is considered a reflow, it does not enter gross ODA, but will surface in Net ODA in the next section. So canceling any loan, ODA or OOF, increases gross ODA. In fact, when

[3] The process occurs within the U.S. government's Interagency Country Risk Assessment System.
[4] "Grants" here includes capital subscriptions to multilateral organizations.

donors and recipients *reschedule* debt, as under Paris Club agreements, the capitalization of interest arrears is treated as a new aid flow, and is included in "ODA loans extended", under the subheading, "rescheduled debt."[5]

Since the purpose here is to count only transactions that reflect current, actual transfers, we exclude all debt forgiveness grants and capitalized interest, none of which involves actual movement of money. The result is called "gross aid transfers" or simply "gross aid" to distinguish it from gross ODA. Thus:

Gross aid = (grants – debt forgiveness grants) + (ODA loans extended – rescheduled debt)

This removes all debt forgiveness grants, for both ODA and non-ODA loans, from the definition of gross aid. Now, the DAC definition of Net ODA, discussed in the next section, does itself remove grants for ODA loan forgiveness, by counting those offsetting entries for debt relief in ODA reflows. So in order to highlight the real departure of gross aid transfers from DAC accounting, I compare gross aid to DAC's Gross ODA net of offsetting entries for ODA loan forgiveness. Table 1 shows the 10 recipients most affected by changing the definition this way for 2005, a year in which much debt was forgiven. In all, forgiveness of non-ODA loans accounted for an extraordinary $23.9 billion of reported gross ODA. It may be a long time before that figure is surpassed since it is clearly driven by unusual developments in Iraq and Nigeria.

Table 1. Gross ODA net of offsetting entries for ODA loan forgiveness vs. gross aid transfers, selected recipients, 2005 (million $)

Recipient	Gross ODA net of offsetting entries for ODA loan forgiveness	Gross aid	Difference
Iraq	21,654	7,726	13,927
Nigeria	6,490	854	5,635
Congo, Rep.	1,565	167	1,397
Congo, Dem. Rep.	1,864	1,355	509
Indonesia	2,835	2,332	503
Zambia	1,233	892	340
Madagascar	975	681	293
Serbia & Montenegro	1,142	937	205
Cameroon	603	404	199
Egypt	1,491	1,309	182
All Part I countries	119,142	95,204	23,938

Table 2 shows the implications from the donor perspective, for 2007. Among bilaterals, the United States gave the most gross aid to non-DAC governments and Japan came in second. Among multilaterals, the European Commission disbursed the most, with the World Bank's International Development Association (IDA) not far behind. Most of the calculations in the aid index are done for each donor-recipient pair. The donor-level totals in Table 2, are *not* used in the calculations, but are summaries for illustration. The final row of the table is an

[5] In the 2006 edition of this paper, I asserted incorrectly that ODA loan forgiveness is netted out of gross ODA. I thank Nicolas Van de Sijpe for catching this problem.

exception: it shows the figures for one donor-recipient pair, Japan and Sierra Leone. I will continue the Japan-Sierra Leone example in order to illustrate the actual calculations at the level of the donor-recipient pair.

Table 2. Gross ODA net of offsetting entries for ODA loan forgiveness vs. gross aid transfers aid by donor, 2007

Donor	Gross ODA net of offsetting entries for ODA loan forgiveness	Gross aid transfers	% reduction from gross ODA to gross aid transfers
Arab Agencies	751	751	0
Arab Countries	3,209	3,209	0
Australia	2,268	1,976	13
Austria	1,328	403	70
Belgium	1,298	1,113	14
Canada	3,192	3,191	0
Czech Republic	81	70	14
Denmark	1,754	1,631	7
Finland	584	584	0
France	7,495	5,957	21
Germany	9,219	6,352	31
Greece	249	249	0
Hungary	33	33	0
Iceland	37	37	0
Ireland	824	824	0
Italy	1,573	1,003	36
Japan	11,300	9,699	14
Luxembourg	253	253	0
Netherlands	4,813	4,427	8
New Zealand	247	247	0
Norway	2,883	2,883	0
Other Donors	740	740	0
Poland	165	165	0
Portugal	277	277	0
Slovak Republic	28	28	0
South Korea	528	528	0
Spain	3,558	3,378	5
Sweden	2,932	2,858	3
Switzerland	1,280	1,222	5
Turkey	545	545	0
United Kingdom	7,367	7,358	0
United States	19,719	19,665	0
AfDF	1,313	1,313	0
AsDF	1,768	1,768	0
CarDB	59	59	0
EBRD	8	8	0
EC	11,546	11,546	0
GEF	193	193	0
GFATM	1,627	1,627	0
IDA	9,308	9,297	0
IDB Sp.Fund	545	529	3
IFAD	461	461	0
Montreal Protocol	94	94	0
Nordic Dev.Fund	73	73	0
SAF+ESAF(IMF)	502	502	0
UNAIDS	193	193	0
UNDP	439	439	0
UNFPA	216	216	0
UNHCR	289	289	0
UNICEF	984	984	0
UNRWA	700	700	0
UNTA	462	462	0
WFP	233	233	0
Japan-Sierra Leone	30	14	54

2. Subtracting debt service

The next step is to net debt service received out of gross aid transfers, in the belief that net transfers are a better measure than gross of the cost to the donor's treasury and benefit to the recipient. This departs somewhat from the approach of the DAC, whose Net ODA statistic is net of payments of principal, not interest. The rationale for the DAC approach is an analogy with the capital flow concept of net foreign direct investment. Only return of capital is netted out of net FDI, not repatriation of earnings. Similarly, only amortization is netted out of Net ODA, not interest, which can be seen as the donors' "earnings" on aid investment. So the formula for Net ODA is simply:

Net ODA = Gross ODA – (ODA loans received + Offsetting entries for ODA loan forgiveness)

(As mentioned in the previous section, Net ODA does subtract out the offsetting entries for forgiveness of ODA loans since those loans were counted in full as aid at disbursement.)

But for the purposes of evaluating aid policy, the FDI metaphor seems inapt. When the government of Ghana sends a check to the government of Japan for $1 million, it hardly matters to citizens in either country whether the check has "interest" or "principal" in the memo field, that is, whether the transaction enters the capital or current account. It seems unlikely that interest and principal payments have different effects on Japan's treasury or Ghana's development.

Moreover, studies have found evidence of defensive lending on the part of bilateral and multilateral lenders, whereby new loans go to servicing old ones (Ratha 2001; Birdsall, Claessens, and Diwan 2002). To the extent that donors are lending to cover interest payments they receive on concessional loans, Net ODA makes the circulation of money on paper look like an aid increase. Much the same can be said for treating capitalization of interest arrears as new aid. For these reasons, the CDI aid index treats debt service uniformly. "Net aid transfers" is defined as "gross aid transfers" less debt service actually received on ODA loans. (See Table 3.)

However, computing actual transfers from DAC data is surprisingly difficult. In DAC accounting, "interested received" includes interest on ODA loans that has been forgiven, not actually paid. Forgiving interest generates two opposite transactions: a debt forgiveness grant and a (forgiven) interest received transaction, which is included in total interest received. Since the definition of gross aid used here excludes the debt forgiveness grant, it must also exclude the return transaction for consistency. Thus:

Net aid transfers = gross aid transfers – ODA loans received
– (interest received – interest forgiven)

Note that "ODA loans received," unlike "interest received," only counts payments that result in actual transfers. Amortization payments made as the result of debt cancellation agreements are recorded separately, as offsetting entries for debt relief, described earlier. Surprisingly, it is impossible in general using DAC data to

determine exactly how much interest a given aid recipient actually paid a given donor in a given year. DAC Table 2a, the table with disbursements data by donor and recipient only reports total interest received, amalgamating interest actually paid and interest forgiven. DAC Table 1, however, which contains donor-level aggregates, does make the distinction, and provides a good basis for estimating the shares at the donor-recipient level, via prorating. The portion of "interest received" for each donor-recipient pair that is actually forgiven is assumed to be the same for each of a donor's recipients. Table 3 shows the donor-level amounts that are the basis for the prorating. For most donors, the potential error at the donor-recipient level is small because they a) receive no interest or almost none or b) almost all of the interest they report receiving is actually received rather than forgiven.

The final column of Table 3 shows net aid transfers by donor. For multilaterals lenders, only concessional (low-interest) lending programs such as the World Bank's International Development Association are counted since only they generate ODA. Again, the calculations displayed do not in fact enter the aid index directly and are only illustrative summaries, except for the Japan-Sierra Leone example at the bottom. Among bilaterals, this adjustment to gross aid particularly affects Japan, which received $7.5 billion in debt service on concessional loans, equal to a striking 78% of its gross aid transfers and sufficient to put Japan's bilateral aid program well behind those of Canada, France, Germany, the Netherlands, Spain, the United Kingdom, and the United States in size. Among bilaterals, France and Germany were also major recipients of debt service for their size. Multilateral institutions are too, unsurprisingly. At the upper extreme, the IMF received more than it disbursed.

Table 3. Subtracting Debt Service, 2007

Donor	A. Gross aid transfers	B. Amortization	C. DAC interest received	D. Estimated interest actually paid	Net Aid Transfers (A – B – D)
Arab Agencies	751	298	16	16	437
Arab Countries	3,209	616	0	0	2,592
Australia	1,976	0	0	0	1,976
Austria	403	4	1	1	399
Belgium	1,113	58	3	3	1,052
Canada	3,191	40	0	0	3,151
Czech Republic	70	0	0	0	70
Denmark	1,631	103	2	2	1,525
Finland	584	0	0	0	584
France	5,957	1,236	473	441	4,280
Germany	6,352	1,270	328	291	4,791
Greece	249	0	0	0	249
Hungary	33	0	0	0	33
Iceland	37	0	0	0	37
Ireland	824	0	0	0	824
Italy	1,003	302	0	0	701
Japan	9,699	5,522	2,146	2,069	2,108
Luxembourg	253	0	0	0	253
Netherlands	4,427	169	59	59	4,198
New Zealand	247	0	0	0	247
Norway	2,883	0	0	0	2,883
Other Donors	740	0	0	0	740
Poland	165	9	0	0	156
Portugal	277	6	2	2	269
Slovak Republic	28	0	0	0	28
South Korea	528	35	30	30	463
Spain	3,378	219	14	0	3,159
Sweden	2,858	0	0	0	2,858
Switzerland	1,222	7	0	0	1,215
Turkey	545	0	0	0	545
United Kingdom	7,358	1,766	22	20	5,572
United States	19,665	817	327	319	18,528
AfDF	1,313	104	78	78	1,131
AsDF	1,768	586	210	210	972
CarDB	59	18	10	10	31
EBRD	8	0	0	0	8
EC	11,546	450	122	122	10,973
GEF	193	0	0	0	193
GFATM	1,627	0	0	0	1,627
IDA	9,297	1,844	784	784	6,669
IDB Sp.Fund	529	288	109	109	131
IFAD	461	139	43	43	279
Montreal Protocol	94	0	0	0	94
Nordic Dev.Fund	73	6	4	4	64
SAF+ESAF(IMF)	502	574	28	28	-100
UNAIDS	193	0	0	0	193
UNDP	439	0	0	0	439
UNFPA	216	0	0	0	216
UNHCR	289	0	0	0	289
UNICEF	984	0	0	0	984
UNRWA	700	0	0	0	700
UNTA	462	0	0	0	462
WFP	233	0	0	0	233
Japan-Sierra Leone	14	0	9	9	5

[1]From previous table.

3. Discounting tied aid

Most bilateral donors tie some of their aid, requiring recipients to spend it on goods and services from the donor's home country, which reduces recipient governments' freedom to shop for the best deals. Catrinus Jepma's literature review (1991, p. 58) finds that tying raises the cost of aid projects a typical 15–30%. This suggests that tying reduces the *value* of aid by 13–23 percent. (Consider that a 15-percent cost increase lowers the purchasing power of aid by 1–1/1.15 = 13 percent. Similarly, a 30-percent cost increase cuts the value of aid 23 percent.)

The DAC tying statistics split aid commitments—tying data are unavailable for disbursements—into three categories: untied, tied, and partially untied. "Partially untied aid" comes with restrictions, but ones that are looser than those of "tied aid." To be precise, partially untied aid is subject to the restriction that it must be spent on goods and services from the donor nation *or* developing countries, or else to the restriction that it be spent on goods and services from developing countries only. In principle, the approach taken to penalizing tying is simple. Tied aid is discounted by 20% (a round number in the 13–23% range) and partially untied aid by 10%. No attempt is made to account for unreported, informal, de facto tying that may occur.

Implementation is more complex. The tying figures come primarily from the detailed commitment-level data in DAC's Creditor Reporting System (CRS) database, and are aggregated to the level of the donor-recipient pair. Since the data are for commitments, not disbursements, it is assumed that the same shares of disbursements and commitments are tied, untied, or partially untied. The discount applies to gross aid; returns flows are not discounted since they are assumed to have an opportunity cost equivalent to untied aid. The selectivity discount described in the next section exempts emergency aid, so the tying discount step also splits gross aid into emergency and non-emergency aid and discounts them separately for tying.[6] Table 4 shows the results of this step, "net tying-discounted aid" by emergency status. Austria, Greece, Italy, and South Korea suffer most from the tying discount.[7]

[6] For commitments that missing tying status information, the index calculation algorithm uses two backstops to estimate the tied fraction. If the donor is multilateral, it assumes the aid is untied. Otherwise, it takes the average tied share of all of a donor's commitments, excluding debt forgiveness, from DAC Table 7b, for the most recently available year.

