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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 2008 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 2008). The aid index was introduced in 2003 and has been re-

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[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.

vised 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.

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 2006 data, which are the latest available and the basis for the 2008 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. In DAC terminology, OA is concessional aid meeting the ODA definition, except that while ODA goes to countries conventionally thought of as developing, OA goes to "Part II" countries—most European states that emerged out of the Soviet bloc and richer non-DAC members such as Israel and Singapore. DAC excludes OA from its most frequently cited statistics, perhaps out of concern that assistance to such rich countries stretches the meaning of "aid." I include OA because some Part II countries, such as Ukraine, are poorer than many Part I countries.[3] And since the selectivity adjustment detailed below heavily discounts aid to the richest developing countries, there is less risk that counting OA will misrepresent aid flows. For simplicity of exposition, I refer henceforth to both ODA and OA as ODA.

[3] See http://www.oecd.org/dac/stats/daclist for lists of Part I and Part II countries.

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 OOF loans to countries such as Nigeria, Iraq, Pakistan, Cameroon, and the Democratic Republic of Congo (DRC). 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. Actual transfers of money were far 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.[4] 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.

[4] The process occurs within the U.S. government's Interagency Country Risk Assessment System.

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[5]:

Gross ODA = grants + 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 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."[6]

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.

[5] "Grants" here includes capital subscriptions to multilateral organizations.

[6] In the first 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.

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 2006. 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 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, 2006

Donor	Gross ODA net of offsetting entries for ODA loan forgiveness	Gross aid transfers	% reduction from gross ODA to gross aid transfers
Arab Agencies	680	680	0
Arab Countries	2,921	2,921	0
Australia	1,796	1,519	15
Austria	1,096	340	69
Belgium	1,395	997	29
Canada	2,573	2,328	10
Czech Republic	78	63	19
Denmark	1,510	1,397	8
Finland	458	458	0
France	9,131	5,484	40
Germany	8,356	5,615	33
Greece	189	189	0
Hungary	84	84	0
Iceland	28	28	0
Ireland	632	632	0
Italy	2,362	975	59
Japan	12,700	9,772	23
Luxembourg	205	205	0
Netherlands	4,415	4,121	7
New Zealand	203	203	0
Norway	2,198	2,198	0
Other Donors	612	612	0
Poland	122	122	0
Portugal	217	217	0
Slovak Republic	25	25	0
South Korea	401	401	0
Spain	2,369	1,889	20
Sweden	2,852	2,560	10
Switzerland	1,265	1,167	8
Thailand	65	65	0
Turkey	643	593	8
United Kingdom	9,266	6,717	28
United States	22,032	20,347	8
AfDF	1,686	1,031	39
AsDF	1,488	1,488	0
CarDB	47	47	0
EBRD	11	11	0
EC	9,922	9,922	0
GEF	190	190	0
GFATM	1,252	1,252	0
IDA	8,061	8,039	0
IDB Sp.Fund	514	514	0
IFAD	348	348	0
Montreal Protocol	81	81	0
Nordic Dev.Fund	73	73	0
SAF+ESAF(IMF)	744	744	0
UNDP	437	437	0
UNFPA	388	388	0
UNHCR	289	289	0
UNICEF	740	740	0
UNRWA	600	600	0
UNTA	371	371	0
WFP	473	473	0
Japan-Sierra Leone	63	11	82

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 77% of its gross aid transfers and sufficient to put Japan's bilateral aid program well behind those of France, Germany, the Netherlands, 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, 2006

Donor	A. Gross aid transfers	B. Amortization	C. DAC interest received	D. Estimated interest actually paid	Net Aid Transfers (A – B – D)
Arab Agencies	680	241	0	0	440
Arab Countries	2,921	466	0	0	2,455
Australia	1,519	0	0	0	1,519
Austria	340	4	4	1	334
Belgium	997	38	3	3	956
Canada	2,328	42	0	0	2,286
Czech Republic	63	0	0	0	63
Denmark	1,397	46	9	9	1,342
Finland	458	3	0	0	455
France	5,484	1,212	371	473	3,799
Germany	5,615	1,322	316	272	4,021
Greece	189	0	0	0	189
Hungary	84	0	0	0	84
Iceland	28	0	0	0	28
Ireland	632	0	0	0	632
Italy	975	361	0	0	613
Japan	9,772	5,387	2,210	2,127	2,258
Luxembourg	205	0	0	0	205
Netherlands	4,121	133	34	34	3,954
New Zealand	203	0	0	0	203
Norway	2,198	0	0	0	2,198
Other Donors	612	0	0	0	612
Poland	122	3	0	0	119
Portugal	217	6	1	1	210
Slovak Republic	25	0	0	0	25
South Korea	401	25	19	19	357
Spain	1,889	277	5	0	1,612
Sweden	2,560	0	0	0	2,560
Switzerland	1,167	11	0	0	1,156
Thailand	65	0	0	0	65
Turkey	593	0	0	0	593
United Kingdom	6,717	549	1	0	6,169
United States	20,347	870	322	322	19,155
AfDF	1,031	145	757	757	129
AsDF	1,488	468	204	204	816
CarDB	47	16	10	10	22
EBRD	11	0	0	0	11
EC	9,922	433	107	107	9,382
GEF	190	0	0	0	190
GFATM	1,252	0	0	0	1,252
IDA	8,039	2,065	869	869	5,105
IDB Sp.Fund	514	298	154	154	62
IFAD	348	122	39	39	187
Montreal Protocol	81	0	0	0	81
Nordic Dev.Fund	73	5	4	4	64
SAF+ESAF(IMF)	744	756	0	0	-12
UNDP	437	0	0	0	437
UNFPA	388	0	0	0	388
UNHCR	289	0	0	0	289
UNICEF	740	0	0	0	740
UNRWA	600	0	0	0	600
UNTA	371	0	0	0	371
WFP	473	0	0	0	473
Japan-Sierra Leone	11	0	0	0	11

[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.[7] Table 4 shows the results of this step, "net tying-discounted aid" by emergency status. Italy and the United States suffer most from the tying discount.[8]

[7] 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. This is especially important for the United States, which has not reported tying data since 1996. The estimated tied shares in the index are those it reported for all aid in 1996: 71.6% tied and 0% partially untied.

