The Commitment to Development Index: 2010 Edition

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Contents

Tables and figures

Introduction

In 2003, the Center for Global Development introduced the Commitment to Development Index (Birdsall and Roodman 2003; CGD and *FP* 2003).[1] The immediate purpose was and is to rate rich countries based on how much their government policies facilitate development in poorer countries. But "ranking the rich" is a means to other ends: to draw media attention to the many ways that rich-country governments affect development, to provoke debate on which policies matter and how to measure them, to highlight gaps in current knowledge, to stimulate data collection and other research, to educate the public and policymakers, and, ultimately, to prod policy reform.

The CDI has once more been revised and updated, though the revisions to the formulas that are the heart of the CDI are minor this year.

The CDI embodies intellectual contributions from collaborators over the last few years, including Theodore Moran of the Georgetown University School of Foreign Service (on investment); Kimberly Hamilton, Elizabeth Grieco, and Jeanne Batalova of the Migration Policy Institute (migration); B. Lindsay Lowell and Valerie Edwards Carro of Georgetown University (also migration); Michael O'Hanlon and Adriana Lins de Albuquerque of the Brookings Institution (security); Jason Alderwick and Mark Stoker of the International Institute for Strategic Studies (also security); Amy Cassara and Daniel Prager of the World Resources Institute (environment); and Keith Maskus of the University of Colorado at Boulder (technology). As always, the final design departs in places from the recommendations of background paper authors. Ultimate responsibility for it rests solely with CGD.

One thing that has not changed is the conceptual framework of the CDI. It still ranks a relative handful of rich countries: all the members of the Development Assistance Committee (DAC) save Luxembourg, plus South Korea whose DAC membership seems imminent. The policy domains are aid, trade, investment, migration, environment, security, and technology. A country's overall score is the average of its seven component scores. The CDI aims to assess policies *today*. In practice, because of lags in official data, most information used for 2009 is from 2007. And the CDI rates countries in ways that allow normative comparisons, which usually means adjusting for size. Denmark cannot be expected to give as much foreign aid as Japan, which has an economy 25 times as big, but Japan could be asked to give as much as Denmark as a share of its gross domestic product, and that is how the index gauges aid quantity. Switzerland cannot be expect to import as much from developing countries as the Unite States, but it could have trade barriers as low, which is what the trade component looks for.

This paper describes the latest CDI methodology. Section Scaling and weighting confronts some overarching design issues having to do with scaling and weighting of scores. Section The Seven Components reviews the index component by component. It focuses on what we now call the "global" CDI—the original version that applies to all poor countries rather than a specific region—and builds on background research done for each of the seven policy areas (Roodman 2007, 2007b; Cline 2004; Moran 2007; Grieco and Hamilton 2004; Lowell and Carro 2006; O'Hanlon and de Albuquerque 2003; Maskus 2005; Cassara and Prager 2005), while making explicit where the final CDI departs from their recommendations. Section Overall results presents the overall results for the global CDI, back-calculates the current methodology to 2003, and analyzes the sensitivity to changes in component weights. Section 4 overviews the production of the *regional* CDIs, which measure the constructive engagement of individual rich countries with parts of the developing world such as sub-Saharan Africa. Most of the calculations described in the global and regional CDIs are embedded in spreadsheets. These and the component background papers are available at cgdev.org/cdi.

[1] The Commitment to Development Index is a collective effort. I am grateful to the collaborators for technical work on components; to Paolo Abarcar, Cindy Prieto, and Julie Walz for superlative assistance; to CGD President Nancy Birdsall for guidance, to the Rockefeller Foundation for its support; and likewise to the nine governments that currently in the CDI Consortium: those of Australia, Canada, Finland, France, Germany, the Netherlands, Norway, Sweden, and the United Kingdom.

1. Scaling and weighting

The CDI combines readings on dozens of indicators. Since the indicators are not perfectly correlated, countries' standings on the final results are affected by the relative importance the formulas give to the various indicators. In mathematical terms, the results are affected by choices of both functional form and parameters. Both the CDI designers and commentators have naturally asked whether the CDI makes the best choices.

In some parts of the CDI, the way in which indicators are combined is grounded in a clear conceptual framework and calibrated to available evidence. For example, the aid component combines donors' aid-giving totals with information on the extent to which they tie their aid (requiring recipients to spend it on donor-country goods and services) by referring to a finding that tying raises project costs 15–30%. Tied aid is discounted 20% (I detail the rationale below), and the result is a figure, tying-discounted aid, that still has real-world meaning. Other examples are the theory-grounded method used to express agricultural subsidies in tariff-equivalent terms, which allows them to be combined with actual tariffs; and the reasonable but coarse assumption that the marginal cost of deploying personnel in international security operations is $10,000/month/person, which allows personnel and financial contributions to such operations to be combined in dollar terms. All these techniques use theory and evidence to reduce arbitrariness in the CDI design.