[7] For simplicity, aid to recipients missing tying information, such as to "Far East Asia unallocated," is assumed untied. Therefore the donor-level totals involve no extrapolations and are simple sums of the feasible estimates at the donor-recipient level.

Table 4. Penalizing tied aid, 2007

	Non-emergency					Emergency				
Donor	A. Gross transfers	B. Tied	C. Partially untied	D. Tying penalty (20%×B+ 10%×C)	Tying-discounted gross transfers (A – D)	E. Gross transfers	F. Tied	G. Partially untied	H. Tying penalty (20%×F+ 10%×G)	Tying-discounted gross transfers (E – H)
Arab Agencies	751	0	0	0	751	0	0	0	0	0
Arab Countries	3,209	0	0	0	3,209	0	0	0	0	0
Australia	1,826	92	0	18	1,808	150	1	0	0	150
Austria	389	158	0	32	357	15	3	0	1	14
Belgium	1,021	70	0	14	1,007	92	0	0	0	92
Canada	2,915	428	41	90	2,826	275	49	0	10	266
Czech Republic	64	0	0	0	64	5	0	0	0	5
Denmark	1,491	99	0	20	1,471	140	1	0	0	140
Finland	479	30	0	6	473	105	1	0	0	105
France	5,862	687	0	137	5,725	95	34	0	7	89
Germany	6,073	1,781	0	356	5,717	279	4	0	1	278
Greece	237	79	22	18	219	13	9	1	2	11
Hungary	33	0	0	0	33	0	0	0	0	0
Iceland	37	0	0	0	37	0	0	0	0	0
Ireland	634	0	0	0	634	190	0	0	0	190
Italy	920	378	143	90	830	83	4	16	2	81
Japan	9,604	676	0	135	9,469	95	0	0	0	95
Luxembourg	223	0	0	0	223	31	0	0	0	31
Netherlands	4,088	551	0	110	3,978	339	11	0	2	336
New Zealand	218	22	5	5	213	29	0	0	0	29
Norway	2,527	4	0	1	2,526	355	0	0	0	355
Other Donors	740	0	0	0	740	0	0	0	0	0
Poland	165	0	0	0	165	0	0	0	0	0
Portugal	276	45	7	10	266	1	0	0	0	1
Slovak Republic	28	0	0	0	28	0	0	0	0	0
South Korea	511	325	60	71	440	17	11	2	2	15
Spain	3,152	921	0	184	2,968	225	24	0	5	221
Sweden	2,551	0	0	0	2,551	308	0	0	0	308
Switzerland	1,050	2	0	0	1,049	172	4	0	1	171
Turkey	499	0	0	0	499	46	0	0	0	46
United Kingdom	7,007	0	0	0	7,007	352	0	0	0	352
United States	16,671	3,739	0	748	15,923	2,994	1,305	0	261	2,733
AfDF	1,313	0	0	0	1,313	0	0	0	0	0
AsDF	1,768	0	0	0	1,768	0	0	0	0	0
CarDB	59	0	0	0	59	0	0	0	0	0
EBRD	8	0	0	0	8	0	0	0	0	0
EC	10,235	0	0	0	10,235	1,311	0	0	0	1,311
GEF	193	0	0	0	193	0	0	0	0	0
GFATM	1,627	0	0	0	1,627	0	0	0	0	0
IDA	9,297	0	0	0	9,297	0	0	0	0	0
IDB Sp.Fund	529	0	0	0	529	0	0	0	0	0
IFAD	461	0	0	0	461	0	0	0	0	0
Montreal Protocol	94	0	0	0	94	0	0	0	0	0
Nordic Dev.Fund	73	0	0	0	73	0	0	0	0	0
SAF+ESAF(IMF)	502	0	0	0	502	0	0	0	0	0
UNAIDS	193	0	0	0	193	0	0	0	0	0
UNDP	439	0	0	0	439	0	0	0	0	0
UNFPA	216	0	0	0	216	0	0	0	0	0
UNHCR	0	0	0	0	0	289	0	0	0	289
UNICEF	984	0	0	0	984	0	0	0	0	0
UNRWA	700	0	0	0	700	0	0	0	0	0
UNTA	462	0	0	0	462	0	0	0	0	0
WFP	233	0	0	0	233	0	0	0	0	0
Japan-Sierra Leone	13.4	0.1	0.0	0.0	13.4	0.5	0.0	0.0	0.0	0.5

4. Adjusting for selectivity

It has long been argued that which country aid goes to is an important determinant of its effectiveness (Burnside and Dollar 2000; Easterly 2002a, p. 35). Some countries need aid more than others. Some countries can use it better than others. There is little empirically grounded consensus, however, on what precisely donors should select for.[8]

For anyone measuring selectivity, two main challenges arise: choosing a mathematical *structure* to distill numbers on recipient attributes and donor aid allocations into a metric; and choosing the *attributes* that donors are expected to select for, such as low income, good policies, or good governance. This section discusses the choices made here at the level of principle, then descends to the details of implementation.

Principles

The oldest approach to measuring selectivity—even if not thought of as such—is the use of cross-country regressions to explain donors' aid allocations as a function of recipient characteristics. Historically, these characteristics have included indicators of geopolitical importance (e.g, oil exports or military expenditure), commercial links (trade with donors), and development need and potential (income, governance) (Kaplan 1975; Dudley and Montmarquette 1976; McKinley and Little 1979; Mosley 1981, 1985; Maizels and Nissanke 1984; Frey and Schneider 1986; Gang and Lehman 1990; Schraeder, Hook, and Taylor 1998; Trumbull and Wall 1994; Alesina and Dollar 1998; Burnside and Dollar 2000; Collier and Dollar 2002; Birdsall, Claessens, and Diwan 2002). In general, bilateral donors appear to be less sensitive to recipient need and potential than to strategic and commercial interests. More limited evidence suggests that multilaterals act oppositely. Almost all the studies that check find a bias in favor of small countries, in the sense that the elasticity of aid receipts with respect to population or GDP is less than 1.

The cross-country regression approach to measuring selectivity is conceptually consistent, but if used to evaluate donors, it invites methodological challenges that it seems better to avoid. This is because it embodies an attempt to model donor decision-making and predict the effects on allocations of marginal changes in recipient characteristics, all else equal. (That is the meaning of regression coefficient estimates.) With modeling comes the risk of misspecification. If a donor's aid allocations fail to relate to the chosen variables via the chosen functional form, the results may not be meaningful. For example, if a donor specializes in a region, such as France does in francophone Africa, its aid allocations will be highly nonlinear with respect to most indicators of recipient appropriateness, and a linear regression may produce strange results. Similarly if a donor specializes in the poorest nations. Results may also be sensitive to the choice of regressors. The United States gives large amounts of aid to countries such as Russia and Pakistan that appear too poorly governed to make good use of aid for development but have obvious geopolitical value. As a result, regressions that control for geopolitical

[8] And as Radelet (2004) points out, aid allocation rules should probably vary by aid type.

value may yield a different coefficient on governance for the United States than regressions that do not. This then raises the question of whether evaluations of selectivity should abstract from donors' responsiveness to non-development concerns. Controlling for non-development concerns gives a better picture of the effects of a hypothetical marginal change in an indicator of recipient development potential. Not controlling for it gives a better picture of the general importance of development potential in allocation. It is a question, in other words, of what is meant by "selectivity."

The work of David Dollar and Victoria Levin (2006) stands in the regression tradition and faces these questions. The authors estimate the elasticity of a donor's aid disbursements with respect to recipient's income and governance. They posit a log-linear (elasticity-type) relationship between aid disbursements and recipient population, GDP/capita, and "institutions/policies" as indicated by the World Bank's Country Policy and Institutional Assessment (CPIA). They do not control for commercial or geopolitical interests but in controlling for population they abstract from small-country bias, even though Collier and Dollar (2002) find that global aid could reduce poverty twice as fast if most of it were reallocated to India.

The second major approach to evaluating selectivity was initiated by McGillivray (1989, 1992). It is more radically empirical, eschewing any attempt to model allocation procedures or estimate marginal effects, and lends itself more naturally to creating an index that combines aid quantity and selectivity. His index is essentially the weighted sum of a donor's aid disbursements to all recipients, where the weights are mathematically related to a recipient characteristic such as GDP/capita. If the weights lie between 0 and 1, they can be thought of as discounts that penalize or reward selection for desired characteristics. The ratio of the weighted sum to the unweighted sum measures overall selectivity.[9]

Rao (1994, 1997) points out that donors can maximize their scores on McGillivray's index by concentrating all their aid in the single poorest country. He argues that the source of this perverse result is the failure of McGillivray's index to consider recipients' *post-aid* GDP/capita. On the assumption that aid leads directly to GDP gains, if all aid went to the poorest country, that country's GDP/capita would rise rapidly and make it a less deserving recipient. He revises McGillivray's index to factor in both pre- and post-aid GDP. This introduces a notion of diminishing returns to aid: not diminishing returns to the effectiveness of aid in raising GDP/capita, but diminishing returns to the value of doing so.

The third approach to assessing selectivity is the newest and most sophisticated. Drawing on the cross-country literature on determinants of aid allocation, McGillivray, Leavy, and White (2002), formally model aid allocation. They endow donors with utility functions that depend on their allocation of aid among recipients that are characterized by various commercial and geopolitical interest factors as well as levels of development need

[9] McGillivray's original (1989) index sums aid/recipient population rather than total aid to each recipient. White (1992) questions the implicit notion of donors allocating aid/recipient population: shifting $1 million in aid from small, poor Mali to large, poor India would reduce a donor's score in McGillivray's system because the aid would be lower *per capita* in India. In reply, McGillivray (1992) proposes using absolute aid rather than aid/capita, within the same basic framework.

and potential. The authors incorporate diminishing returns to aid, compute optimal allocations, and penalize donors to the extent they deviate from their optima. The approach has several disadvantages from the point of view of the CDI. It is conceptually complex. It is vulnerable to challenges analogous to those that apply to the first approach, regarding proper specification. It rewards donors for pursuing geopolitical and commercial interests (though this could be easily changed, to focus purely on recipient need, as appropriate for the CDI). And it penalizes donors for aid allocations that are rather different from the ideal ones even if they do not generate much lower utility. For example, if a donor at the optimal allocation shifts aid between two identical recipients, the marginal utility loss is zero, but the marginal decline in the donor's score would be non-zero.

The approach taken here is closest to McGillivray's original. For the purposes of the CDI, it has the advantages of conceptual simplicity. It combines quantity and quality (selectivity) in a natural way that minimizes questions about proper modeling specification. Since it does not model with smooth functional forms, it does not inherently penalize sharp specialization in a certain region or income bracket. It can be combined with other discount factors, such as for tying and project proliferation. It lends itself to a distinction between subflows of aid (emergency and non-emergency). And it can handle negative net aid flows, which do occur and which some of the common functional forms cannot. (Reverse flows, like zero flows, would bedevil the elasticity approach of Dollar and Levin, for example.)

Here is a simple example of how the chosen system works. The selectivity formula introduced here, it will emerge, assigns Uganda a weight of 0.75 for non-emergency aid and Uzbekistan a 0.75 for the 2006 data year. A donor whose aid program consisted of giving $1 million to each of these countries would have selectivity-weighted aid of $1 million (0.75 × $1 million = $0.75 million for Uganda plus 0.25 × $1 million = $0.25 million for Uzbekistan). The donor's overall "selectivity" is then the ratio of its selectivity-weighted aid to its unweighted aid—in this case, $1 million / $2 million = 0.5. This is also the average selectivity weight of the donor's recipients, where the average is weighted by how much aid the donor gives each recipient.

One potentially counterintuitive result of this approach is that a donor that is constitutionally confined to a clientele with low selectivity weights comes off poorly even if it is in some sense selective within that pool. The best example is the European Bank for Reconstruction and Development (EBRD), which lends to nations of the former Eastern bloc, which are relatively rich. Once again we are faced with the question of what we mean by "selectivity." But for the present purpose of comparing *bilateral* donors to each other, the potentially counterintuitive outcome makes sense. As will be described below, the "quality-adjusted aid quantities" of multilaterals are ultimately allocated back as credits to the bilaterals. If Germany is to be more rewarded for giving aid to Mali than Slovenia, it should be more rewarded for doing the same indirectly—giving more to the African Development Fund than the EBRD.