[8] 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, 2006

	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	680	0	0	0	680	0	0	0	0	0
Arab Countries	2,921	0	0	0	2,921	0	0	0	0	0
Australia	1,328	57	0	11	1,316	191	17	0	3	188
Austria	322	80	0	16	306	18	3	0	1	17
Belgium	911	70	0	14	897	86	0	0	0	86
Canada	2,097	605	6	122	1,976	231	118	0	24	207
Czech Republic	53	0	0	0	53	10	0	0	0	10
Denmark	1,246	79	0	16	1,230	151	1	0	0	151
Finland	388	46	0	9	378	70	1	0	0	70
France	5,435	342	-2	68	5,367	49	1	0	0	48
Germany	5,257	702	0	140	5,117	357	4	0	1	357
Greece	170	48	0	10	160	19	12	0	2	17
Hungary	84	0	0	0	84	0	0	0	0	0
Iceland	28	0	0	0	28	0	0	0	0	0
Ireland	545	0	0	0	545	87	0	0	0	87
Italy	901	185	22	39	861	74	15	2	3	71
Japan	9,589	673	0	135	9,454	183	0	0	0	183
Luxembourg	168	0	0	0	168	37	0	0	0	37
Netherlands	3,724	156	0	31	3,693	397	0	0	0	397
New Zealand	181	6	22	3	178	21	0	1	0	21
Norway	1,888	4	0	1	1,888	309	0	0	0	309
Other Donors	612	0	0	0	612	0	0	0	0	0
Poland	122	0	0	0	122	0	0	0	0	0
Portugal	210	20	4	4	206	7	0	0	0	7
Slovak Republic	25	0	0	0	25	0	0	0	0	0
South Korea	377	0	0	0	377	24	0	0	0	24
Spain	1,752	547	0	109	1,642	137	24	0	5	133
Sweden	2,265	22	0	4	2,260	295	0	0	0	295
Switzerland	991	19	0	4	988	175	31	0	6	169
Thailand	65	0	0	0	65	0	0	0	0	0
Turkey	477	0	0	0	477	116	0	0	0	116
United Kingdom	5,883	0	0	0	5,883	835	0	0	0	835
United States	17,325	8,553	0	1,711	15,615	3,022	1,006	0	201	2,820
AfDF	1,031	0	0	0	1,031	0	0	0	0	0
AsDF	1,488	0	0	0	1,488	0	0	0	0	0
CarDB	47	0	0	0	47	0	0	0	0	0
EBRD	11	0	0	0	11	0	0	0	0	0
EC	8,766	0	0	0	8,766	1,156	0	0	0	1,156
GEF	190	0	0	0	190	0	0	0	0	0
GFATM	1,252	0	0	0	1,252	0	0	0	0	0
IDA	8,039	0	0	0	8,039	0	0	0	0	0
IDB Sp.Fund	514	0	0	0	514	0	0	0	0	0
IFAD	348	0	0	0	348	0	0	0	0	0
Montreal Protocol	81	0	0	0	81	0	0	0	0	0
Nordic Dev.Fund	73	0	0	0	73	0	0	0	0	0
SAF+ESAF(IMF)	744	0	0	0	744	0	0	0	0	0
UNDP	437	0	0	0	437	0	0	0	0	0
UNFPA	388	0	0	0	388	0	0	0	0	0
UNHCR	289	0	0	0	289	0	0	0	0	0
UNICEF	740	0	0	0	740	0	0	0	0	0
UNRWA	600	0	0	0	600	0	0	0	0	0
UNTA	371	0	0	0	371	0	0	0	0	0
WFP	473	0	0	0	473	0	0	0	0	0
Japan-Sierra Leone	6.8	0.1	0.0	0.0	6.8	4.4	0.0	0.0	0.0	4.4

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.[9]

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

[9] 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.[10]

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

[10] 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.[11] 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

[11] 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 $21,930 in year-2000 dollars) gets a 0 and the DRC (GDP/capita of $82), 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 2006.[12] 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 2006, this happens for Ghana on the high end as well as 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 15 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; 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).[13,14]

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, Mongolia, 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.

[12] 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.
[13] The full CRS purpose classification is at http://www.oecd.org/dataoecd/40/23/34384375.doc.
[14] I think Ian Anderson and Terry O'Brien for comments that led to this change.