But where theory and evidence are thinner, we have not found such solid ways to reduce arbitrariness. When we needed to combine indicators in a sort of conceptual vacuum, we restricted ourselves to taking linear combinations, as a first step toward managing the complexity. This happened in all components but the aid component, and in each of these cases the CDI designers chose to weight some indicators more than others. The weights are open to challenge, but are backed by years of experience in the relevant fields.

At the top level of the CDI hierarchy, however, where the seven CDI components merge into a single index, the components are equally weighted. Because of the prominence of this choice and its potential importance for the final results (section Overall results quantifies its importance), this decision has provoked many challenges. I focus on it for the rest of the section.

Intuitively, taking linear combinations happens in two steps: mapping each variable to be combined onto a standard scale, which may involve scaling and translation (shifting up or down); then taking a weighted average. Both steps—standardizing and weighting—raise tough conceptual questions. Consider the challenges of standardizing first. To prepare the scores on the seven CDI components combination into an overall score, the standardizing system should arguably have the following properties:

1. Standardized scores should fall within some intuitive scale, say 0–10.

2. For components that measure "goods" (aid, investment, migration, security, and technology), zero should map to zero. That is, if a country gives no aid (more precisely, if its aid program is deemed valueless after adjusting for quality), its final aid score should be 0—not –2 or +2. For components that measure "bads" (environment and trade, which mainly assess environmental harm and trade barriers) a perfect absence of the thing assessed should translate into an intuitive maximum score, such as 10.

   All this is nearly equivalent to requiring that the coefficient of variation (standard deviation divided by the mean) be preserved. For the "good" components, it also means that the transformation should be a simple rescaling, with no translation.

3. The standardized averages on each component, at least in some base year, should be the same—say, 5. Then one can immediately tell by looking at a country's aid, environment, or other score whether it is above or below the base-year average. And one can tell whether a country's score in one component is better than its score in another by the standards of its peers. The first edition's scoring system did not have this property. The average trade score (6.4) was twice the average aid score (3.2).

As a result, when Switzerland scored 4.0 on trade and 3.3 on aid, it appeared to a lay reader to be better on trade than aid when in fact it was below average on trade and above average on aid.

4. The variance of standardized scores should be the same for each component—as they would be if they were *z* scores (number of standard deviations from the mean) from a normal distribution. In other words, countries should be "graded on a curve" for each component. If they are not—if, instead, standardized scores on one component are relatively clustered—this effectively under-weights that component because differences between countries on the component will have relatively little effect on the overall results.

Since we have restricted ourselves to linear transformations, two free parameters—slope and intercept—determine how the results from each component are standardized. With seven components, that yields 14 degrees of freedom. The above constraints together would consume far more than 14 degrees of freedom. The first imposes what we can call 14 inequalities[2], and the other three impose 6 equalities each, for a total of 18. Thus only by luck could all four conditions be satisfied. If one drops the requirement that standard deviations are equal, there is more hope (12 equalities and 14 inequalities imposed on 14 parameters), but it still would take luck.

Luck has not been with the CDI designers. As a result, we have faced trade-offs, trade-offs that are tricky because they involve mathematical principles, our (limited) understanding of rich world-poor world linkages, and the imperatives of effective mass communication. For example, in the index's first year, standardized investment scores averaged 3.0. Forcing those scores to average 5 instead might have required adding 2 to every country's standardized investment score, which would have raised Portugal to 11 and given a "no investment support" country 2 points out of 10. Or it could have required multiplying all the scores by 5/3, which would have raised Portugal to 15. Thus, enforcing condition 3 would have led to violations of condition 1 and perhaps 2.

The current system, adopted in 2004, gives up on condition 1 in favor of condition 3. Scores on each component now average 5 in the base year by fiat; as a result, so do the overall CDI scores. But the boundaries of 0 and 10 are no longer inviolable. Countries whose aid programs, say, are deemed more than twice as good as average score above 10. And countries with trade barriers or rates of environmental harm more than twice the average score below 0. In fact, in 2006, just one of the 147 component scores is negative; and one more exceeds 10. These few transgression of the intuitive range seem worth the greater ease of comparison within and across components. For example, Switzerland now scores higher on aid than trade—4.8 versus 3.1—which makes more sense for a country that is near the average of its peers on aid and well below it on trade. The parameters of the standardization transformations are calibrated to the benchmark year of 2008 and then held constant over time to allow inter-temporal comparisons of scores.[3] Thus in subsequent years, average scores are not precisely 5. This allows proper comparison over time.

An astute reader will have noticed in the discussion of condition 4, which demands equal standard deviations, that *weighting* crept into the discussion of *scaling*. Using a linear transformation to double the range or standard deviation of a component has exactly the same effect on overall standings as doubling its weight.