Having settled the question of mathematical form for measuring selectivity, there remains the question of what donors are supposed to select for. The aid index uses two indicators. The first is GDP/capita, converted

to dollars on the basis of exchange rates.[10] The second indicator is the composite governance variable of Daniel Kaufman and Aart Kraay (Kaufmann, Kraay, and Mastruzzi 2008), which is the most comprehensive governance indicator available. The KK composite is an average of indicators on up to six dimensions, available data permitting: democracy, political instability, rule of law, bureaucratic regulation, government effectiveness, and corruption. The six variables are themselves synthesized from several hundred primary variables from more than a score of datasets. These two indicators of recipient need and appropriateness, GDP/capita and the KK composite, have several strengths for measuring selectivity. They have wide coverage. They are updated annually and made freely available. And they reflect consensus views that a) the richer a country is, the less it needs aid; and b) that institutional quality is a key determinant of development and, most likely, aid effectiveness.

Before descending to the particulars of the selectivity discounting, it is worth reiterating that two concepts are defined here relating to selectivity. The first, selectivity-weighted aid, is a measure of aid allocations that blends quantity and quality, and is of primary interest for grading performance. It possesses the desirable properties of linearity: If a country doubles its aid to every recipient, its selectivity-adjusted aid score will double. If it runs two parallel aid programs, the selectivity-adjusted aid total of the combination is the sum of those for the individual programs.

The second concept is the weighted-average selectivity score of a donor's recipients—the donor's "selectivity." This measure, it should be noted, behaves strangely when applied to donors with net transfers much smaller than gross transfers. Consider this example. Donor X is a development bank. It disburses nothing to Recipient Y, which has selectivity weight 0.6, but *receives* $1 million from Y in debt service, which is treated as negative aid. It disburses the $1 million to Recipient Z, which has weight 0.8. Donor X's selectivity-weighted aid is thus:

$$0.6 \times (-\$1 \text{ million}) + 0.8 \times (\$1 \text{ million}) = \$0.2 \text{ million}.$$

Its score is small but positive because it has transferred funds from a less appropriate to a more appropriate aid "recipient"—perhaps an odd result, but meaningful. Now, what is the "selectivity" of Donor X?

$$\text{selectivity-weighted net transfers} / \text{total net transfers} = \$0.2 \text{ million} / 0 = \infty.$$

The donor has done some good for the developing world on net, according to the measure, with zero net disbursal of funds. It is infinitely efficient.

This extreme example illustrates a counterintuitive result for donors whose net transfers are much smaller than gross transfers (because of debt service). In these cases, the donor's reported "selectivity" can lie outside the range of most of its recipients' selectivity weights. For example, the IDB's Fund for Special Operations disbursed $593 million in 2003. It received $434 million in debt service, for a net aid of only $159 million. Yet it

[10] PPP-based GDP might seem more meaningful, but it is highly correlated with exchange-rate GDP in logs, so that it gives nearly the same results as used here, and is available for slightly fewer countries.

generally transferred funds from countries deemed less appropriate for aid to those deemed more appropriate and so achieves a selectivity score of 0.88 in 2003, which is higher than the selectivity weight of any of its recipients. Mathematically, the 0.88 is a weighted average of selectivity factors between 0 and 1, where some of those weights (net transfers) are negative.

One can avoid such results by measuring selectivity of gross disbursements only, which I call "gross selectivity." In the abstract example above, Donor X has gross selectivity of $0.2 million/$1 million = 0.2. This result seems more meaningful than infinity, but comes at the expense of ignoring the debt service received from Recipient Y.

The sometimes-strange behavior of the version that includes reflows, "net selectivity," does not mean it is inherently flawed. Rather, it points up yet another subtlety in the question of what is meant by selectivity. The picture conjured by the word "selectivity" is of a donor that only sends funds outward. In fact, donors not only distribute their own money but redistribute that of recipients. What does selectivity mean in such a context? Is a donor that bestows all its net transfers on Mali almost perfectly selective? Or is it falling far short of the ideal by failing to transfer billions of dollars from Kuwait to Mali?

The aid index set forth here does incorporate reflows into its measure of selectivity. To avoid infinities, it makes a compromise between principle and simplicity. It segregates (tying-discounted) disbursements from reflows. It then applies the gross selectivity factor to disbursements, yielding selectivity-weighted disbursements, and applies the same factor to reflows, implicitly assuming that the distribution of a donor's disbursements and reflows across recipients are same. It would be more accurate to separately compute the "selectivity" of the donor's reflows, but would also be more complicated, and tends to generate extreme results in some cases.

Implementation

The flow to which selectivity weights are applied is the output of the previous steps in the construction of the aid performance measure, namely "gross tying-discounted aid" and debt service. These quantities are multiplied by two discount factors. The first is linearly related to a country's KK governance score. The linear relationship is such that in the benchmark year of 2001, the data year for the first edition of the CDI, the governance weight ranges exactly between 0 (for the worst-governed country, Afghanistan) and 1 (for Singapore). The second factor is a linear function of a country's log GDP/capita. In 2001, Singapore (GDP/capita of $21,869 in year-2000 dollars) gets a 0 and the DRC (GDP/capita of $81), defines the upper end for the GDP/capita weights. This upper end is not 1.0, as one might expect, but 2.21, a number chosen so that the highest *combined* selectivity weight (the product of the governance and income factors) *is* 1.0 in the benchmark year of 2001 (for Ghana).

Table 5 summarizes the weight computations for 2007.[11] Since the scalings just described are based on 2001 data and remain fixed thereafter for the sake of valid comparisons over time, it is possible for selectivity weights in later years to stray outside the 0–1 range. In 2007, this happens for Ghana on the high end and for Macao, Singapore, and Hong Kong on the low end. (None of the latter receives much aid).

There are two exceptions to this weighting. First, emergency aid is exempted from the selectivity discounting since it is often effective even in the poorest-governed countries. Second is an exemption from the governance discount—the first discount factor—for aid that is meant to *improve* governance, broadly defined. This sort of aid receives a uniform governance-based discount of 50%—compared to, say, the 75% discount it would otherwise get in Haiti. It seems perverse to penalize donors for trying to improve governance where it is low. On the other hand, poor governance may indeed undermine the effectiveness of aid meant to improve it. The choice of a uniform 50% discount seems like a minimally arbitrary, middle-of-the-road response to the problem. Governance aid is defined as that assigned a code in the 15000's in DAC's Creditor Reporting System database. The headings for these 16 codes are: Government and civil society, general; Economic & development policy/planning; Public sector financial management; Legal and judicial development; Government administration; Strengthening civil society; Elections; Human rights; Free flow of information; Womens equality organisations and institutions; Security system management and reform; Civilian peace-building; Conflict prevention and resolution; Post-conflict peace-building (UN); Demobilisation; Land mine clearance; and Child soldiers (prevention and demobilisation).[12,13]

This system implies several valuations, which are meant to be minimally arbitrary but should be made explicit. For one, non-emergency program aid to the highest-weighted recipient in 2001, Ghana, is precisely as meritorious as emergency aid to any country any year, since the latter is not discounted. All other aid is valued less. And because of the multiplicative weighting structure, non-emergency aid to the richest country is valueless no matter how well-governed the country: by virtue of being the richest its income weight is zero. Similarly, non-emergency, non-governance aid to the worst-governed country is also treated as valueless regardless of how poor the country is. In general, governance quality and income level are each seen as conditioning the other's relevance for aid effectiveness.

Table 6 summarizes the calculations by donor, which, recall, actually take place at the donor-recipient level.

[11] The KK governance variables are available on a biannual basis for 1996–2004 and annual since. For years missing KK data, the aid index uses the previous year's values.
[12] The full CRS purpose classification is at http://www.oecd.org/dataoecd/40/23/34384375.doc.
[13] I think Ian Anderson and Terry O'Brien for comments that led to this change.

Table 5. Computation of selectivity weights, 2007

Country name	A. Exchange rate GDP/capita, 2007 ($)	B. Log exchange rate GDP/capita	C. GDP selectivity multiplier	D. Kaufmann-Kraay composite governance score, 2007	E. Governance selectivity multiplier	F. Combined selectivity multiplier[1]
Formula:		Log A	(linear map of B onto standard scale)		(linear map of B onto standard scale)	C × E
Ghana	307	5.73	1.68	0.07	0.61	1.03
Madagascar	246	5.51	1.77	–0.18	0.54	0.96
Kiribati	552	6.31	1.45	0.24	0.66	0.95
Malawi	151	5.02	1.96	–0.42	0.48	0.94
Mali	289	5.67	1.71	–0.26	0.52	0.89
Benin	328	5.79	1.66	–0.23	0.53	0.88
Burkina Faso	260	5.56	1.75	–0.38	0.49	0.86
Mozambique	347	5.85	1.63	–0.31	0.51	0.83
Tanzania	354	5.87	1.63	–0.32	0.51	0.83
Cape Verde	1,447	7.28	1.07	0.57	0.74	0.80
Niger	169	5.13	1.92	–0.69	0.41	0.79
Rwanda	271	5.60	1.73	–0.53	0.45	0.78
Zambia	386	5.96	1.59	–0.39	0.49	0.78
Lesotho	550	6.31	1.45	–0.25	0.53	0.77
Senegal	509	6.23	1.48	–0.30	0.51	0.76
Vanuatu	1,275	7.15	1.12	0.31	0.67	0.76
Uganda	282	5.64	1.72	–0.59	0.44	0.75
India	686	6.53	1.37	–0.18	0.54	0.74
Gambia, The	340	5.83	1.64	–0.53	0.45	0.74
Mongolia	681	6.52	1.37	–0.21	0.54	0.74
Liberia	140	4.94	1.99	–0.90	0.36	0.71
Bhutan	1,277	7.15	1.12	0.09	0.62	0.69
Guinea-Bissau	130	4.87	2.02	–0.95	0.34	0.69
Mauritania	480	6.17	1.51	–0.54	0.45	0.68
Sierra Leone	235	5.46	1.79	–0.81	0.38	0.68
Moldova	516	6.25	1.48	–0.51	0.46	0.68
Ethiopia	174	5.16	1.91	–0.92	0.35	0.67
Kenya	458	6.13	1.53	–0.65	0.42	0.64
Vietnam	617	6.42	1.41	–0.56	0.44	0.63
Micronesia, Fed. Sts.	2,003	7.60	0.95	0.26	0.66	0.63
Solomon Islands	731	6.60	1.34	–0.48	0.47	0.62
Namibia	2,265	7.73	0.90	0.33	0.68	0.61
Burundi	101	4.62	2.12	–1.16	0.28	0.60
Nepal	243	5.49	1.77	–0.96	0.34	0.60
Kyrgyz Republic	347	5.85	1.63	–0.86	0.36	0.60
Georgia	1,218	7.11	1.14	–0.27	0.52	0.59
Guyana	1,108	7.01	1.18	–0.33	0.50	0.59
Papua New Guinea	656	6.49	1.38	–0.63	0.43	0.59
Togo	239	5.48	1.78	–1.01	0.33	0.58
St. Vincent and the Grenadines	3,734	8.23	0.70	0.87	0.82	0.58
Cambodia	482	6.18	1.50	–0.79	0.38	0.58
Bulgaria	2,407	7.79	0.87	0.24	0.66	0.57
Ukraine	1,125	7.03	1.17	–0.40	0.49	0.57
Nicaragua	887	6.79	1.27	–0.55	0.45	0.57
Tajikistan	262	5.57	1.74	–1.02	0.32	0.56
Timor-Leste	299	5.70	1.69	–0.98	0.33	0.56
Jordan	2,248	7.72	0.90	0.09	0.62	0.55
Marshall Islands	2,066	7.63	0.93	–0.01	0.59	0.55
Comoros	371	5.92	1.61	–0.95	0.34	0.55
Armenia	1,461	7.29	1.07	–0.31	0.51	0.55
Sri Lanka	1,144	7.04	1.17	–0.47	0.47	0.55
Djibouti	835	6.73	1.29	–0.65	0.42	0.54
Tonga	1,621	7.39	1.03	–0.25	0.53	0.54
Bangladesh	439	6.09	1.54	–0.93	0.35	0.53
Indonesia	1,034	6.94	1.21	–0.57	0.44	0.53
Lao PDR	462	6.13	1.52	–0.92	0.35	0.53
Romania	2,594	7.86	0.84	0.12	0.62	0.53