Table 5. Computation of selectivity weights, 2006

Country name	A. Exchange rate GDP/capita, 2005 ($)	B. Log exchange rate GDP/capita	C. GDP selectivity multiplier	D. Kaufmann-Kraay composite governance score, 2005	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	300	5.70	1.70	0.05	0.60	1.03
Madagascar	238	5.47	1.79	–0.16	0.55	0.98
Kiribati	546	6.30	1.46	0.22	0.65	0.95
Mali	250	5.52	1.77	–0.23	0.53	0.94
Malawi	164	5.10	1.93	–0.50	0.46	0.89
Mozambique	307	5.73	1.69	–0.25	0.53	0.89
Benin	327	5.79	1.66	–0.25	0.52	0.87
Tanzania	335	5.81	1.65	–0.33	0.50	0.83
Burkina Faso	267	5.59	1.74	–0.44	0.48	0.83
Niger	158	5.06	1.95	–0.63	0.42	0.83
Mongolia	524	6.26	1.47	–0.12	0.56	0.82
Bhutan	1,069	6.97	1.19	0.34	0.68	0.81
Lesotho	564	6.34	1.45	–0.13	0.56	0.81
Senegal	473	6.16	1.51	–0.26	0.52	0.79
Cape Verde	1,393	7.24	1.09	0.50	0.72	0.79
India	634	6.45	1.40	–0.12	0.56	0.78
Gambia, The	342	5.84	1.64	–0.46	0.47	0.77
Vanuatu	1,255	7.14	1.13	0.34	0.68	0.77
Rwanda	268	5.59	1.74	–0.57	0.44	0.77
Zambia	365	5.90	1.62	–0.46	0.47	0.76
Uganda	274	5.61	1.73	–0.60	0.43	0.75
Guinea-Bissau	136	4.91	2.01	–0.90	0.35	0.71
Mauritania	466	6.15	1.52	–0.52	0.45	0.69
Ethiopia	155	5.05	1.95	–0.92	0.35	0.68
Micronesia, Fed. Sts.	1,967	7.58	0.95	0.42	0.70	0.67
Vietnam	576	6.36	1.44	–0.50	0.46	0.66
Moldova	492	6.20	1.50	–0.57	0.44	0.66
St. Vincent and the Grenadines	3,343	8.11	0.74	0.96	0.84	0.63
Kenya	456	6.12	1.53	–0.69	0.41	0.63
Sierra Leone	228	5.43	1.80	–0.92	0.35	0.63
Solomon Islands	696	6.55	1.36	–0.50	0.46	0.62
Namibia	2,172	7.68	0.91	0.31	0.67	0.61
Burundi	106	4.66	2.11	–1.15	0.29	0.60
Comoros	379	5.94	1.60	–0.85	0.37	0.59
Bulgaria	2,256	7.72	0.90	0.22	0.65	0.58
Liberia	142	4.95	1.99	–1.13	0.29	0.58
Morocco	1,439	7.27	1.08	–0.19	0.54	0.58
Georgia	1,071	6.98	1.19	–0.39	0.49	0.58
Guyana	1,027	6.93	1.21	–0.42	0.48	0.58
Timor-Leste	321	5.77	1.67	–0.92	0.35	0.58
Kyrgyz Republic	326	5.79	1.66	–0.93	0.34	0.57
Armenia	1,284	7.16	1.12	–0.34	0.50	0.56
Nepal	234	5.45	1.79	–1.05	0.31	0.56
Ukraine	1,040	6.95	1.20	–0.47	0.47	0.56
Sri Lanka	1,076	6.98	1.19	–0.45	0.47	0.56
Papua New Guinea	639	6.46	1.40	–0.74	0.39	0.55
Eritrea	165	5.11	1.93	–1.16	0.28	0.55
Jordan	2,193	7.69	0.91	0.05	0.60	0.55
Philippines	1,175	7.07	1.16	–0.45	0.47	0.55
Cambodia	437	6.08	1.55	–0.90	0.35	0.55
Nicaragua	904	6.81	1.26	–0.61	0.43	0.54
Togo	238	5.47	1.79	–1.10	0.30	0.54
Tajikistan	247	5.51	1.77	–1.09	0.30	0.53
Dominica	4,050	8.31	0.67	0.79	0.80	0.53
Romania	2,443	7.80	0.87	0.09	0.61	0.53
Marshall Islands	2,050	7.63	0.94	–0.08	0.57	0.53

Tonga	1,658	7.41	1.02	–0.26	0.52	0.53
Honduras	1,024	6.93	1.21	–0.58	0.44	0.53
Serbia and Montenegro	1,455	7.28	1.07	–0.37	0.49	0.53
Serbia and Montenegro	1,455	7.28	1.07	–0.37	0.49	0.53
Indonesia	983	6.89	1.23	–0.61	0.43	0.53
Lao PDR	438	6.08	1.54	–0.95	0.34	0.53
Tunisia	2,512	7.83	0.86	0.07	0.61	0.52
St. Lucia	4,829	8.48	0.60	1.04	0.87	0.52
South Africa	3,562	8.18	0.72	0.47	0.71	0.51
Cameroon	751	6.62	1.33	–0.80	0.38	0.51
Albania	1,604	7.38	1.03	–0.39	0.49	0.51
Bangladesh	454	6.12	1.53	–0.99	0.33	0.50
Djibouti	824	6.71	1.30	–0.77	0.39	0.50
El Salvador	2,173	7.68	0.91	–0.16	0.55	0.50
Yemen, Rep.	549	6.31	1.46	–0.94	0.34	0.50
Macedonia, FYR	1,940	7.57	0.96	–0.28	0.52	0.50
Bosnia and Herzegovina	1,741	7.46	1.00	–0.38	0.49	0.49
Fiji	2,257	7.72	0.90	–0.19	0.54	0.48
Mauritius	4,522	8.42	0.62	0.69	0.77	0.48
Pakistan	623	6.43	1.41	–0.96	0.34	0.48
Bolivia	1,091	6.99	1.18	–0.72	0.40	0.48
Botswana	4,770	8.47	0.60	0.74	0.79	0.47
Suriname	2,688	7.90	0.83	–0.07	0.57	0.47
Chile	5,846	8.67	0.52	1.19	0.91	0.47
Maldives	2,811	7.94	0.81	–0.04	0.58	0.47
China	1,595	7.37	1.03	–0.53	0.45	0.47
Swaziland	1,416	7.26	1.08	–0.61	0.43	0.47
Grenada	4,081	8.31	0.66	0.41	0.70	0.46
Thailand	2,549	7.84	0.85	–0.18	0.54	0.46
Slovak Republic	5,126	8.54	0.57	0.77	0.79	0.46
Egypt, Arab Rep.	1,696	7.44	1.01	–0.54	0.45	0.45
Costa Rica	4,793	8.47	0.60	0.57	0.74	0.45
Dominican Republic	2,694	7.90	0.83	–0.23	0.53	0.44
Lithuania	5,247	8.57	0.56	0.70	0.78	0.44
Malaysia	4,623	8.44	0.61	0.44	0.71	0.44
Paraguay	1,387	7.23	1.09	–0.73	0.40	0.44
Guatemala	1,771	7.48	0.99	–0.60	0.43	0.43
Central African Republic	232	5.45	1.80	–1.33	0.24	0.43
Jamaica	3,367	8.12	0.74	–0.06	0.58	0.43
Nigeria	439	6.08	1.54	–1.20	0.28	0.43
Colombia	2,317	7.75	0.89	–0.43	0.48	0.42
Peru	2,489	7.82	0.86	–0.39	0.49	0.42
Latvia	5,683	8.65	0.53	0.72	0.78	0.42
Turkey	3,582	8.18	0.72	–0.04	0.58	0.41
Belize	3,786	8.24	0.69	–0.01	0.59	0.41
Hungary	6,126	8.72	0.50	0.82	0.81	0.41
Guinea	406	6.01	1.58	–1.29	0.25	0.40
Kazakhstan	2,164	7.68	0.91	–0.61	0.43	0.39
Algeria	2,153	7.67	0.92	–0.62	0.43	0.39
Estonia	6,945	8.85	0.45	1.03	0.86	0.39
Chad	283	5.65	1.72	–1.38	0.23	0.39
Poland	5,521	8.62	0.54	0.45	0.71	0.39
Ecuador	1,597	7.38	1.03	–0.86	0.36	0.38
Haiti	443	6.09	1.54	–1.31	0.24	0.38
Azerbaijan	1,576	7.36	1.04	–0.87	0.36	0.38
Panama	4,711	8.46	0.61	0.10	0.62	0.38
Brazil	4,055	8.31	0.67	–0.11	0.56	0.38
Syrian Arab Republic	1,271	7.15	1.12	–1.00	0.33	0.37
Croatia	5,461	8.61	0.55	0.28	0.67	0.37
Angola	1,044	6.95	1.20	–1.10	0.30	0.36
Czech Republic	7,040	8.86	0.45	0.79	0.80	0.36
Congo, Rep.	1,030	6.94	1.21	–1.15	0.29	0.35
Russian Federation	2,621	7.87	0.84	–0.69	0.41	0.34
Uruguay	6,987	8.85	0.45	0.61	0.75	0.34
St. Kitts and Nevis	8,361	9.03	0.38	1.01	0.86	0.33
Sudan	511	6.24	1.48	–1.45	0.21	0.31
Congo, Dem. Rep.	93	4.53	2.16	–1.69	0.14	0.31
Gabon	3,975	8.29	0.67	–0.56	0.44	0.30