Nevertheless, for the lay reader, weighting is a distinct concept, and raises distinct concerns. Indeed, one criticisms of the CDI is that it is "equal weighted," even though some policy domains, it is argued, may very well matter more than others (Picciotto 2003; Chowdhury and Squire 2003; Sawada and Ikegami 2004). The

[2] Technically the first condition imposes 21×7×2=294 inequalities: each country's score on each component should be ≥0 and ≤10. The "14 inequalities" apply to the maximum and minimum scores on each component.

[3] Previously, the benchmark was 2003, the CDI's first year. As explained in section 3, the introduction of regional CDI's occasioned the switch to 2008.

accusation of equal weighting is true in that a country's overall CDI score is the simple average of its component scores.

Before examining the criticism, it is worth noting that "equal weighting" is a not a well-defined concept. We can only speak of equal weighting in a meaningful way if we know how to compare the things being weighted. Is a one-point gain on the aid component better or worse for developing countries than a one-point gain on trade? If we cannot answer this question, then we cannot determine whether aid is under-, over-, or equally weighted compared to trade. Consider that allowing trade scores to range more widely in 2004 happened to increase the effective weight on trade. Yet the CDI was still "equal weighted." Under which system is trade really "equal weighted"? Both, and neither. There are several reasonable ways to scale scores—characterized in part by which of the above conditions are enforced—thus several possible rankings resulting from "equal weighting." So in choosing "equal weighting" for the CDI, we are not claiming to truly give aid, trade, etc., equal weight. No one knows how to do that. Rather, we have opted for what seems least arbitrary in the face of uncertainty.

Still, the attacks on "equal weighting" are accurate in the sense that the CDI lacks the following property: *any two CDI-measured policy changes in a given country that have an equal effect on development have an equal effect on the CDI.* We have not striven for that ideal, out of several considerations. First, achieving it does not seem essential for the CDI as a communications strategy and a goad to research, and such are the ultimate goals of the project, not scientific measurement. The CDI broadcasts the basic message that many policy areas matter and that all countries have major room for improvement as is. The success of the project so far in spotlighting issues and providing a conceptual framework for governments is reassuring.

Second, a survey of expert opinion suggests that "equal weighting" is not unreasonable. Shyamal Chowdhury and Lyn Squire (2003) surveyed members of the Global Development Network, who are researchers in both rich and poor countries working on development issues. Of the 200 solicited respondents in the stratified random sample, 105 completed the questionnaire. They were asked to assign their own weights to each of the major issue areas then in the CDI.[4] For four of the six components covered by their survey, the mean weight was statistically different from the "equal weight" of one-sixth.[5] Trade and investment were weighted high (with weights of 0.20 and 0.19 respectively) and aid and migration were low (0.14 and 0.13). However the significance of these weight differences for the index results—as distinct from their statistical significance—is small. There was no consensus for anything as extreme as, say, aid and trade alone getting two-thirds of the total weight. As a result, Chowdury and Squire find that reweighting the 2003 CDI using their survey results produces overall scores that are correlated 0.98 with the original, and rank-correlated 0.99. On balance, the study corroborates my own experience. Of the seven current CDI policy areas, all but one has been nominated to me for extra weight by someone with a decade or more of experience in development.[6] Finally, the study and the experts surveyed do not appear to take on board the point just made that the conceptual foundation for discussing weighting is has more the consistency of mud than concrete.

There are other reasons to be cautious about departing from "equal weighting." One phrase in the ideal property enunciated above, "equal effect on development," is, like "equal weighting," not well defined. Different policies have different effects on people in different times and places. Moral and philosophical conundrums arise about how one should compare effects on people with different levels of poverty and opportunities; about

[4] The survey was based on the first draft of the first edition of the CDI, in which anti-corruption was a separate, seventh component rather than being folded in to investment as it eventually was. On the other hand, after the survey, the CDI gained a seventh component, on technology.

[5] This contradicts my characterization of their work last year, which reflects improvements in their own analysis in successive drafts of this paper.

[6] The exception is environment—and that is probably only because hardly any environmental experts have commented. Surely it can be argued that tinkering with the planet's biogeochemical cycles is an issue of the first rank.

which discount rate to use; and about whether development is a something that happens to people or countries.[7] Huge uncertainties also loom about the actual long-term effects of trade barriers, greenhouse gas policies, government R&D spending, humanitarian interventions, migration, etc.

Finally, it cannot be assumed that the proper mathematical form for combining the components into an overall score is linear. Especially for large donor nations, the policy areas may interact significantly. For example, Thomas Hertel, when head of the Global Trade Analysis Project at Purdue University, called for simultaneous computable general equilibrium modeling of trade and migration.[8] To the extent policy areas interact, there can be no right weights in a linear framework.