Morocco	1,686	7.43	1.01	–0.28	0.52	0.52
Philippines	1,216	7.10	1.14	–0.51	0.46	0.52
Albania	1,677	7.42	1.02	–0.30	0.51	0.52
Cameroon	695	6.54	1.36	–0.82	0.38	0.51
St. Lucia	4,759	8.47	0.61	0.91	0.83	0.50
Macedonia, FYR	2,064	7.63	0.93	–0.20	0.54	0.50
Honduras	1,423	7.26	1.08	–0.50	0.46	0.50
South Africa	3,718	8.22	0.70	0.43	0.71	0.50
El Salvador	2,326	7.75	0.89	–0.13	0.56	0.50
Tunisia	2,646	7.88	0.84	–0.02	0.59	0.49
Dominica	4,775	8.47	0.60	0.80	0.81	0.49
Yemen, Rep.	555	6.32	1.45	–0.97	0.34	0.49
Swaziland	1,319	7.18	1.11	–0.60	0.43	0.48
Botswana	4,625	8.44	0.62	0.68	0.77	0.48
Mauritius	4,700	8.46	0.61	0.66	0.77	0.47
Bolivia	1,126	7.03	1.17	–0.74	0.40	0.47
Suriname	2,876	7.96	0.80	–0.06	0.58	0.46
Bosnia and Herzegovina	2,037	7.62	0.94	–0.41	0.48	0.45
Eritrea	156	5.05	1.95	–1.36	0.23	0.45
Nigeria	472	6.16	1.51	–1.11	0.30	0.45
Grenada	4,313	8.37	0.64	0.41	0.70	0.45
Central African Republic	228	5.43	1.80	–1.29	0.25	0.45
Chile	6,153	8.72	0.50	1.12	0.89	0.45
China	1,791	7.49	0.99	–0.54	0.45	0.45
Fiji	2,246	7.72	0.90	–0.37	0.49	0.45
Haiti	411	6.02	1.57	–1.17	0.28	0.45
Paraguay	1,456	7.28	1.07	–0.70	0.41	0.44
Costa Rica	5,022	8.52	0.58	0.57	0.74	0.43
Jamaica	3,400	8.13	0.74	–0.01	0.59	0.43
Egypt, Arab Rep.	1,815	7.50	0.98	–0.58	0.44	0.43
Pakistan	660	6.49	1.38	–1.07	0.31	0.43
Dominican Republic	2,881	7.97	0.80	–0.25	0.53	0.42
Thailand	2,713	7.91	0.83	–0.32	0.51	0.42
Guatemala	1,866	7.53	0.97	–0.61	0.43	0.42
Slovak Republic	5,734	8.65	0.53	0.71	0.78	0.42
Colombia	2,461	7.81	0.86	–0.42	0.48	0.42
Belize	3,841	8.25	0.69	0.03	0.60	0.41
Lithuania	5,772	8.66	0.53	0.71	0.78	0.41
Malaysia	4,715	8.46	0.61	0.33	0.68	0.41
Peru	2,751	7.92	0.82	–0.36	0.50	0.41
Hungary	6,196	8.73	0.50	0.80	0.80	0.40
Kazakhstan	2,324	7.75	0.89	–0.57	0.44	0.39
Latvia	6,315	8.75	0.49	0.68	0.77	0.38
Estonia	7,424	8.91	0.43	1.06	0.87	0.38
Poland	5,935	8.69	0.52	0.48	0.72	0.37
Ecuador	1,647	7.41	1.02	–0.86	0.36	0.37
Chad	260	5.56	1.75	–1.44	0.21	0.37
Azerbaijan	1,857	7.53	0.98	–0.81	0.38	0.37
Brazil	4,212	8.35	0.65	–0.11	0.56	0.37
Syrian Arab Republic	1,339	7.20	1.10	–0.99	0.33	0.37
Maldives	3,668	8.21	0.71	–0.30	0.51	0.36
Croatia	5,798	8.67	0.53	0.33	0.68	0.36
Algeria	2,157	7.68	0.92	–0.76	0.39	0.36
Panama	5,190	8.55	0.57	0.13	0.63	0.36
Angola	1,284	7.16	1.12	–1.03	0.32	0.36
Congo, Dem. Rep.	94	4.54	2.15	–1.62	0.17	0.35
Czech Republic	7,408	8.91	0.43	0.80	0.80	0.35
Congo, Rep.	1,103	7.01	1.18	–1.13	0.29	0.35
Uzbekistan	783	6.66	1.31	–1.26	0.26	0.34
Turkey	5,045	8.53	0.58	–0.08	0.57	0.33
Guinea	404	6.00	1.57	–1.44	0.21	0.33
Uruguay	7,497	8.92	0.43	0.67	0.77	0.33
Cote d'Ivoire	548	6.31	1.45	–1.39	0.22	0.33
Russian Federation	2,868	7.96	0.80	–0.75	0.39	0.32
St. Kitts and Nevis	8,579	9.06	0.37	0.87	0.82	0.31
Gabon	4,435	8.40	0.63	–0.54	0.45	0.29
Belarus	2,244	7.72	0.90	–1.06	0.31	0.28
Sudan	527	6.27	1.47	–1.53	0.19	0.28

Iran, Islamic Rep.	2,133	7.67	0.92	–1.11	0.30	0.28
Seychelles	7,408	8.91	0.43	0.09	0.62	0.27
Mexico	6,533	8.78	0.48	–0.17	0.55	0.26
Afghanistan	345	5.84	1.64	–1.69	0.15	0.24
Antigua and Barbuda	10,754	9.28	0.29	0.78	0.80	0.23
Lebanon	5,111	8.54	0.58	–0.78	0.39	0.22
Argentina	9,357	9.14	0.34	–0.23	0.53	0.18
Trinidad and Tobago	10,974	9.30	0.28	0.21	0.65	0.18
Slovenia	13,016	9.47	0.21	0.95	0.84	0.18
Libya	7,375	8.91	0.43	–0.83	0.37	0.16
Venezuela, RB	5,787	8.66	0.53	–1.13	0.29	0.16
Saudi Arabia	10,004	9.21	0.31	–0.38	0.49	0.15
South Korea	14,540	9.58	0.17	0.74	0.79	0.13
Cyprus	15,071	9.62	0.15	1.00	0.86	0.13
Iraq	1,818	7.51	0.98	–1.74	0.13	0.13
Equatorial Guinea	8,207	9.01	0.39	–1.22	0.27	0.11
Israel	20,825	9.94	0.03	0.56	0.74	0.02
Singapore	28,964	10.27	–0.10	1.50	0.99	–0.10
Macao, China	32,372	10.39	–0.15	0.54	0.74	–0.11
Hong Kong, China	34,037	10.44	–0.17	1.39	0.96	–0.16

[1]To allow comparisons over time, the linear maps are designed so that selectivity weights fit exactly in the 0–1 range in a fixed reference year, 2001. In other years, weights can cross these bounds.

Table 6. Discounting for selectivity, 2007

Donor	Tying-discounted gross transfers: A. Non-emergency[1]	Tying-discounted gross transfers: B. Emergency[1]	C. Reflows[1]	D. Gross selectivity	Tying- and selectivity-discounted gross transfers (A × D + B)	Selectivity-discounted reflows (C × D)
Arab Agencies	751	0	314	0.62	466	152
Arab Countries	3,209	0	616	0.32	1,020	153
Australia	1,808	150	0	0.60	1,234	0
Austria	357	14	4	0.51	197	2
Belgium	1,007	92	61	0.63	725	30
Canada	2,826	266	40	0.61	1,979	19
Czech Republic	64	5	0	0.45	34	0
Denmark	1,471	140	106	0.70	1,167	57
Finland	473	105	0	0.65	411	0
France	5,725	89	1,677	0.55	3,230	705
Germany	5,717	278	1,561	0.55	3,396	624
Greece	219	11	0	0.51	123	0
Hungary	33	0	0	0.62	21	0
Iceland	37	0	0	0.61	23	0
Ireland	634	190	0	0.71	640	0
Italy	830	81	302	0.53	518	119
Japan	9,469	95	7,591	0.54	5,231	2,884
Luxembourg	223	31	0	0.67	181	0
Netherlands	3,978	336	228	0.67	2,993	117
New Zealand	213	29	0	0.60	158	0
Norway	2,526	355	0	0.62	1,916	0
Other Donors	740	0	0	0.51	376	0
Poland	165	0	9	0.47	78	3
Portugal	266	1	8	0.66	176	4
Slovak Republic	28	0	0	0.32	9	0
South Korea	440	15	65	0.49	229	23
Spain	2,968	221	219	0.49	1,683	80
Sweden	2,551	308	0	0.66	1,983	0
Switzerland	1,049	171	7	0.61	815	3
Turkey	499	46	0	0.34	215	0
United Kingdom	7,007	352	1,786	0.66	4,957	901
United States	15,923	2,733	1,137	0.48	10,331	422
AfDF	1,313	0	182	0.76	1,001	110
AsDF	1,768	0	797	0.53	931	325
CarDB	59	0	28	0.48	29	10
EBRD	8	0	0	0.60	5	0
EC	10,235	1,311	572	0.57	7,103	251
GEF	193	0	0	0.51	99	0
GFATM	1,627	0	0	0.63	1,028	0
IDA	9,297	0	2,629	0.64	5,967	1,317
IDB Sp.Fund	529	0	398	0.54	284	162
IFAD	461	0	182	0.61	279	84
Montreal Protocol	94	0	0	0.48	45	0
Nordic Dev.Fund	73	0	10	0.70	51	5
SAF+ESAF(IMF)	502	0	602	0.59	294	282
UNAIDS	193	0	0	0.56	107	0
UNDP	439	0	0	0.67	294	0
UNFPA	216	0	0	0.55	119	0
UNHCR	0	289	0			
UNICEF	984	0	0	0.58	573	0
UNRWA	700	0	0	0.40	283	0
UNTA	462	0	0	0.51	234	0
WFP	233	0	0	0.63	148	0
Japan-Sierra Leone	13	1	9	0.71	10	5

[1]From previous tables.

5. Penalizing project proliferation

Project proliferation, donor fragmentation, and lack of coordination have long been cited as major problems for aid effectiveness. Donors often act at cross-purposes—one donor's trains won't run on another's tracks, literally or metaphorically. Or donors overload recipient ministries with mission visitations and project reporting requirements (Acharya, de Lima, and Moore 2006; Roodman 2006a, 2006b). Roodman (2006a) shows theoretically how the tendency to proliferate can create bottlenecks in aid delivery on the recipient side, limiting absorptive capacity for aid. A related model in Roodman (2006b) suggests that to maximize aid effectiveness, donors need to fund fewer, larger projects in *smaller* countries else equal since they have less administrative capacity.

Though such transaction costs of aid are widely thought to be substantial, they have mostly defied direct measurement. For example, Brown et al. (2000) set out to measure aid transaction costs in Vietnam but ended up obtaining only anecdotal information. A pair of recent papers has made fresh contributions to analyzing the extent of proliferation and indirectly measuring its costs. Arnab Acharya, Ana Fuzzo de Lima, and Mick Moore (2006) develop indexes of donors' tendency to *proliferate* (disperse) aid among recipients, and of the tendency of recipients' aid to be *fragmented* among many donors. Stephen Knack and Aminur Rahman (2007) measured fragmentation similarly, and find it to be predictive of lower recipient bureaucratic quality. They hypothesize that donors out-compete recipient governments for the scarce resource of skilled nationals.

The inputs to the indexes of proliferation and fragmentation in these papers are data on aid disbursements by donor and recipient, from DAC Table 2a. Given that dataset, the indexes are logical first steps toward measuring proliferation. But this style of analysis also has disadvantages since it looks at allocation of aid across countries rather than allocation across projects within countries. A donor that gives aid to only one country but does so through tiny projects would score perfectly on the Acharya, de Lima, and Moore proliferation index since it would not be proliferating at all across recipients, while a donor that provided large, equal-sized blocks of pure budgetary support to several dozen nations would be a major "proliferator."

The idea of the adjustment in the CDI for project proliferation is to weight each dollar of aid based on the size of the "aid activity" of which it is part. The weights depend on the sizes of other projects in the country and the country's governance.

Calculating these size weights in a conceptually sound way turns out to be more complicated than calculating selectivity weights. One reason is that the sizes of aid activities range over many orders of magnitude, from $10,000 or smaller to $100 million or bigger. A linear map from this range to a limited span needed for weights, such as [0, 1], would have to consign all projects smaller than $10 million to near-0 weights. A map from *log* project size would work little better, for while it would compress the high end, bringing $10 million and $100 million aid activities closer together, it would explode the low end, generating large weight differences between $1,000 and $10,000 projects. A second complication is that if there is such a thing as too small a

project, there is also such a thing as too big. As Radelet (2004) and Roodman (2006b) argue, large blocks of program support are less appropriate for countries where governance is poor. In such countries, the oft-criticized transaction costs associated with aid activities—meetings with donors, quarterly reports, etc.—also have the benefit of improving measurability of results and holding recipients accountable for outcomes. This makes size fundamentally different from governance and poverty. For the latter, monotonic weighting functions are reasonable: to a first approximation, the poorer or better governed the country, the more appropriate it arguably is aid. In contrast, there is in, in some theoretical sense, an *optimal* project size. It should depend on several factors, including how big the receiving country is, how much aid it is receiving, and the quality of its governance.

For these reasons, the size weighting function in the CDI tends toward zero at both the low and high ends, with a peak in between. More precisely, it is lognormal. This is the most natural functional form for this situation because it has strictly positive support (and project size is never negative), takes strictly positive values (so that size weights are never negative), and is inherently compatible with the tendency of aid activity sizes to range over many orders of magnitude, being a normal function of log project size.

As it happens, aid activities themselves tend to be lognormally distributed by size. Thus the mathematical framework is one where a weighted sum of an approximately lognormal distribution of aid activities is taken using weights from a separate lognormal function. Figure 1, on page 27, illustrates on a logarithmic scale. The heavy line shows the distribution of aid activities by size in a hypothetical country. The most common size is at the peak of this curve. Because of the lognormal scale, however, the *average size*, which is lifted by a few very large projects, is far to the right of the peak. The dashed line shows one possible weighting curve for rewarding or penalizing projects of various sizes. The weighting curve drawn here peaks at an “optimal” size somewhat above the average project size, implying the belief that the average aid dollar is going into aid activities that are too small. The weighting curve is also relatively wide, which can be taken to indicate uncertainty about what the true optimal size is, and how much deviation from this optimum matters.