Cote d'Ivoire	576	6.36	1.44	–1.45	0.21	0.30
Iran, Islamic Rep.	2,029	7.62	0.94	–1.05	0.31	0.30
Belarus	2,070	7.64	0.93	–1.06	0.31	0.29
Seychelles	6,863	8.83	0.46	0.11	0.62	0.28
Mexico	6,387	8.76	0.49	–0.10	0.57	0.28
Zimbabwe	409	6.01	1.57	–1.60	0.17	0.27
Uzbekistan	724	6.58	1.35	–1.53	0.19	0.25
Afghanistan	270	5.60	1.74	–1.69	0.14	0.25
Lebanon	5,055	8.53	0.58	–0.65	0.42	0.24
Antigua and Barbuda	10,718	9.28	0.28	0.77	0.79	0.22
Slovenia	12,047	9.40	0.24	0.96	0.84	0.20
Trinidad and Tobago	10,268	9.24	0.30	0.14	0.63	0.19
Argentina	8,695	9.07	0.37	–0.29	0.51	0.19
Venezuela, RB	5,427	8.60	0.55	–1.08	0.31	0.17
Libya	7,154	8.88	0.44	–0.93	0.35	0.15
South Korea	13,865	9.54	0.18	0.65	0.76	0.14
Equatorial Guinea	7,005	8.85	0.45	–1.23	0.27	0.12
Iraq	1,818	7.51	0.98	–1.83	0.11	0.11
Macao, China	26,264	10.18	–0.07	0.73	0.79	–0.06
Singapore	27,685	10.23	–0.09	1.57	1.01	–0.09
Hong Kong, China	31,779	10.37	–0.15	1.43	0.97	–0.14

[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, 2006

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	680	0	241	0.61	416	115
Arab Countries	2,921	0	466	0.46	1,343	151
Australia	1,316	188	0	0.58	957	0
Austria	306	17	5	0.54	182	2
Belgium	897	86	41	0.61	633	20
Canada	1,976	207	42	0.60	1,387	19
Czech Republic	53	10	0	0.42	32	0
Denmark	1,230	151	55	0.68	992	29
Finland	378	70	3	0.64	313	2
France	5,367	48	1,685	0.57	3,098	746
Germany	5,117	357	1,594	0.55	3,179	640
Greece	160	17	0	0.53	101	0
Hungary	84	0	0	0.11	9	0
Iceland	28	0	0	0.62	17	0
Ireland	545	87	0	0.69	463	0
Italy	861	71	361	0.49	491	141
Japan	9,454	183	7,514	0.55	5,386	2,905
Luxembourg	168	37	0	0.67	150	0
Netherlands	3,693	397	167	0.70	2,976	90
New Zealand	178	21	0	0.59	127	0
Norway	1,888	309	0	0.62	1,475	0
Other Donors	612	0	0	0.52	320	0
Poland	122	0	3	0.39	47	1
Portugal	206	7	7	0.70	151	4
Slovak Republic	25	0	0	0.37	9	0
South Korea	377	24	44	0.47	200	15
Spain	1,642	133	277	0.49	929	98
Sweden	2,260	295	0	0.66	1,775	0
Switzerland	988	169	11	0.63	789	5
Thailand	65	0	0	0.55	35	0
Turkey	477	116	0	0.39	301	0
United Kingdom	5,883	835	549	0.63	4,520	272
United States	15,615	2,820	1,192	0.40	9,049	370
AfDF	1,031	0	902	0.79	810	569
AsDF	1,488	0	672	0.53	795	262
CarDB	47	0	25	0.50	24	9
EBRD	11	0	0	0.59	7	0
EC	8,766	1,156	539	0.57	6,190	237
GEF	190	0	0	0.55	105	0
GFATM	1,252	0	0	0.61	761	0
IDA	8,039	0	2,934	0.65	5,265	1,474
IDB Sp.Fund	514	0	452	0.51	261	176
IFAD	348	0	161	0.63	218	76
Montreal Protocol	81	0	0	0.52	42	0
Nordic Dev.Fund	73	0	9	0.68	50	5
SAF+ESAF(IMF)	744	0	756	0.66	492	397
UNDP	437	0	0	0.58	255	0
UNFPA	388	0	0	0.53	207	0
UNHCR	289	0	0	0.50	143	0
UNICEF	740	0	0	0.57	419	0
UNRWA	600	0	0	0.42	253	0
UNTA	371	0	0	0.50	186	0
WFP	473	0	0	0.56	264	0
Japan-Sierra Leone	7	4	0	0.71	9	0

[1]From previous tables.