It may still be possible in light of current knowledge, or especially with more research, to stick with the linear approach and yet find unequal weights that would command a broader consensus than equal weighting does. One starting point might be estimates of global dollar flows of aid, trade, investment, remittances, and so on. Greenhouse gases could be converted to the same dollar units via a fixed rate per ton, based on estimates of the harm climate change could do to developing country economies. Picciotto (2003) suggests an approach along these lines.[9]

But from the point of view of the CDI, flows are merely intermediaries between rich-country policies on the one hand and poor-country development on the other, and it is the linkages between these variables that should determine ideal weights. In some areas, these relationships are reasonably well understood. For example, several studies have estimated the economic effects of rich-country trade policies on poor-country development. (e.g., World Bank 2001; Cline 2004) Cline estimates that complete rich-country liberalization would, after a 15-year adjustment, increase income in developing countries by $100 billion per year, which is approximately twice current aid flows. Similar work is now being done on migration liberalization. CGE modeling by Walmsley and Winters (2003) suggests that an if rich countries increased their temporary migrant worker stocks by an amount equal to just 3% of their labor forces, global income would increase $150 billion, with most of that accruing to the temporary workers themselves. Complete liberalization could generate vastly larger gains for temporary workers.[10]

The trouble with unequal weighting is that one cannot do it halfway. As soon as one, say, doubles trade's weight relative to aid, one needs equally sound rationales for the choice of weights for every other component. The links between policy and development in other policy domains are more uncertain or controversial. There is little evidence on how investment-relevant policies in rich countries affect developing countries. And it is far from clear how to weigh in security interventions and rich-country public R&D investment.

Thus we have stood by the humble choice of "equal weights." We hope that the CDI will increasingly spur research to speed the day when unequal weighting will be more defensible. Meantime, "equal weighting" serves.

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[7] This last distinction is important for migration. If someone moves permanently from a poor to a rich country, quadruples her income, and sends back no remittances, is that development?

[8] Private communication between Thomas Hertel and Michael Clemens, CGD, October 2002.

[9] But for trade, Picciotto suggests using estimates of the benefits, in producer surpluses, of complete rich-country liberalization rather than current earnings on exports from developing to developed countries. This is not parallel to current total aid, remittance, or investment flows.

[10] This does not automatically imply, however, that the migration component is currently underweighted relative to, say, trade. On the current scale, conceivably, a country that completely liberalized temporary migration might earn a score of 50 or 100—a score so high that it might actually exaggerate the benefits of migration. In other words, it is possible with the current scaling that a 1-point increase in trade score still corresponds to more benefit than a 1-point increase on migration.

2. The Seven Components

Aid

The aid component of Roodman (2010) starts with a measure of aid quantity, then discounts it to reflect several quality concerns, namely, tying, selectivity, and project proliferation. And it factors in private charitable giving to developing countries to the extent this can be credited to government fiscal policy. The component is built largely on data from the Development Assistance Committee (DAC).

As summarized in Table 2, the calculations run as follows:

- The starting point is gross disbursements of grants and concessional (low-interest) loans for each donor (bilateral or multilateral) and recipient. The data are the latest available, for 2007.[11] Included here is what DAC terms Official Development Assistance (ODA). Unlike in standard DAC accounting, cancellation of old, non-concessional loans ("Other Official Finance" or "OOF" loans) is not considered current aid, however necessary. OOF loans tend to be less motivated by development concerns than ODA (they include export credits and subsidized loans for arms sales). And to the extent that cancellation is associated with transfers of funds, the transfers have typically occurred long ago, and are not primarily a credit to current policy. If a Reagan Administration export credit to Iraq went bad in the early 1990s, and was finally written off in 2005, is the cancellation a transfer of funds in 2005? In fact, Iraq did receive more than $21 billion in gross ODA in 2005 according to DAC accounting, but some $13.9 billion of this resulted from a Paris Club agreement to write off the old debts that seemed largely uncollectible and worthless. Policy action was taken in 2005, but as an aid flow it was little more than a change in accounting.

- Tied aid is discounted 20%. Studies suggest that tying raises aid project costs 15–30% (Jepma 1991), which translates into a reduction in aid *value* of 13–23%.[12] 20% is a round figure toward the top of this range. "Partially untied"[13] aid is discounted 10%. The tying figures come from project-level data in DAC's Creditor Reporting System database. Since tying data are for aid commitments rather than disbursements, rates of tying are assumed to be the same for commitments and disbursements.

- Principal and interest payments are netted out, to more closely reflect net transfers to recipients. DAC's standard "net ODA" statistic is net of principal payments only. The DAC approach reflects the influence of the traditional capital flow concept. Only return of capital is netted out of net foreign direct investment (FDI), not repatriation of earnings. Similarly, only amortization is netted out of standard net ODA, not interest, which can be seen as the donors' "earnings" on aid investment. I find the capital flow concept inapt. When the government of Ghana writes a check to the government of Japan for $1 million, it should hardly matter for either whether the check says "interest" or "principal" in the memo field. It seems unlikely that interest and principal payments have different effects on Ghana's development investments. For this reason, the CDI treats debt service uniformly.