Applying such a weighting function to the distribution of projects that donors fund forces choices about the height, location, and width of this size weighting curve for each recipient. In a near-vacuum of empirical evidence about the costs of proliferation, three principles hinted at above shape the choices. First, the *actual* distribution of aid activities by size is taken as a starting point. Even though this is probably far from optimal in most countries, the choice serves o minimize arbitrariness and puts some faith in donors’ judgments about where large or small projects are most appropriate. Second is a bias toward larger projects. There is more consensus that the proliferation of small projects in countries such as Tanzania and Mozambique is inefficient than that $100,000,000 million loans from Japan and the Asian Development Bank to China are too big, even though one might legitimately question the appropriateness of such *carte blanche* disbursements to a relatively unaccountable, corrupt government. Thus the parameters chosen here lead to formulas that tend to penalize projects

on the small side of the observed distributions more than those on the large side. Third is a bias toward agnosticism given the poor understanding of these issues, toward preventing the differences among bilaterals' overall proliferation scores from being too great, manifest as a relatively wide weighting curve.

The choices can be stated precisely, as follows. The data source is the CRS database, for which the unit of observation is the "aid activity," which the CRS reporting guidelines describe as follows:

> An aid activity can take many forms. It could be a project or a programme, a cash transfer or delivery of goods, a training course or a research project, a debt relief operation or a contribution to an NGO. (DAC 2002)

All aid activities in the CRS database are included, except for those coded as being donor administrative costs or debt forgiveness.

Since there are three degrees of freedom in the lognormal family of curves, which can be thought of as height, width, and mode (highest-weighted project size), three constraints must be imposed. The first constraint is that the weighting function must reach a peak value of 1.0, so that only projects of "optimal" size go undiscounted. That fixes the height. To describe how the optimal size is defined, let μ_1 and σ_1 be the mean and standard deviation of a recipient's log aid activity size. These are the standard parameters of the lognormal distribution. Let *KK* be the country's Kaufmann-Kraay governance score (on which 0 is average). Then the mode of the weighting function is decreed to occur at size $2^{KK} e^{\mu_1+\sigma_1^2}$. For comparison, if the aid activities are perfectly lognormally distributed, *their* modal size is $e^{\mu_1-\sigma_1^2}$, their median at e^{μ_1}, and their average size at $e^{\mu_1+\sigma_1^2/2}$ (Aitchison and Brown 1963, p. 8). Thus for a country of average governance (*KK* = 0), the "optimal aid activity size" is $e^{\mu+\sigma_1^2}$, which is a step above the average—just as far above the average as the average is above the median, in order-of-magnitude terms. Meanwhile, as a hypothetical country's KK score climbs from 0 to about standard deviation above the mean, to 1.0, the "optimal" project size exactly doubles.[14] Finally, the width of the weighting curve, as measured by its standard deviation in log space, is set to twice that of the distribution of projects, that is, to $2\sigma_1$. A relatively broad weighting curve is meant to reflect uncertainty about the true optimal size. All of these choices are meant to be minimally arbitrary.

To simplify the calculations somewhat, the weighting is not done project by project. Rather, the mean and standard deviation of log aid activity size of donor's projects in each recipient country are computed. The donor's projects are then treated as if they are perfectly lognormally distributed, corresponding to the heavy line in Figure 1, thus fully characterized by these two numbers. *Size-weighted aid* is then calculated using a general formula for the integral of the product of two lognormal curves. (See Appendix for details.)

As elsewhere, there are practical complications. Bilateral donors that do not report full CRS commitments data, including Belgium, Spain, and Ireland, are assigned, recipient by recipient, the average weight for

[14] Scores on each of the 6 Kaufmann-Kraay components are standardized to have mean 0 and standard deviation 1. The composite has mean zero and standard deviation 0.93 (in 2002).

donors that do. Multilaterals that do not provide CRS data are assigned an average size weight of 1.0 for all recipients. Figure 2 shows that most of the multilaterals that do report get size weights near 1. Given this pattern, a figure near 1 is clearly appropriate for the only major multilateral not reporting, the IMF, which disburses in large blocks. Both emergency and non-emergency aid are subject to the discount. For consistency, debt service is discounted too, but by the average size weight for the full distribution of a recipient's projects from all donors. This implicitly assumes that the opportunity cost of debt service is a set of aid activities of a size that is not necessarily typical for the donor in that country, but is typical of all donors. Note that this choice can heavily penalize a donor that disburses aid to a country through small projects and then receives comparable amounts of money in debt service. If the debt service is discounted much less than the disbursements for size, a donor's size-adjusted aid can turn negative.

The approach does penalize very large projects in theory, especially in poorly governed countries, but because the parameter choices create a bias toward large projects and a degree of agnosticism, few large projects are actually discounted much. As a result, there is a strong positive correlation between a donor's average project size across all recipients and its average size weight in the CDI. (See Figure 2.) In sum, the approach has a thought-through and somewhat sophisticated theoretical foundation, but in practice, because of the conservative parameter choices, the upshot is essentially a straightforward discount based on each donor's average log project size.

As before, the actual calculations take place at the donor-recipient level. At that level, two size weights figure: one for the donor's own portfolio of projects in the recipient country, the other for all donors' projects in each recipient country, which is used for discounting debt service. Multilaterals such as the African and Asian Development Funds and the IDA clearly come out ahead, as they commit aid in much larger blocks than other donors in the countries they assist. Among bilaterals, Denmark stands out.

Since this is the last adjustment for quality, the final column of Table 7 is labeled "net quality-adjusted aid." This is a dollar value that embodies both quantity and quality factors. Since this actually calculated at the donor-recipient level, the next step to describe is aggregating up to the donor level.

Figure 1. Illustration of aid activity size weighting

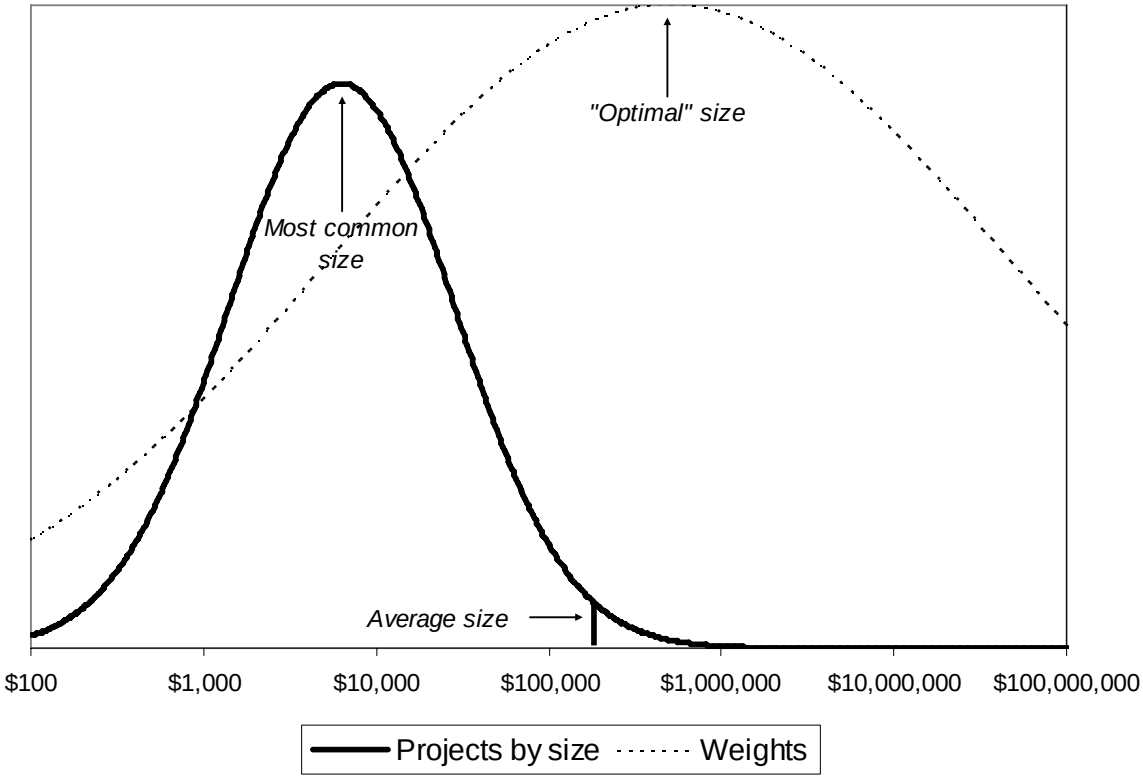


Figure 2. Average size weight in CDI versus average log aid activity commitment, 2003