5. Penalizing 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.[15] 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

[15] 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.

Summary calculations at the donor level are in

. 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

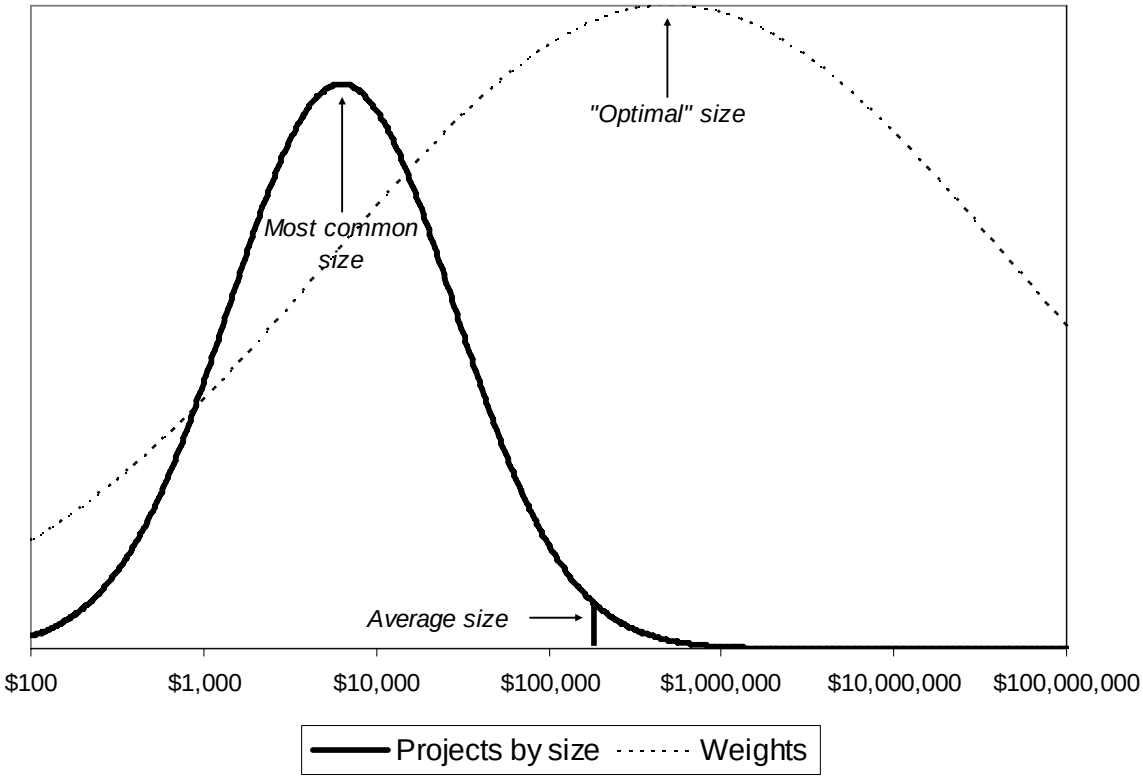


Figure 2. Average size weight in CDI versus average log aid activity commitment, 2003