- For each donor-recipient pair, the tying-discounted net transfer is multiplied by a "selectivity weight" that is meant to reflect the recipient's appropriateness for aid, the idea being that the poorer and better-governed it is, the more appropriate it is for aid. The selectivity weight is the

[11] Preliminary 2007 data available from the DAC at this writing are too incomplete for use in this year's CDI.

[12] A 15-percent cost increase lowers the purchasing power of aid by 1–1/1.15 = 13%. Similarly, a 30% cost increase cuts aid value 23%.

[13] Aid that must be spent on goods and services from the donor nation *or* developing countries; or aid that must be spent on goods and services from developing countries only.

product of two factors. The first is linearly related to the country's Kaufmann-Kraay composite governance score, which captures information on six aspects of governance: voice and accountability, political stability, government efficiency, regulatory quality, rule of law, and control of corruption. The Kaufmann-Kraay composite score, like the CDI, is a simple average of scores for each of these components (Kaufmann, Kraay, and Mastruzzi 2008). Afghanistan, the country with the lowest governance score in 2000, defines the bottom of that range, getting a 0 in 2000. Singapore anchors the top for 2000, with a weight of 1.0. (The reference year for the aid component is 2001, the data year for the first CDI, published in 2003. Because the KK scores are not available for 2001, 2000 figures are used here. And because both countries' governance scores have changed since 2000, neither gets exactly a 0 or 1 for later years.)

The second selectivity multiplier reflects the country's poverty. It is linearly related to the country's log GDP/capita, with Singapore (GDP/capita of $21,869 on an exchange rate basis in 2001), getting a 0 for 2001, and Democratic Republic of Congo, the poorest country with data (GDP/capita of just $81 in 2001), getting a 2.21. The latter number was chosen so that the maximum combined selectivity factor (poverty factor × governance factor) for any country in the reference year of 2001 is 1.0 (for Ghana). Table 1 shows the resulting weights for the current CDI edition.

There are two exceptions to this discounting. First, emergency aid is exempted from both poverty and selectivity discounting, to acknowledge in a way that is practical given the available data that some forms of aid may be more valuable in countries with the worst governance and average incomes well above bare subsistence. Second, aid that is meant to improve governance, broadly defined, is exempted from the governance discount.[14] Since it is arguably perverse to penalize donors for trying to improve governance where it is low, this sort of aid receives a uniform governance discount of 50%—compared to the roughly 75% discount it would otherwise get in, say, Afghanistan. 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).[15]

- For each donor-recipient pair, selectivity-weighted aid is multiplied by a final factor that reflects concerns about the problem of project proliferation. Project proliferation is thought to overburden recipient governments with administrative and reporting responsibilities, and lure the most talented workers out of government and into the employ of the donors, thus undermining the effectiveness of aid projects, and government administration in general. (Cassen 1994; Brown et al. 2001; Roodman 2006a, 2006b; Knack and Rahman 2007).

  The idea of the adjustment is to weight the aid going to each aid activity based on the size of the dollar commitment of which it is part. Roodman (2009) provides the details. The approach is theoretically capable of penalizing large projects, especially in poorly governed countries that arguably should not, roughly speaking, be given carte blanche (Radelet 2004). But because certain parameter choices for the CDI intentionally bias the results in favor of large projects, few large projects are actually discounted much. As a result, there is a strong correlation between a donor's average log project size across all recipients and its average discount for project proliferation in the CDI. (See Figure 1.) For example, the World Bank's concessional lending arm, the International Development Association (IDA), disburses in large chunks compared to other do-

[14] I thank Terry O'Brien for comments that led to this change in 2006.
[15] The full CRS purpose classification is at http://www.oecd.org/dataoecd/40/23/34384375.doc.

nors in countries where it operates, so its size weight is 0.93, meaning only a 7% discount, for minimal project proliferation. Table 2 shows the overall size weight for each donor.

- For each bilateral and multilateral donor, the resulting tying-, selectivity-, and size-weighted aid figures are summed across recipients to obtain a single figure for each donor, whether bilateral or multilateral. (Shown in Table 2.)

- The result is a "quality-adjusted aid quantity" for each bilateral and multilateral donor. The quality-adjusted aid totals of multilaterals are then allocated back to bilaterals in proportion to the bilaterals' net contributions to the multilaterals during the year in question. 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 European Commission), it receives credit for 8.23% of the UNDP's quality-adjusted aid of $153 million, or $12.6 million.

The final performance measure for government aid is bilaterals' total quality-adjusted aid as a share of GDP. (See Table 4.)