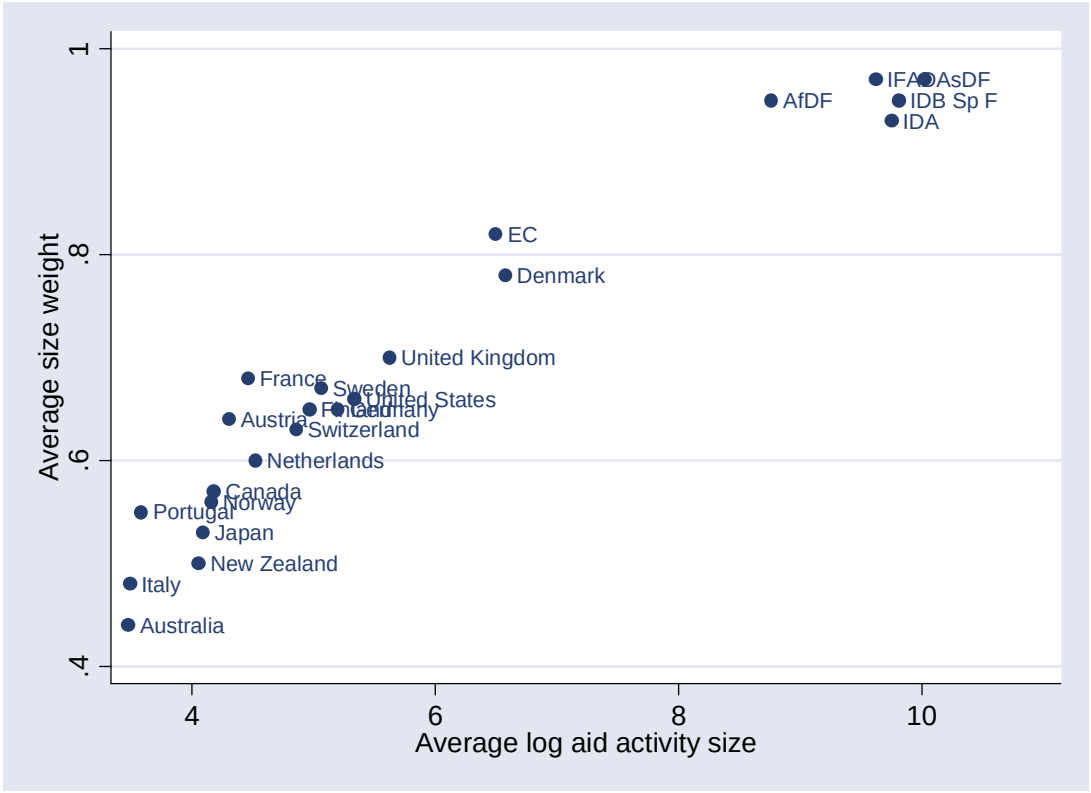


Table 7. Discounting for proliferation, 2007

Donor	A. Tying- and selectivity-discounted gross aid1	B. Selectivity-discounted reflows1	C. Size weight	D. Recipient average size weight	E. Gross quality-adjusted aid (A × C)	F. Quality-adjusted repayments (B × D)	Net quality-adjusted aid (E – F)
Arab Agencies	466	195	0.78	0.78	363	152	211
Arab Countries	1,020	196	0.78	0.78	795	153	642
Australia	1,234	0	0.54	0.74	660	0	660
Austria	197	2	0.57	0.75	111	2	110
Belgium	725	39	0.65	0.77	473	30	444
Canada	1,979	24	0.73	0.77	1,450	19	1,432
Czech Republic	34	0	0.77	0.77	26	0	26
Denmark	1,167	74	0.83	0.77	972	57	915
Finland	411	0	0.69	0.77	282	0	282
France	3,230	921	0.78	0.77	2,532	705	1,827
Germany	3,396	851	0.56	0.73	1,901	624	1,277
Greece	123	0	0.76	0.76	94	0	94
Hungary	21	0	0.79	0.79	16	0	16
Iceland	23	0	0.76	0.76	17	0	17
Ireland	640	0	0.79	0.79	506	0	506
Italy	518	159	0.57	0.75	294	119	174
Japan	5,231	4,118	0.59	0.70	3,077	2,884	193
Luxembourg	181	0	0.77	0.75	139	0	139
Netherlands	2,993	152	0.78	0.77	2,325	117	2,208
New Zealand	158	0	0.64	0.73	101	0	101
Norway	1,916	0	0.63	0.77	1,203	0	1,203
Other Donors	376	0	0.75	0.75	281	0	281
Poland	78	4	0.65	0.65	51	3	48
Portugal	176	5	0.60	0.71	106	4	102
Slovak Republic	9	0	0.83	0.83	7	0	7
South Korea	229	32	0.73	0.73	167	23	144
Spain	1,683	108	0.74	0.74	1,248	80	1,168
Sweden	1,983	0	0.78	0.78	1,551	0	1,551
Switzerland	815	4	0.60	0.76	490	3	487
Turkey	215	0	0.81	0.81	174	0	174
United Kingdom	4,957	1,174	0.69	0.77	3,418	901	2,516
United States	10,331	542	0.73	0.78	7,559	422	7,137
AfDF	1,001	139	0.90	0.79	901	110	791
AsDF	931	419	0.95	0.78	886	325	560
CarDB	29	14	0.71	0.71	20	10	11
EBRD	5	0	0.78	0.78	4	0	4
EC	7,103	324	0.88	0.77	6,239	251	5,989
GEF	99	0	0.71	0.71	70	0	70
GFATM	1,028	0	0.90	0.76	924	0	924
IDA	5,967	1,687	0.93	0.78	5,528	1,317	4,210
IDB Sp.Fund	284	213	0.91	0.76	257	162	95
IFAD	279	110	0.93	0.76	261	84	177
Montreal Protocol	45	0	0.60	0.60	27	0	27
Nordic Dev.Fund	51	7	0.76	0.76	39	5	34
SAF+ESAF(IMF)	294	353	0.80	0.80	235	282	-47
UNAIDS	107	0	0.76	0.76	81	0	81
UNDP	294	0	0.57	0.78	167	0	167
UNFPA	119	0	0.55	0.77	65	0	65
UNHCR			0.77	0.77			
UNICEF	573	0	0.78	0.78	447	0	447
UNRWA	283	0	0.71	0.71	200	0	200
UNTA	234	0	0.76	0.76	177	0	177
WFP	148	0	0.78	0.78	115	0	115
Japan-Sierra Leone	10	6	0.69	0.83	7	5	2

[1] From previous tables.

6. Aggregation to the donor level

In principle, this aggregation is matter of simple sums over recipients. But as always data problems intrude and complicate. Not all aid in the DAC database is fully disaggregated by recipient country, partly because administrative costs at headquarters are hard to allocate, partly because aid can support projects or programs intended to benefit an entire region or continent. The United States, for example, gave $2.435 billion in gross transfers in 2003 to "Least developed countries unspecified," $130 million to "Americas Unspecified," and a separate $37 million to "North and Central America Unallocated." In addition, it is impossible to assign selectivity weights to some recipients for lack of data for GDP/capita or the KK composite. These aid flows cannot be discounted for selectivity without further assumptions. Similarly, some recipients, including recipient groups like those just mentioned, have no commitments listed in the CRS database for some donors, so that no size weight can be directly computed.

Leaving out aid that cannot be directly discounted for selectivity or size would understate donors' contributions. So such aid is incorporated as follows. For each sub-continental region, as defined in the DAC database, such aid is discounted by the donor's average selectivity and size weights for aid that *can* be directly discounted. Once this discounting is done, all selectivity-discounted aid to each region is summed. This procedure repeats at the level of the continent, then the Part, then the aid recipient universe.[15] This is how donor-level figures in previous tables are calculated.

7. Allocating multilateral quality-adjusted aid to bilaterals

Since the motivation for this exercise is to compare national governments, it is important to give bilaterals credit for their contributions to multilateral institutions. This final step in computing the index of official aid performance does this. But it operates in a way that is the mirror image of the standard DAC approach for imputing aid through multilaterals. In the DAC approach, each bilateral's contribution to each multilateral is imputed forward to recipient countries based on the multilateral's allocation across recipients in the same year. So if Japan gives $50 million to the Asian Development Fund in some year, and 10% of the AsDF's Net ODA goes to Indonesia that year, then 10% × $50 million = $5 million is imputed as Japan-Indonesia aid. In the CDI, the process runs the other way, because it is necessary to transmit back the information about the multilaterals' aid quality that is contained in their quality-adjusted aid totals. So in the aid index, bilaterals receive credit for the aid programs of multilaterals in proportion to the bilaterals' contributions to those multilaterals during the same year.

The calculations properly handle the fact that multilaterals occasionally give aid to other multilaterals, so that the flow of money from a bilateral donor to its ultimate multilateral recipient can take more than one

[15] The DAC database divides Part II counties not into continents but into two major groups—former eastern bloc nations, and relatively rich non-DAC members. For the present calculations, these two groups are treated as "continents."

step. For example, since the United Kingdom accounted for 8.23% of net contributions to the UNDP during 2005 (6.56% of that disbursed directly and 1.67% through the EC), it receives credit for 8.23% of the UNDP's quality-adjusted aid of $153 million, or $12.6 million.[16]

Table 8 shows the results of all this aggregation and imputation. The penultimate column is the final measure of official aid performance: quality-adjusted aid as a share of donor Gross National Income. GNI figures are converted to dollars using market exchange rates, and are from the DAC.

Despite the quality adjustments, what most distinguishes donors from each other in this index is still the sheer quantity of aid they disburse, especially when measured as true net transfers. Denmark, the Netherlands, Norway, and Sweden are large donors by DAC's Net ODA measure, and they score highest on this one too, with at least 0.39% of GNI for 2006. The two largest donors by DAC's standard Net ODA measure, the United States and Japan, score among the lowest on this index of relative effort, at 0.06% and 0.05% respectively. One reason for Japan's low score is that its true net transfers are much lower than its Net ODA; at $6.095 billion, it is behind France, Germany, and the United Kingdom. The new addition—South Korea—scores even lower.

The final column of Table 8 offers a measure of aid quality: the ratio of quality-adjusted aid to net aid transfers. U.S. aid quality is low despite large projects because it channels the lion's share of its aid through its bilateral program, which features high tying and low selectivity for poverty and good governance. In particular, U.S. aid quality is hurt by large allocations to Iraq and Israel, both of which rate low for selectivity (see Table 5). One subtle but important reason that Japan's aid quality measures low is the way its aid quantities move around. The *opportunity cost* of the substantial debt service it receives is assumed to be equivalent to the value of high-quality aid since if the recipient were not paying the debt service, it would be free to use the aid without donor constraints such as tying and small project size. Penalties for tying and project proliferation are computed as a fraction of gross aid and so loom large relative to Japan's much-smaller net aid. The leaders on quality are Ireland, the United Kingdom, and Denmark.[17]

Although the final scores are expressed as percentages of GNI, they should not be compared to other variables so expressed, such as Net ODA/GNI, only to each other. The selectivity adjustment, for example, could have super-weighted aid to the most appropriate recipients rather than discounting it to less appropriate ones. This equally meaningful choice would make little difference for the relative results, but would raise scores across the board.

[16] A few small multilaterals, such as the Central American Bank for Economic Integration receive contributions in but do not themselves report to DAC on their own aid allocations (examples include). This made it impossible to compute their quality-adjusted aid and allocate it back to bilaterals. To prevent contributions to these unscored multilaterals from being dropped, a simple extrapolation was performed based on each bilateral's ratio of quality-adjusted allocated back from scored multilaterals to contributions the donor made to those multilaterals.

[17] The quality scores are generally higher than those reported last year. But the comparison is not valid. Small changes to the data used in calculating selectivity weights are the main reason. A proper comparison is between these year's scores, and previous years' scores recomputed using the latest methodology. Full results are available at www.cgdev.org/cdi.

I back-calculate this index of official aid performance to explore time-series as well as cross-sectional variation in scores. What sets the starting point of the time frame is the availability of the Kaufmann-Kraay governance variable—for even years in 1996–2004. For odd years, I use the previous year's score, except that 1995 calculations also use the 1996 KK scores. This allows calculation of the index for 1995–2007. Total quality-adjusted aid/GNI of bilaterals declined slightly over this period. The simple average was 0.20% in 1995 and 0.18% in 2007, and the correlation of 1995 and 2007 scores is 0.90.[18] (See Figure 3.) Aid quality (quality-adjusted aid/net aid transfers) is more volatile, and shows little long term trend.

Table 8. Allocating multilateral quality-adjusted aid to bilaterals, 2007

		Net aid			Quality-adjusted aid					Adjusted/ Net aid (Aid
Donor	Gross aid	Bilateral	Multilateral	Total	Bilateral	Multilateral	Total	GNI	**Adjusted aid/GNI**	Quality)
	(million $)	----- (million $) -----			----- (million $) -----			(million $)	----- (%) -----	
Australia	2,377	1,976	400	2,377	660	275	935	827,212	**0.11**	39
Austria	902	399	499	898	110	289	399	363,102	**0.11**	44
Belgium	1,852	1,052	738	1,790	444	405	849	457,796	**0.19**	47
Canada	4,118	3,151	928	4,079	1,432	688	2,120	1,409,735	**0.15**	52
Denmark	2,556	1,525	925	2,450	915	452	1,366	317,271	**0.43**	56
Finland	991	584	407	991	282	220	502	249,027	**0.20**	51
France	9,734	4,280	3,777	8,057	1,827	2,130	3,957	2,603,833	**0.15**	49
Germany	10,830	4,791	4,478	9,269	1,277	2,568	3,845	3,350,294	**0.11**	41
Greece	513	249	264	513	94	132	226	308,408	**0.07**	44
Ireland	1,200	824	376	1,200	506	186	692	216,152	**0.32**	58
Italy	3,787	701	2,784	3,484	174	1,373	1,547	2,090,867	**0.07**	44
Japan	11,600	2,108	1,901	4,009	193	1,239	1,432	4,523,906	**0.03**	36
Netherlands	6,039	4,198	1,612	5,811	2,208	797	3,005	770,431	**0.39**	52
New Zealand	320	247	73	320	101	35	136	120,057	**0.11**	43
Norway	3,728	2,883	845	3,728	1,203	382	1,585	392,350	**0.40**	43
Portugal	485	269	208	477	102	113	216	214,267	**0.10**	45
South Korea	734	463	206	669	144	154	298	971,310	**0.03**	45
Spain	5,231	3,159	1,853	5,012	1,168	957	2,124	1,400,260	**0.15**	42
Sweden	4,282	2,858	1,424	4,282	1,551	802	2,353	464,198	**0.51**	55
Switzerland	1,637	1,215	416	1,630	487	271	757	455,146	**0.17**	46
United Kingdom	11,725	5,572	4,367	9,939	2,516	2,457	4,973	2,843,706	**0.17**	50
United States	22,560	18,528	2,895	21,424	7,137	2,125	9,262	13,925,500	**0.07**	43

[18] These figures exclude Greece, which did not report to DAC for 1995, and may have given essentially no aid.