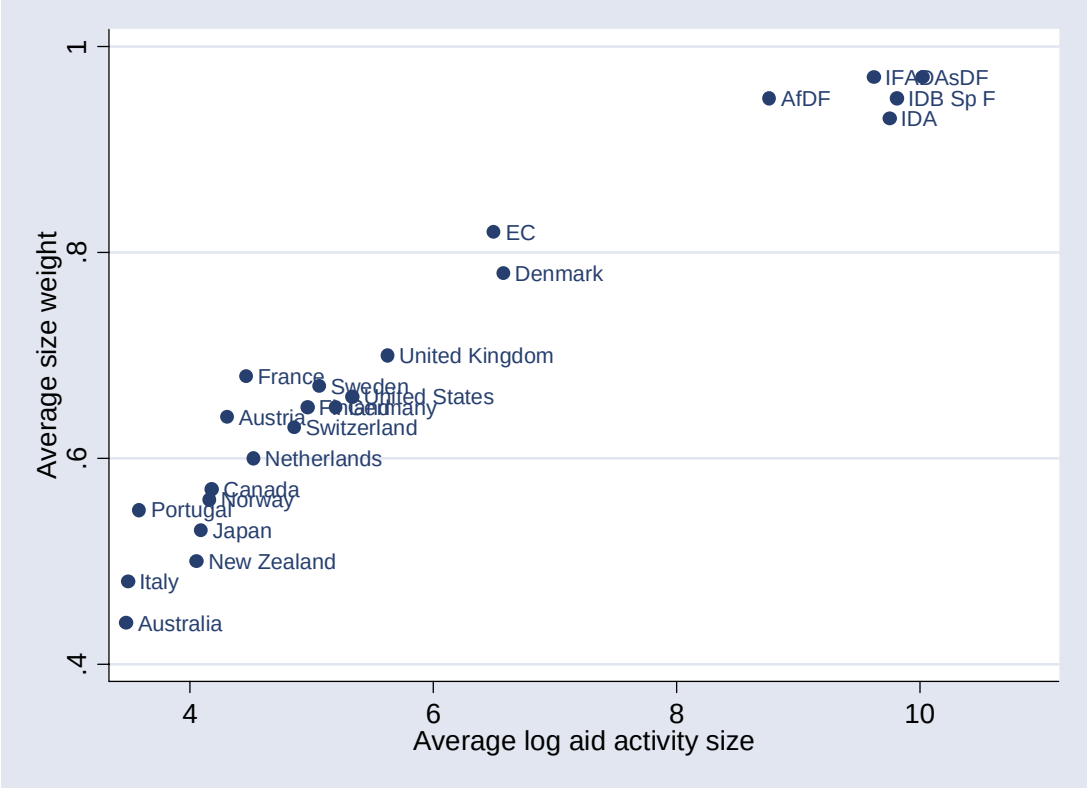


Table 7. Discounting for proliferation, 2006

Donor	A. Tying- and selectivity-discounted gross aid[1]	B. Selectivity-discounted reflows[1]	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	416	147	0.78	0.78	324	115	210
Arab Countries	1,343	214	0.71	0.71	948	151	797
Australia	957	0	0.54	0.71	513	0	513
Austria	182	3	0.56	0.75	102	2	100
Belgium	633	25	0.64	0.78	403	20	383
Canada	1,387	25	0.72	0.77	997	19	977
Czech Republic	32	0	0.77	0.77	25	0	25
Denmark	992	38	0.83	0.77	823	29	794
Finland	313	2	0.67	0.76	209	2	208
France	3,098	957	0.82	0.78	2,554	746	1,807
Germany	3,179	879	0.54	0.73	1,724	640	1,084
Greece	101	0	0.78	0.78	79	0	79
Hungary	9	0	0.83	0.83	8	0	8
Iceland	17	0	0.77	0.77	13	0	13
Ireland	463	0	0.79	0.79	367	0	367
Italy	491	176	0.55	0.80	271	141	131
Japan	5,386	4,135	0.59	0.70	3,156	2,905	252
Luxembourg	150	0	0.78	0.76	117	0	117
Netherlands	2,976	117	0.77	0.77	2,281	90	2,192
New Zealand	127	0	0.62	0.70	79	0	79
Norway	1,475	0	0.64	0.78	946	0	946
Other Donors	320	0	0.75	0.75	239	0	239
Poland	47	1	0.80	0.80	38	1	37
Portugal	151	5	0.58	0.76	88	4	85
Slovak Republic	9	0	0.79	0.79	7	0	7
South Korea	200	21	0.75	0.75	150	15	134
Spain	929	134	0.73	0.73	676	98	578
Sweden	1,775	0	0.74	0.78	1,310	0	1,310
Switzerland	789	7	0.57	0.77	449	5	444
Thailand	35	0	0.70	0.70	25	0	25
Turkey	301	0	0.76	0.76	230	0	230
United Kingdom	4,520	344	0.84	0.79	3,807	272	3,535
United States	9,049	475	0.74	0.78	6,687	370	6,316
AfDF	810	709	0.93	0.80	754	569	185
AsDF	795	359	0.95	0.73	759	262	498
CarDB	24	13	0.67	0.67	16	9	7
EBRD	7	0	0.80	0.80	5	0	5
EC	6,190	310	0.84	0.76	5,226	237	4,989
GEF	105	0	0.73	0.73	77	0	77
GFATM	761	0	0.92	0.78	702	0	702
IDA	5,265	1,922	0.91	0.77	4,782	1,474	3,308
IDB Sp.Fund	261	229	0.89	0.77	231	176	56
IFAD	218	101	0.93	0.75	204	76	128
Montreal Protocol	42	0	0.65	0.65	27	0	27
Nordic Dev.Fund	50	6	0.77	0.77	38	5	34
SAF+ESAF(IMF)	492	500	0.79	0.79	390	397	-7
UNDP	255	0	0.57	0.78	145	0	145
UNFPA	207	0	0.50	0.77	102	0	102
UNHCR	143	0	0.78	0.78	112	0	112
UNICEF	419	0	0.79	0.79	330	0	330
UNRWA	253	0	0.70	0.70	177	0	177
UNTA	186	0	0.76	0.76	141	0	141
WFP	264	0	0.77	0.77	204	0	204
Japan-Sierra Leone	9	0	0.61	0.76	6	0	6

[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.[16] 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

[16] 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.[17]

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.[18]

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.

[17] 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.

[18] 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 1995–2005. Total quality-adjusted aid/GNI of bilaterals declined somewhat over this period. The simple average was 0.21% in 1995 and 0.17% in 2006, and the correlation of 1995 and 2004 scores is 0.90.[19] (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, 2006

		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	1,844	1,519	325	1,844	513	153	666	719,553	**0.09**	36
Austria	759	334	420	754	100	192	292	319,586	**0.09**	39
Belgium	1,646	956	649	1,605	383	300	683	395,971	**0.17**	43
Canada	3,441	2,286	1,113	3,399	977	528	1,506	1,253,807	**0.12**	44
Denmark	2,185	1,342	788	2,130	794	323	1,117	280,148	**0.40**	52
Finland	849	455	391	846	208	171	379	210,778	**0.18**	45
France	8,308	3,799	2,824	6,623	1,807	1,314	3,121	2,266,600	**0.14**	47
Germany	9,159	4,021	3,544	7,565	1,084	1,660	2,744	2,930,802	**0.09**	36
Greece	436	189	247	436	79	118	197	245,109	**0.08**	45
Ireland	1,030	632	398	1,030	367	179	547	188,888	**0.29**	53
Italy	2,705	613	1,731	2,344	131	837	968	1,846,855	**0.05**	41
Japan	13,608	2,258	3,837	6,095	252	1,852	2,104	4,486,031	**0.05**	35
Netherlands	5,322	3,954	1,201	5,155	2,192	478	2,670	676,089	**0.39**	52
New Zealand	259	203	56	259	79	21	100	96,551	**0.10**	39
Norway	2,954	2,198	756	2,954	946	304	1,250	332,681	**0.38**	42
Portugal	412	210	194	404	85	89	174	187,162	**0.09**	43
South Korea	480	357	78	436	134	44	179	887,339	**0.02**	41
Spain	3,664	1,612	1,775	3,387	578	824	1,402	1,210,298	**0.12**	41
Sweden	3,681	2,560	1,121	3,681	1,310	459	1,769	385,922	**0.46**	48
Switzerland	1,555	1,156	388	1,544	444	155	599	421,081	**0.14**	39
United Kingdom	10,527	6,169	3,809	9,978	3,535	1,722	5,257	2,423,548	**0.22**	53
United States	22,727	19,155	2,380	21,535	6,316	1,128	7,444	13,259,900	**0.06**	35