The aid component also rewards policies that encourage private charitable giving to development organizations. Private giving is encouraged by specific tax incentives that lower the "price" of giving. And it is encouraged by a low tax/GDP ratio, which leaves citizens and corporations with more after-tax income to spend on charitable giving. The approach taken in the CDI is to estimate the proportional increase in giving caused by each country's fiscal policies, compare that to actual giving, then work backwards to estimate how much actual giving is a credit to policy. (See Table 3.) Specifically:

- An estimate is made of the increase in charitable giving to developing countries brought about by tax incentives for charity. The CDI distinguishes between deductions and credits, and takes account of limits on the amount of giving that can earn the tax incentive. Thirteen CDI countries offer income tax deductions for charitable giving, including overseas giving. Of the remaining nine, six—Austria, Canada, France, Italy, New Zealand, Portugal, and Spain—offer tax credits instead, while two—Finland and Sweden—offer no incentive. Drawing on results of a survey of all CDI countries (see Roodman and Standley 2006), we estimate the "price" of giving in each country. For example, in France, which offers a 66% tax credit, the price of giving for the giver is 34 cents on the euro. For deductions, the price is based on a representative marginal tax rate, namely the marginal income tax rate faced by single individuals at 167% of the income level of the average production worker. For countries that cap deductions or credits, we use the simple average of the below- and above-cap prices. Based on a survey of the academic literature, we set the price elasticity of charitable giving at –0.5. In the United States, where the representative marginal tax rate is 31.3% for 2006, the data year for 2008 CDI aid component, this implies that income tax incentives increase charitable giving by 20.6%.[16]

- An estimate is also made of how much having lower taxes increases giving. The benchmark against which "lowness" is measured is Sweden's tax revenue/GDP ratio of 51.9% in 2001 (the reference year), the highest among the CDI countries. The United States, to continue the example, is treated as having reduced its total tax take from this 51.9% to the actual 28.3% in 2007. This raises the privately claimed share of GDP from 48.1% to 71.7%, an increase of 49.0% relative to the benchmark.[17] Again drawing on the literature, we take the income elasticity of giving

[16] The calculation is $(1 - 0.313)^{-0.5} - 1 = 0.206$.

[17] 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.

to be 1.1: charitable giving increases somewhat more than proportionally with private income. As a result, the lower U.S. tax ratio is estimated to raise charity 55.1%.[18]

- The price and income effects are then combined. For the United States in 2007, the 20.6% and 55.1% increases compound to a 87.0% increase.[19]

- DAC data on actual private giving to developing countries is then used to estimate what giving would have been in the absence of these policies, thus what credit should be given to the policies. This statistic counts all giving by individuals and foundations to non-DAC countries but leaves out government aid that is channeled through NGOs. In the U.S. case, charitable giving is reported at $12.161 billion for 2007. The CDI estimates that this would have been $6.502 billion before the policy-induced 87.0% increase, and attributes the $5.659 billion difference to public policy.

- The policy-induced increases in charitable giving are then discounted for quality so that they can be compared and added to the quality-adjusted official aid quantities. Private giving too can go to countries that are more or less appropriate for aid, and can contribute to the problems of project proliferation, for example by siphoning off talented administrators from government service. As a rough adjustment, the CDI discounts policy-induced private giving by the simple average of the quality discounts for bilaterals' own aid programs, which is 60%. To complete the U.S. example, we credit the country for $5.659 billion × (1 – 60%) = $2.260 billion in quality-adjusted aid. Added to its $9.262 billion in official quality-adjusted aid, this raises its CDI aid score to 2.3, from what would be 1.9 were charitable contributions not considered.

This analysis suggests that conventional aid programs are still the dominant government-induced aid channel developing countries. On the other hand, the $11.5 billion in policy-induced charitable giving across all donors is on a par with transfers from France, Germany, or the United Kingdom. Were this giving a country in some sense, it would be one of the world's largest donors.

Overall, despite the quality adjustments and the incorporation of private giving, what most distinguishes donors from each other in the CDI is still the quantity of official aid they disburse. Denmark, the Netherlands, Norway, Sweden are large donors by DAC's quantity measure (net ODA), and they score highest on the CDI aid measure too.

[18] The calculation is $((1 - 0.283)/(1 - 0.519))^{1.1} - 1 = 0.551$.]

[19] $(1+0.206)\times(1+0.551)-1=0.870$.