Figure 3. Quality-adjusted aid/GNI by bilateral donor, 1995–2007

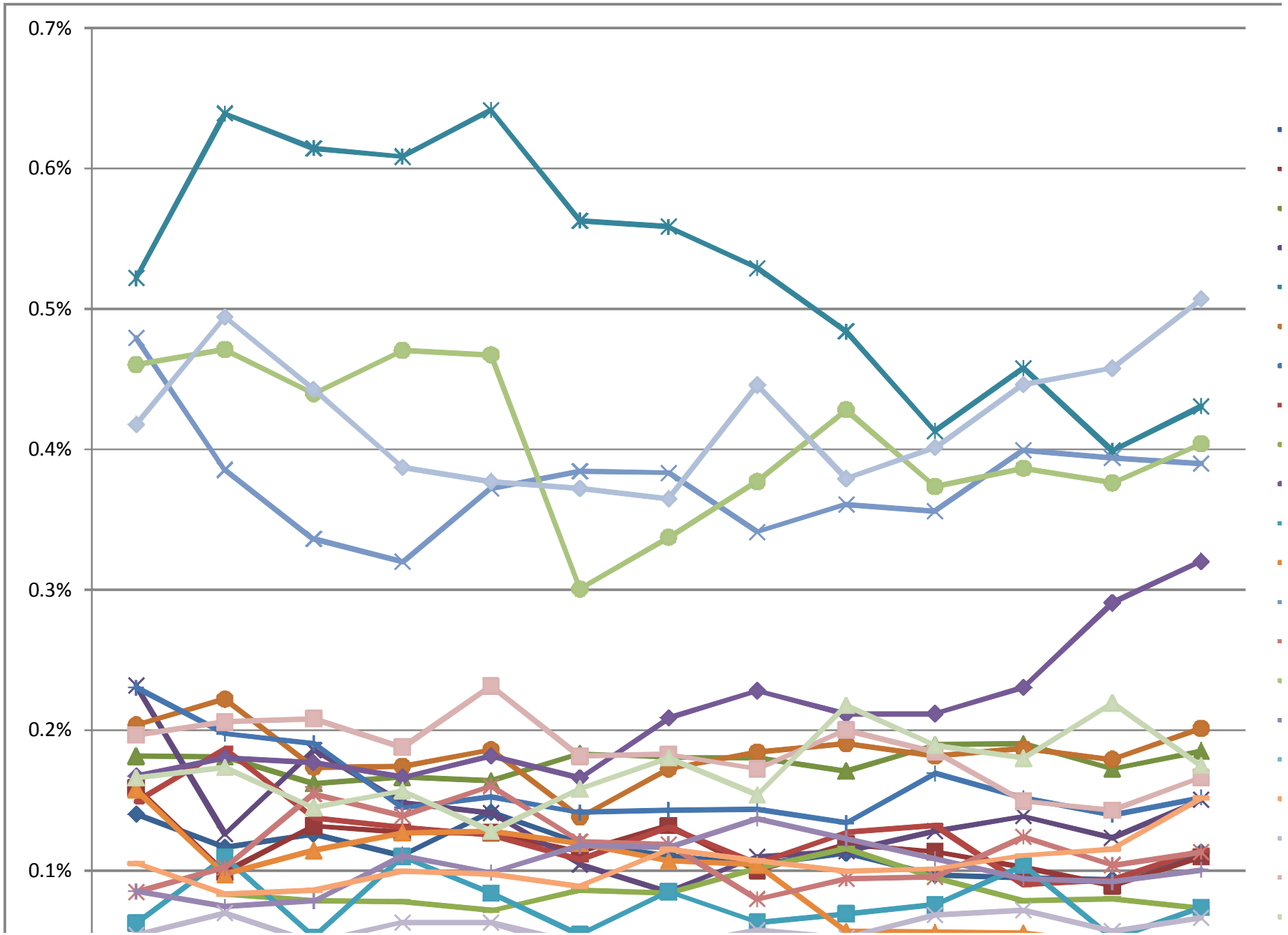
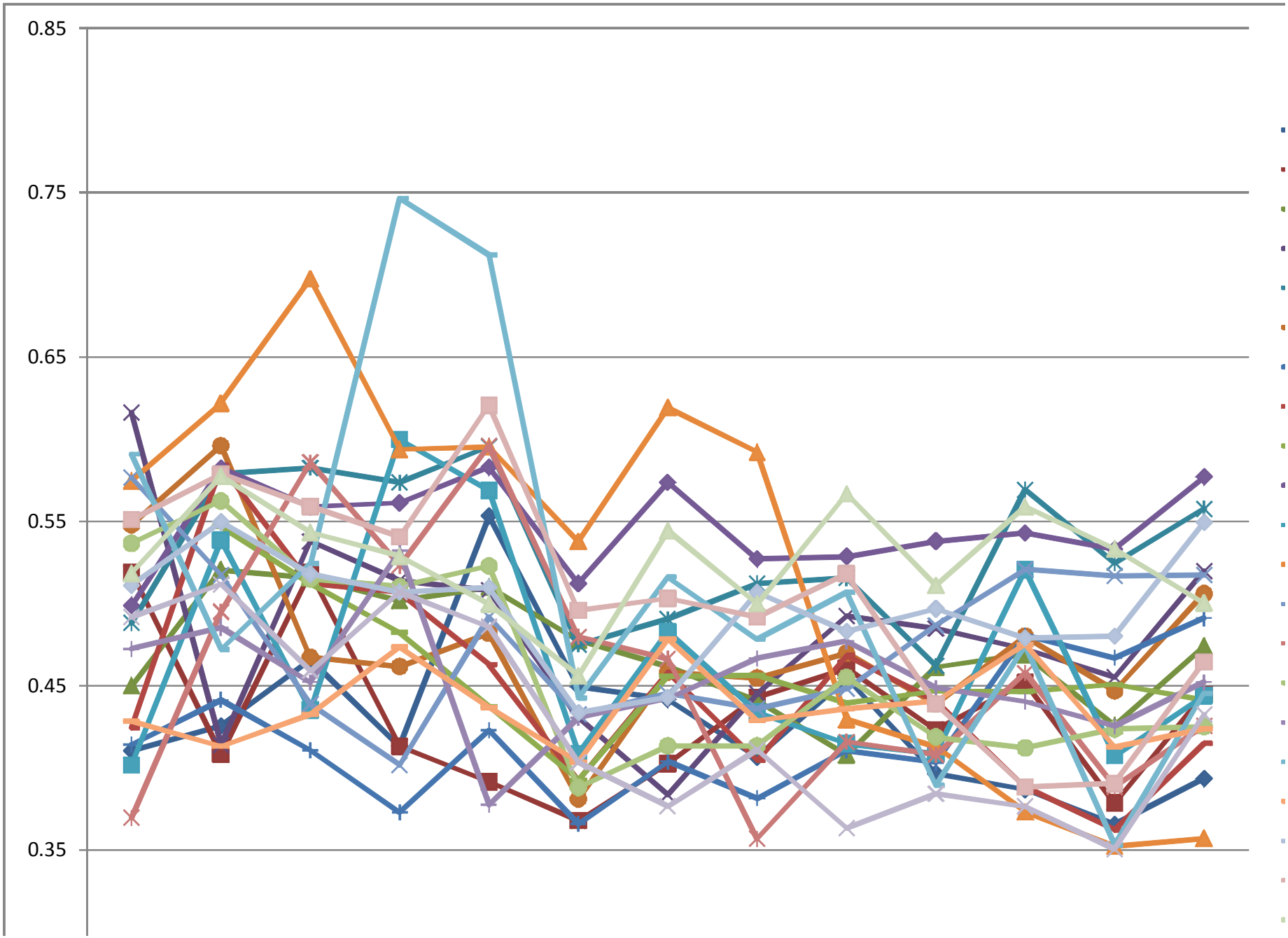


Figure 4. Quality-adjusted aid/net aid by bilateral donor, 1995–2007



8. Rewarding tax policies that support private giving

The focus so far as been on foreign aid in the sense of public expenditure. However, private citizens also give aid to developing countries, usually via non-governmental organizations. Private giving is of course not public policy per se, but it is influenced by public policy—fiscal policy in particular. The aid index therefore incorporates estimates of the charitable giving caused by public policy. The approach taken here is to estimate the proportional increase in giving caused by each country's tax policies, compare that to actual giving, then work backwards to estimate how much giving would have occurred in the absence of the policies and how much is a credit to their presence. Two aspects of fiscal policy are considered. First are targeted income tax incentives that lower the "price" of giving. Second is the total tax revenue/GDP ratio: lower taxes leave citizens and corporations with more after-tax income to give to charity.

The approach here will seem simplistic to some and too sophisticated to others. To make the calculations practical, we make several simplifying assumptions. Each country's tax policies are complex and idiosyncratic. No two households are in exactly the same financial position, and so the tax codes present different incentives to different households. And of course different people respond to the same incentives differently. On the other hand, the sophistication of the calculations, such as it is, should not be read to imply that we see our estimates as beyond improvement.

According to a survey reported in Roodman and Standley (2006), all but three index countries—Austria, Finland, and Sweden—offer income tax incentives for charitable giving. Australia, Belgium, Denmark, Germany, Greece, Ireland, Japan, Netherlands, Norway, Switzerland, the United Kingdom, and the United States allow partial or full deduction of charitable donations from taxable income. Canada, France, Italy, New Zealand, Portugal, and Spain offer partial credits—through the tax code, they reimburse a percentage of donations. These incentives lower the price of giving in the sense that a dollar of forgone after-tax income buys more than a dollar of charity. Charitable donations can fund the operations of non-profit groups working in developing countries, such as Oxfam and CARE, or they can go to foundations that fund such projects.

We translate the presence of a tax incentive into an estimate of the increase in charitable giving in three steps. First, we express the tax measure as a price effect. For credits, this step is straightforward. Canada's 45% tax credit, for example, reduces the price of giving by 45%. For deductions, we used a crude but available proxy for the marginal income tax rate faced by the households with above-average incomes that appear to generate most charity. This proxy is the marginal income tax rate for people at 167% of the income level of the average production worker, from the OECD Tax Database. For example, the rate is 31.3% for the United States in 2007, so deductibility of charitable giving in the United States is treated as reducing the price by 31.3%. The second step is to factor in whether the deduction or credit is capped. In countries where high-income, high-giving

people account for most charity in the aggregate, caps can severely limit the incentive effect in practice. Precisely how much, however, is hard to know, especially because there is little information about the distribution of giving by income group outside the United States. Given the uncertainty, we factor caps in coarsely, by taking the simple average of the below- and above-threshold price incentives. For most countries with caps, the above-threshold price incentive is 0—there is no tax incentive to exceed the cap—so the price effect is halved. The exception is Greece, which offers full deductibility up to €2,950 a year, then imposes a 10% tax above that limit. Since the Greece's representative marginal income tax is 32.8%, the above-threshold price incentive is the difference between this and the special tax rate, i.e., 22.8%. So the simple average of the below- and above-threshold rates for Greece is 27.8%. (See Table 9.)

Finally, having estimated the price effect, we couple it with an estimate of the price elasticity of giving. Research puts it at around 0.5 in the United States (Andreoni 2001). Thus, if a representative individual in the United States faces a price effect of 31.3%, full deductibility of charitable contributions multiplies giving by a factor of

$$(1 - 0.313)^{-0.5} = 1.206, \text{ for a 20.6\% increase.}$$

The procedure is similar for the effect of lower total taxes. When the overall tax ratio is lower, individuals have more money to give to charity. Thus, while high *marginal* tax rates *increase* the incentive to give when we look at the price effects of tax deductions, higher *average* taxes *decrease* the incentive to give when we look at income effects. Among the 22 scored countries, the tax revenue/GDP ratio in 2001, the last year with data available for the first, baseline edition of the CDI, ranged from 27.4% in Japan to 51.9% in Sweden (OECD 2004). To reward countries for lower tax ratios, we need a baseline against which to define lowness. We choose Sweden's 2001 tax ratio, the highest. We combine this with an estimate of the income of elasticity of giving of 1.1 (Andreoni 2001). The United States, to continue the example, is treated as having reduced its total tax burden in 2006, the last year with data available for the current aid index, from Sweden's 2001 ratio of 51.9% to the actual 28.3%. (Sweden's 2001 ratio is used every year for a consistent benchmark.) This hypothetically raises the privately claimed share of GDP from 100% – 51.9% = 48.1% to 100% – 28.3% = 71.7%, an increase of 71.7% / 48.1% – 100% = 49.0%.[19] As a result, the lower U.S. tax burden is estimated to multiply charity by

$$\left(\frac{1-0.283}{1-0.519}\right)^{1.1} = 1.551, \text{ for a 55.1\% increase.}$$

The two multipliers are then combined, and divided into observed giving in order to estimate giving in the absence of these favorable policies. Observed giving is "grants by NGOs" from DAC Table 1; it counts con-

[19] Some share of the revenue funds transfer payments, which increase recipients' disposable income and should therefore increase charitable giving. However, the transfer payments going to the high-income people that appear to account for most charity are probably relatively small. p

tributions by foundations and individuals, which do ordinarily go through NGOs, but excludes official aid that is channeled through NGOs. Just as with official aid, grants by NGOs to Part 2 countries are also counted. The result is a set of estimates for the dollar increase in private giving to developing countries caused by fiscal policy. In the U.S. case, the multipliers combine to 1.206 × 1.551 = 1.870. Observed giving of $12.161 billion in 2007 happens to be 1.870 times $6.502 billion, so U.S. policy is credited for the difference, $5.659 billion.

To incorporate the results on charitable giving attributed to policy into the main quality-adjusted aid measure, it is necessary to adjust the charitable giving results for quality in parallel fashion. As noted above, quality-adjusted aid cannot be directly compared or added to simple aid totals. Moreover, private giving too can go to countries that are more or less appropriate for aid, and can contribute to the problems of project proliferation. As a rough adjustment in the absence of information on the quality of private aid, the CDI discounts policy-induced private giving by the simple average of the quality discounts for the bilaterals' own aid programs, relative to net aid transfers, which is 60% for 2007.

Table 10 incorporates private giving into the previous results on official aid. The last column of this table reports the final results of this evaluation of aid policy, counting both quality-adjusted official aid and charitable giving attributable to fiscal policy. The latter turns out to have small effects on the scores. In the case of the United States, a country often pointed to as a stingy public donor and a generous source of private charity, the result is $2.260 billion in quality-adjusted charitable giving attributed to fiscal policy. Added to the country's $9.262 billion in official quality-adjusted aid, this raises the final U.S. score on the aid index from 0.07% to 0.08% of GNI, leaving the country ahead of only Italy, Greece, Japan, and South Korea.