[19] 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, 1995–2006

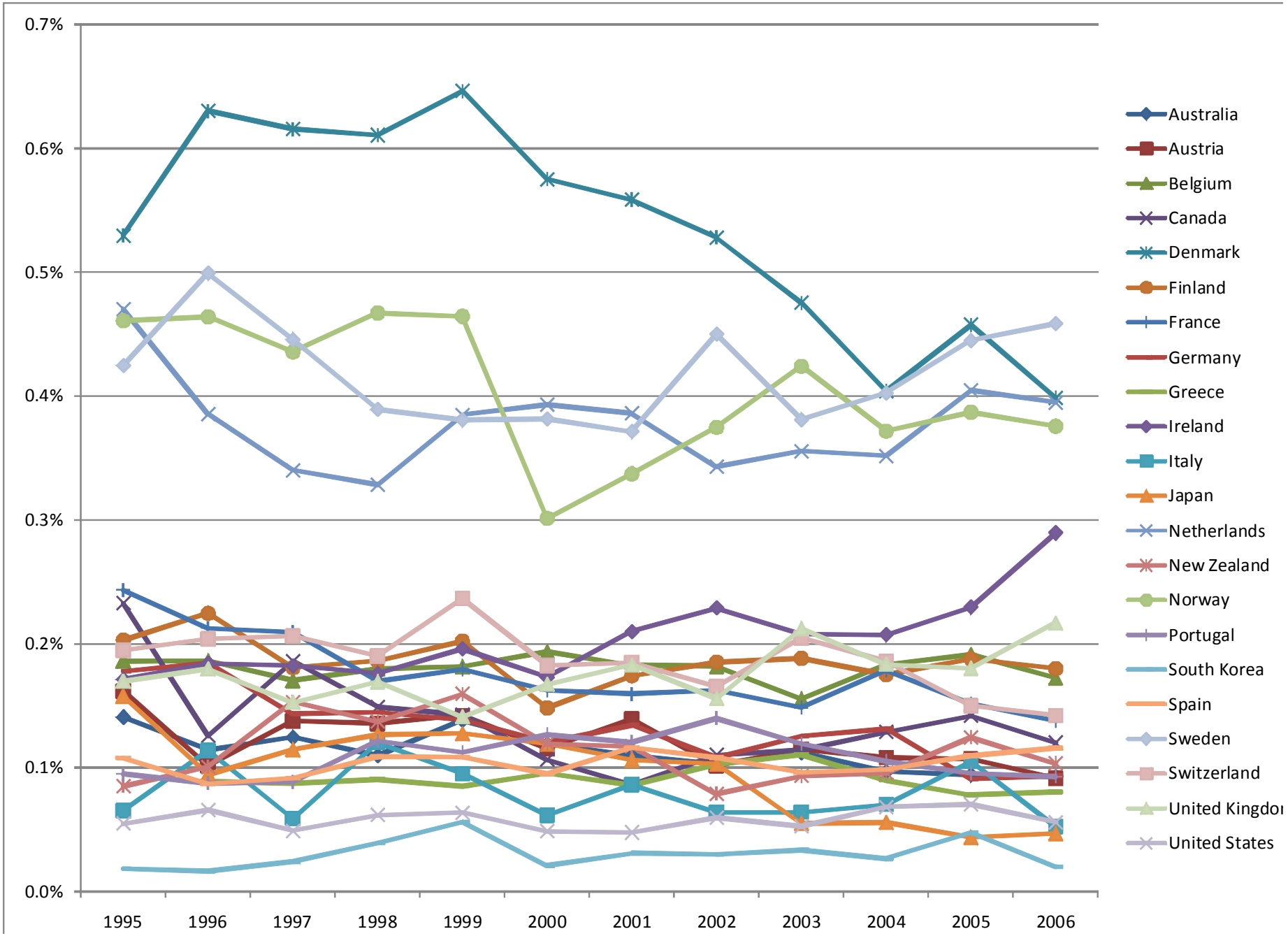
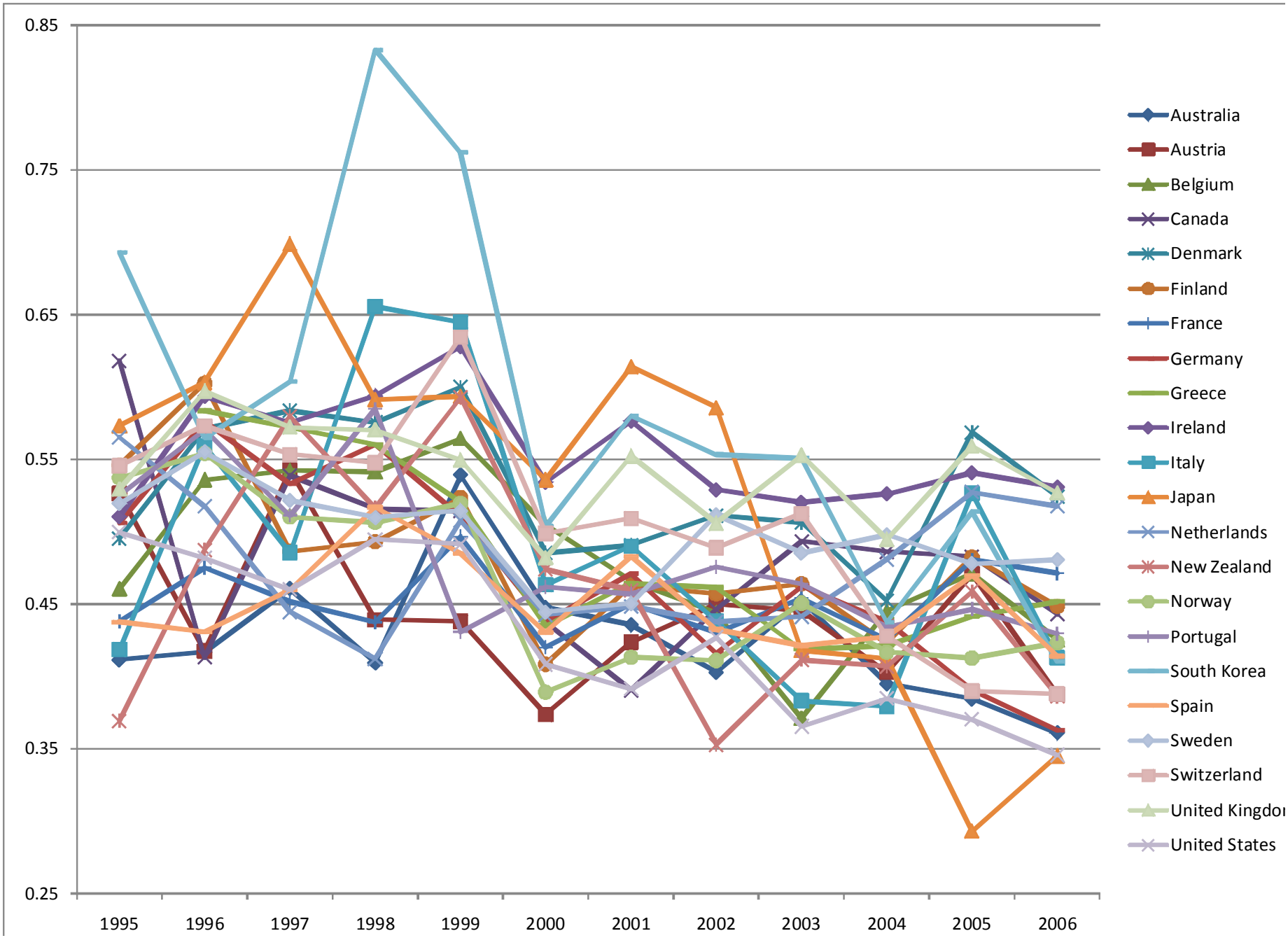