Table 1. Computation of selectivity weights, 2008

Country name	A. Exchange rate GDP/capita, 2008 ($)	B. Log exchange rate GDP/capita	C. GDP selectivity multiplier	D. Kaufmann-Kraay composite governance score, 2008	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	329	5.80	1.56	0.06	0.61	0.95
Malawi	158	5.06	1.77	–0.34	0.50	0.89
Benin	360	5.89	1.54	–0.21	0.54	0.83
Mali	295	5.69	1.59	–0.31	0.51	0.81
Madagascar	272	5.61	1.62	–0.34	0.50	0.81
Burkina Faso	263	5.57	1.63	–0.36	0.50	0.81
Cape Verde	1,576	7.36	1.11	0.52	0.73	0.81
Kiribati	826	6.72	1.30	0.12	0.62	0.81
Mozambique	357	5.88	1.54	–0.30	0.51	0.79
Tanzania	373	5.92	1.53	–0.29	0.52	0.79
Zambia	387	5.96	1.51	–0.30	0.51	0.78
Lesotho	517	6.25	1.43	–0.20	0.54	0.77
Vanuatu	1,339	7.20	1.16	0.26	0.66	0.77
Rwanda	313	5.75	1.58	–0.42	0.48	0.76
Senegal	536	6.28	1.42	–0.25	0.53	0.75
India	718	6.58	1.34	–0.17	0.55	0.73
Bhutan	1,247	7.13	1.18	0.08	0.62	0.72
Niger	180	5.19	1.74	–0.68	0.41	0.72
Gambia	374	5.93	1.52	–0.51	0.46	0.70
Mongolia	735	6.60	1.33	–0.26	0.53	0.70
Uganda	348	5.85	1.55	–0.54	0.45	0.70
Namibia	2,714	7.91	0.95	0.49	0.72	0.69
St. Vincent and the Grenadines	4,313	8.37	0.82	0.82	0.81	0.66
Moldova	588	6.38	1.39	–0.45	0.47	0.66
Micronesia, Fed. Sts.	2,035	7.62	1.04	0.15	0.63	0.66
Chile	6,212	8.73	0.71	1.15	0.90	0.64
Georgia	1,268	7.15	1.17	–0.18	0.55	0.64
Bulgaria	2,570	7.85	0.97	0.26	0.66	0.64
St. Lucia	4,978	8.51	0.78	0.86	0.82	0.64
Dominica	4,359	8.38	0.82	0.71	0.78	0.64
Sierra Leone	261	5.57	1.63	–0.77	0.39	0.64
Botswana	4,497	8.41	0.81	0.72	0.78	0.63
Mauritius	4,813	8.48	0.79	0.78	0.80	0.63
Vietnam	647	6.47	1.37	–0.56	0.45	0.61
Kenya	453	6.12	1.47	–0.68	0.41	0.61
Liberia	148	5.00	1.79	–0.96	0.34	0.61
South Africa	3,764	8.23	0.86	0.41	0.70	0.60
Marshall Islands	2,240	7.71	1.01	0.01	0.60	0.60
Jordan	2,476	7.81	0.98	0.08	0.61	0.60
Romania	2,845	7.95	0.94	0.18	0.64	0.60
Armenia	1,520	7.33	1.12	–0.22	0.54	0.60
Guyana	1,104	7.01	1.21	–0.38	0.49	0.60
Ethiopia	190	5.25	1.72	–0.94	0.35	0.59
Estonia	7,048	8.86	0.68	1.04	0.87	0.59
Nepal	254	5.54	1.64	–0.89	0.36	0.59
Ukraine	1,156	7.05	1.20	–0.39	0.49	0.59
Kyrgyz Republic	376	5.93	1.52	–0.79	0.38	0.58
Albania	1,799	7.50	1.07	–0.18	0.55	0.58
Macedonia, FYR	2,178	7.69	1.02	–0.08	0.57	0.58
Togo	245	5.50	1.65	–0.92	0.35	0.58
Hungary	6,228	8.74	0.71	0.81	0.81	0.58
Guinea-Bissau	143	4.96	1.80	–1.04	0.32	0.57
Burundi	111	4.71	1.87	–1.09	0.31	0.57
Tonga	1,666	7.42	1.09	–0.27	0.52	0.57
Papua New Guinea	676	6.52	1.35	–0.65	0.42	0.57