Table 9. Computation of price incentive of tax policy, 2007

Country	A. Tax deduction?	B. Marginal income tax rate, 2005 (%)[1]	C. Tax credit (%)	D. Deduction or credit capped?	E. Tax incentive (%)[3]	F. Increase in giving with incentive (%)	G. Tax revenue/ GDP, 2005 (%)	H. Giving increase because of smaller government (%)	I. Combined increase (%)	J. Grants by NGOs (million $)[2]	K. Giving in absence of favorable tax policies	Giving attributed to tax policies
Formula:						(1–E)^price elasticity–1[4]		((1–G)/(1–51.9%))^income elasticity–1[5]	(1+F)×(1+H)–1		J/(1+I)	J–K
Australia	Yes	41.5	0.0	No	41.5	30.7	30.6	49.7%	95.7%	655	335	320
Austria	No	37.5	40.0	No	40.0	29.1	41.9	23.2%	59.0%	123	77	46
Belgium	Yes	46.5	0.0	No	46.5	36.7	44.4	17.4%	60.5%	342	213	129
Canada	No	33.0	45.0	No	45.0	34.8	33.3	43.3%	93.2%	1,355	701	654
Denmark	Yes	55.0	0.0	Yes	27.5	17.4	48.9	7.0%	25.6%	94	75	19
Finland	No	41.7	0.0	No	0.0	0.0	43.0	20.6%	20.6%	20	17	3
France	No	30.1	66.0	No	66.0	71.5	43.6	19.2%	104.5%	280	137	143
Germany	Yes	44.3	0.0	No	44.3	34.0	36.2	36.4%	82.8%	1,271	695	576
Greece	Yes	32.8	0.0	No	27.8	17.7	31.3	48.0%	74.1%	7	4	3
Ireland	Yes	41.0	0.0	No	41.0	30.2	32.2	45.8%	89.8%	318	168	151
Italy	No	39.1	19.0	No	19.0	11.1	43.3	19.8%	33.1%	63	47	16
Japan	Yes	25.6	0.0	No	25.6	15.9	27.9	56.1%	80.9%	446	247	200
Netherlands	Yes	52.0	0.0	No	52.0	44.3	38.0	32.1%	90.7%	343	180	163
New Zealand	No	39.0	33.3	No	33.3	22.5	36.0	36.9%	67.7%	50	30	20
Norway	Yes	40.0	0.0	Yes	20.0	11.8	43.4	19.7%	33.8%	452	337	114
Portugal	No	34.0	25.0	No	25.0	15.5	36.6	35.5%	56.5%	2	1	1
South Korea	Yes	17.2	0.0	No	17.2	9.9	28.7	54.2%	69.5%	54	32	22
Spain	No	28.0	25.0	No	25.0	15.5	37.2	34.0%	54.7%	133	86	47
Sweden	No	56.5	0.0	No	0.0	0.0	48.2	8.6%	8.6%	78	72	6
Switzerland	Yes	27.0	0.0	No	27.0	17.1	29.7	51.9%	77.8%	504	283	221
United Kingdom	Yes	40.0	20.0	No	40.0	29.1	36.6	35.5%	74.9%	667	382	286
United States	Yes	31.3	0.0	No	31.3	20.6	28.3	55.1%	87.0%	12,161	6,502	5,659

[1]Marginal income tax rate for single individual at 167% of income level of the average production worker. [2]Uniquely, Greece gives full deductibility up to a certain amount (2,950 euros) and imposes a low tax (10%) on contributions above the threshold. In general, for deductions or credits that are capped, the average of below- and above-cap incentives is used. [3]Data for latest available year. [4]Price elasticity of giving taken to be –0.5. [5]Income elasticity of giving taken to be 1.1. 51.9% is the highest revenue/GDP observed, in Sweden, in the reference year of 2001.

Table 10. Incorporating private giving attributable to public policy, 2007

Donor	A. Quality-adjusted official aid[1]	B. Charitable giving credited to policy[1]	C. Quality-adjusted charitable giving credited to policy (B × (1–60%))	**Adjusted (aid+charitable giving)/GNI** ((A + C)/GNI, %)
Australia	935	320	128	**0.13**
Austria	399	46	18	**0.11**
Belgium	849	129	52	**0.20**
Canada	2,120	654	261	**0.17**
Denmark	1,366	19	8	**0.43**
Finland	502	3	1	**0.20**
France	3,957	143	57	**0.15**
Germany	3,845	576	230	**0.12**
Greece	226	3	1	**0.07**
Ireland	692	151	60	**0.35**
Italy	1,547	16	6	**0.07**
Japan	1,432	200	80	**0.03**
Netherlands	3,005	163	65	**0.40**
New Zealand	136	20	8	**0.12**
Norway	1,585	114	46	**0.42**
Portugal	216	1	0	**0.10**
South Korea	298	22	9	**0.03**
Spain	2,124	47	19	**0.15**
Sweden	2,353	6	2	**0.51**
Switzerland	757	221	88	**0.19**
United Kingdom	4,973	286	114	**0.18**
United States	9,262	5,659	2,260	**0.08**

[1]From previous tables.

Appendix. Size weighting formula

This appendix derives the formula used to compute size-weighted aid for each donor-recipient pair. It first derives a general formula for the integral of the product of two lognormal curves. In the application in this paper, one curve represents the distribution of aid activities by size and the other the weights applied to them based on size. This appendix then shows how the parameters of the size weighting curve are mathematically determined.

Suppose we have two lognormal curves of the form:

$$h_1(x) = \frac{N_1}{\sqrt{2\pi}\sigma_1 x} e^{-\frac{1}{2}\left(\frac{\ln x - \mu_1}{\sigma_1}\right)^2}$$

$$h_2(x) = \frac{N_2}{\sqrt{2\pi}\sigma_2 x} e^{-\frac{1}{2}\left(\frac{\ln x - \mu_2}{\sigma_2}\right)^2}$$

If $u = \ln x$, then $x = e^u$, $du = dx/x$, and the total integral of the product of the two curves is

$$\int_0^\infty \frac{N_1}{\sqrt{2\pi}\sigma_1 x} e^{-\frac{1}{2}\left(\frac{\ln x - \mu_1}{\sigma_1}\right)^2} \frac{N_2}{\sqrt{2\pi}\sigma_2 x} e^{-\frac{1}{2}\left(\frac{\ln x - \mu_2}{\sigma_2}\right)^2} dx$$

$$= \frac{N_1 N_2}{2\pi\sigma_1\sigma_2} \int_{-\infty}^{\infty} \frac{1}{e^u} e^{-\frac{1}{2}\left(\frac{u-\mu_1}{\sigma_1}\right)^2 - \frac{1}{2}\left(\frac{u-\mu_2}{\sigma_2}\right)^2} du$$

$$= \frac{N_1 N_2}{2\pi\sigma_1\sigma_2} \int_{-\infty}^{\infty} \frac{1}{e^u} e^{-\frac{1}{2}\left(u^2\left(\frac{1}{\sigma_1^2}+\frac{1}{\sigma_2^2}\right) - 2u\left(\frac{\mu_1}{\sigma_1^2}+\frac{\mu_2}{\sigma_2^2}\right) + \frac{\mu_1^2}{\sigma_1^2}+\frac{\mu_2^2}{\sigma_2^2}\right)} du$$

$$= \frac{N_1 N_2}{2\pi\sigma_1\sigma_2} \int_{-\infty}^{\infty} e^{-\frac{1}{2}\left(u^2\left(\frac{1}{\sigma_1^2}+\frac{1}{\sigma_2^2}\right) - 2u\left(\frac{\mu_1}{\sigma_1^2}+\frac{\mu_2}{\sigma_2^2}-1\right) + \frac{\mu_1^2}{\sigma_1^2}+\frac{\mu_2^2}{\sigma_2^2}\right)} du.$$

This arranges the exponent as a quadratic expression in u. Completing the square in that expression gives

$$\frac{N_1 N_2}{2\pi\sigma_1\sigma_2} \int_{-\infty}^{\infty} e^{-\frac{1}{2}\left(u\sqrt{\frac{1}{\sigma_1^2}+\frac{1}{\sigma_2^2}} - \frac{\frac{\mu_1}{\sigma_1^2}+\frac{\mu_2}{\sigma_2^2}-1}{\sqrt{\frac{1}{\sigma_1^2}+\frac{1}{\sigma_2^2}}}\right)^2 - \frac{\left(\frac{\mu_1}{\sigma_1^2}+\frac{\mu_2}{\sigma_2^2}-1\right)^2}{\frac{1}{\sigma_1^2}+\frac{1}{\sigma_2^2}} + \frac{\mu_1^2}{\sigma_1^2}+\frac{\mu_2^2}{\sigma_2^2}} du$$

$$= \frac{N_1 N_2}{2\pi\sigma_1\sigma_2} e^{-\frac{1}{2}\left(-\frac{\left(\frac{\mu_1}{\sigma_1^2}+\frac{\mu_2}{\sigma_2^2}-1\right)^2}{\frac{1}{\sigma_1^2}+\frac{1}{\sigma_2^2}} + \frac{\mu_1^2}{\sigma_1^2}+\frac{\mu_2^2}{\sigma_2^2}\right)} \int_{-\infty}^{\infty} e^{-\frac{1}{2}\left(u\sqrt{\frac{1}{\sigma_1^2}+\frac{1}{\sigma_2^2}} - \frac{\frac{\mu_1}{\sigma_1^2}+\frac{\mu_2}{\sigma_2^2}-1}{\sqrt{\frac{1}{\sigma_1^2}+\frac{1}{\sigma_2^2}}}\right)^2} du.$$

The integral has been transformed into that of a normal curve, and evaluates to

$$\frac{\sqrt{2\pi}}{\sqrt{\frac{1}{\sigma_1^2}+\frac{1}{\sigma_2^2}}}.$$

The whole expression is therefore

$$\frac{N_1 N_2}{2\pi\sigma_1\sigma_2}\frac{\sqrt{2\pi}}{\sqrt{\frac{1}{{\sigma_1}^2}+\frac{1}{{\sigma_2}^2}}}e^{-\frac{1}{2}\left(-\frac{\left(\frac{\mu_1}{{\sigma_1}^2}+\frac{\mu_2}{{\sigma_2}^2}-1\right)^2}{\frac{1}{{\sigma_1}^2}+\frac{1}{{\sigma_2}^2}}+\frac{{\mu_1}^2}{{\sigma_1}^2}+\frac{{\mu_2}^2}{{\sigma_2}^2}\right)}$$

$$=\frac{N_1 N_2}{\sqrt{2\pi}\sqrt{{\sigma_1}^2+{\sigma_2}^2}}e^{-\frac{1}{2}\left(\frac{{\mu_1}^2}{{\sigma_1}^2}+\frac{{\mu_2}^2}{{\sigma_2}^2}-\frac{\left(\frac{\mu_1}{{\sigma_1}^2}+\frac{\mu_2}{{\sigma_2}^2}-1\right)^2}{\frac{1}{{\sigma_1}^2}+\frac{1}{{\sigma_2}^2}}\right)}.$$

Letting $\eta_1 = \mu_1/\sigma_1$, $\eta_2 = \mu_2/\sigma_2$, and $\hat{\sigma} = \sqrt{{\sigma_1}^2+{\sigma_2}^2}$, this can be rewritten as

$$\int_0^\infty h_1(x)h_2(x)dx = \frac{N_1 N_2}{\sqrt{2\pi}\hat{\sigma}}e^{-\frac{1}{2}\left({\eta_1}^2+{\eta_2}^2-\frac{{\sigma_1}^2{\sigma_2}^2}{\hat{\sigma}^2}\left(\frac{\eta_1}{\sigma_1}+\frac{\eta_2}{\sigma_2}-1\right)^2\right)}. \qquad (1)$$

In the present case, h_1 is the distribution of aid activities by size, so N_1, the number of aid activities, is known, and μ_1 and σ_1 can be estimated from the data. To fix the three parameters of h_2, the size weighting function, we impose three constraints. First, we require that the peak value of the weighting function is 1. In general, the mode of h_2 is $e^{\mu_2-{\sigma_2}^2}$ (Aitchison and Brown 1963), at which it takes the value

$$h_2\left(e^{\mu_2-{\sigma_2}^2}\right)=\frac{N_2}{\sqrt{2\pi}\sigma_2 e^{\mu_2-{\sigma_2}^2}}e^{-\frac{1}{2{\sigma_2}^2}\left(\mu_2-\sigma^2-\mu_2\right)^2}=\frac{N_2}{\sqrt{2\pi}\sigma_2 e^{\mu_2-\frac{{\sigma_2}^2}{2}}}.$$

This is 1 when

$$N_2=\sqrt{2\pi}\sigma_2 e^{\mu_2-\frac{{\sigma_2}^2}{2}}.$$

As discussed in the main text, we next require that h_2 peaks at $2^{KK}e^{\mu_1+{\sigma_1}^2}$, where *KK* is the recipient's Kaufmann-Kraay governance score.[20] And we require that h_2 is twice as wide as h_1, that is, $\sigma_2 = 2\sigma_1$. Since the peak of h_2 occurs at $e^{\mu_2-{\sigma_2}^2}$, we have $2^{KK}e^{\mu_1+{\sigma_1}^2}=e^{\mu_2-{\sigma_2}^2}$. Ergo

$$\mu_2=\ln\left(2^{KK}e^{\mu_1+{\sigma_1}^2}\right)+{\sigma_2}^2=\mu_1+{\sigma_1}^2+KK\ln 2+4{\sigma_1}^2=\mu_1+5{\sigma_1}^2+KK\ln 2.$$

[20] Previous editions of this paper erroneously stated that h_2 peaks at $2^{KK}e^{\mu_1+{\sigma_1}^2/2}$. I thank Ken Togo and Yoshio Wada (2007) for pointing out this error.

Having expressed N_2, μ_2, and σ_2 as functions of N_1, μ_1, σ_1, and KK, we can then apply (1) to estimate total size-weighted aid for a given project distribution.

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