Figure 4. Quality-adjusted aid/net aid by bilateral donor, 1995–2006



8. Rewarding tax policies that support private giving[20]

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 29% tax credit, for example, reduces the price of giving by 29%. 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 2006, so deductibility of charitable giving in the United States is treated as reducing the price by 31.3%. The second

[20] Scott Standley contributed to this section.

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 33.6%, the above-threshold price incentive is the difference between this and the special tax rate, i.e., 23.6%. So the simple average of the below- and above-threshold rates for Greece is 28.6%. (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

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

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 28.2%. (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% – 28.2% = 71.8%, an increase of 71.8% / 48.1% – 100% = 49.3%.[21] As a result, the lower U.S. tax burden is estimated to multiply charity by

$$\left(\frac{1 - 0.282}{1 - 0.5199}\right)^{1.1} = 1.557, \text{ for a } 55.7\% \text{ increase.}$$

[21] 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.

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 contributions 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 × 1.557 = 1.88. Observed giving of $9.037 billion in 2006 happens to be 1.88 times $4.823 billion, so U.S. policy is credited for the difference, $4.214 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 2006.

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 $1.703 billion in quality-adjusted charitable giving attributed to fiscal policy. Added to the country's $7.444 billion in official quality-adjusted aid, this raises the final U.S. score on the aid index from 0.06% to 0.07% of GNI, leaving the country ahead of only South Korea and Japan.

Table 9. Computation of price incentive of tax policy, 2006

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	43.5	0.0	No	43.5	33.0	31.6	47.3%	96.0%	615	314	301
Austria	No	37.5	0.0	No	0.0	0.0	41.9	23.0%	23.0%	119	96	22
Belgium	Yes	45.1	0.0	No	45.1	35.0	44.8	16.3%	57.0%	251	160	91
Canada	No	35.4	29.0	No	29.0	18.7	33.4	43.1%	69.8%	1,100	648	452
Denmark	Yes	55.0	0.0	Yes	27.5	17.4	49.0	6.8%	25.4%	73	58	15
Finland	No	42.1	0.0	No	0.0	0.0	43.5	19.5%	19.5%	25	21	4
France	No	30.1	66.0	No	66.0	71.5	44.5	17.0%	100.7%	280	140	140
Germany	Yes	44.3	0.0	No	44.3	34.0	35.7	37.5%	84.3%	1,348	731	616
Greece	Yes	33.6	0.0	No	28.6	18.3	27.4	57.2%	86.1%	10	5	4
Ireland	Yes	42.0	0.0	No	42.0	31.3	31.7	47.0%	93.0%	339	175	163
Italy	No	36.4	19.0	No	19.0	11.1	42.7	21.2%	34.7%	123	91	32
Japan	Yes	23.8	0.0	No	23.8	14.6	25.3	62.3%	85.9%	315	170	146
Netherlands	Yes	52.0	0.0	No	52.0	44.3	39.5	28.7%	85.8%	277	149	128
New Zealand	No	39.0	33.3	No	33.3	22.5	36.5	35.7%	66.1%	48	29	19
Norway	Yes	37.0	0.0	Yes	18.5	10.8	43.6	19.1%	31.9%	452	342	109
Portugal	No	18.1	25.0	No	25.0	15.5	35.4	38.3%	59.6%	4	2	1
South Korea	Yes	17.3	0.0	No	17.3	10.0	26.8	58.8%	74.6%	101	58	43
Spain	No	37.0	25.0	No	25.0	15.5	36.7	35.2%	56.2%	133	85	48
Sweden	No	56.6	0.0	No	0.0	0.0	50.1	4.2%	4.2%	12	12	0
Switzerland	Yes	27.0	0.0	No	27.0	17.0	30.1	50.9%	76.6%	402	228	174
United Kingdom	Yes	40.0	20.0	No	40.0	29.1	37.4	33.6%	72.4%	543	315	228
United States	Yes	31.3	0.0	No	31.3	20.6	28.2	55.3%	87.4%	9,037	4,823	4,214

[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, 2006

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	666	301	122	**0.11**
Austria	292	22	9	**0.09**
Belgium	683	91	37	**0.18**
Canada	1,506	452	183	**0.13**
Denmark	1,117	15	6	**0.40**
Finland	379	4	2	**0.18**
France	3,121	140	57	**0.14**
Germany	2,744	616	249	**0.10**
Greece	197	4	2	**0.08**
Ireland	547	163	66	**0.32**
Italy	968	32	13	**0.05**
Japan	2,104	146	59	**0.05**
Netherlands	2,670	128	52	**0.40**
New Zealand	100	19	8	**0.11**
Norway	1,250	109	44	**0.39**
Portugal	174	1	1	**0.09**
South Korea	179	43	17	**0.02**
Spain	1,402	48	19	**0.12**
Sweden	1,769	0	0	**0.46**
Switzerland	599	174	70	**0.16**
United Kingdom	5,257	228	92	**0.22**
United States	7,444	4,214	1,703	**0.07**

[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.[22] 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

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

[22] 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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