Costa Rica	5,187	8.55	0.77	0.56	0.74	0.57
Morocco	1,718	7.45	1.09	–0.28	0.52	0.56
Lithuania	5,996	8.70	0.72	0.69	0.77	0.56
Indonesia	1,087	6.99	1.22	–0.50	0.46	0.56
Grenada	4,802	8.48	0.79	0.43	0.71	0.56
Solomon Islands	1,136	7.04	1.20	–0.50	0.46	0.56
Nicaragua	905	6.81	1.27	–0.59	0.44	0.56
Suriname	2,623	7.87	0.96	–0.06	0.58	0.56
Timor-Leste	329	5.80	1.56	–0.90	0.35	0.55
Cambodia	511	6.24	1.43	–0.78	0.39	0.55
Latvia	6,034	8.71	0.72	0.65	0.76	0.55
Philippines	1,225	7.11	1.18	–0.48	0.47	0.55
Tunisia	2,744	7.92	0.95	–0.05	0.58	0.55
Djibouti	847	6.74	1.29	–0.64	0.42	0.55
El Salvador	2,676	7.89	0.96	–0.09	0.57	0.54
Czech Republic	7,593	8.94	0.66	0.89	0.83	0.54
Poland	6,222	8.74	0.71	0.63	0.76	0.54
Tajikistan	245	5.50	1.65	–1.00	0.33	0.54
Sri Lanka	1,199	7.09	1.19	–0.54	0.45	0.54
Bosnia and Herzegovina	2,155	7.68	1.02	–0.33	0.51	0.52
Honduras	1,437	7.27	1.14	–0.53	0.45	0.51
Bangladesh	462	6.14	1.46	–0.92	0.35	0.51
Malaysia	5,151	8.55	0.77	0.26	0.66	0.51
Swaziland	1,557	7.35	1.11	–0.52	0.46	0.51
Cameroon	703	6.56	1.34	–0.82	0.38	0.51
Belize	3,691	8.21	0.86	–0.05	0.58	0.50
Jamaica	3,795	8.24	0.86	–0.04	0.58	0.50
Slovak Republic	8,591	9.06	0.62	0.78	0.80	0.50
Thailand	2,640	7.88	0.96	–0.30	0.51	0.49
China	1,965	7.58	1.05	–0.47	0.47	0.49
Brazil	4,448	8.40	0.81	0.04	0.60	0.49
Egypt, Arab Rep.	1,786	7.49	1.07	–0.53	0.45	0.49
St. Kitts and Nevis	9,249	9.13	0.60	0.81	0.81	0.48
Laos	475	6.16	1.46	–0.99	0.33	0.48
Peru	2,921	7.98	0.93	–0.30	0.51	0.48
Panama	5,580	8.63	0.75	0.19	0.64	0.48
Croatia	6,796	8.82	0.69	0.38	0.69	0.48
Bolivia	1,173	7.07	1.19	–0.74	0.40	0.47
Uruguay	8,788	9.08	0.61	0.67	0.77	0.47
Guatemala	1,906	7.55	1.06	–0.55	0.45	0.47
Comoros	370	5.91	1.53	–1.10	0.30	0.46
Fiji	2,181	7.69	1.02	–0.53	0.45	0.46
Nigeria	491	6.20	1.45	–1.04	0.32	0.46
Paraguay	1,516	7.32	1.12	–0.70	0.41	0.46
Colombia	2,986	8.00	0.93	–0.38	0.49	0.46
Kazakhstan	2,378	7.77	0.99	–0.51	0.46	0.45
Dominican Republic	3,623	8.20	0.87	–0.27	0.52	0.45
Turkey	5,099	8.54	0.77	–0.05	0.58	0.45
Maldives	3,418	8.14	0.89	–0.35	0.50	0.44
Haiti	387	5.96	1.51	–1.14	0.29	0.44
Yemen	561	6.33	1.41	–1.07	0.31	0.44
Antigua and Barbuda	12,047	9.40	0.52	0.78	0.80	0.42
Pakistan	650	6.48	1.37	–1.09	0.31	0.42
Eritrea	150	5.01	1.79	–1.37	0.23	0.42
Slovenia	13,784	9.53	0.48	0.98	0.85	0.41
Central African Republic	232	5.45	1.66	–1.31	0.25	0.41
Azerbaijan	2,131	7.66	1.02	–0.74	0.40	0.41
Seychelles	8,208	9.01	0.63	0.11	0.62	0.39
Algeria	2,190	7.69	1.02	–0.77	0.39	0.39
Ecuador	1,746	7.47	1.08	–0.86	0.36	0.39
Syrian Arab Republic	1,330	7.19	1.16	–0.96	0.34	0.39
Mexico	6,591	8.79	0.70	–0.14	0.56	0.39
Cyprus	15,510	9.65	0.45	1.01	0.86	0.39
Angola	1,338	7.20	1.16	–0.99	0.33	0.38
Russian Federation	3,030	8.02	0.92	–0.73	0.40	0.37
Bahamas, The	17,323	9.76	0.42	1.09	0.88	0.37

Uzbekistan	840	6.73	1.29	–1.19	0.28	0.36
Gabon	4,168	8.34	0.83	–0.61	0.43	0.36
Congo, Rep.	1,199	7.09	1.19	–1.10	0.30	0.36
Belarus	2,485	7.82	0.98	–0.88	0.36	0.35
South Korea	15,447	9.65	0.45	0.70	0.78	0.35
Trinidad and Tobago	11,071	9.31	0.55	0.19	0.64	0.35
Cote d'Ivoire	530	6.27	1.42	–1.36	0.23	0.33
Iran, Islamic Rep.	2,228	7.71	1.01	–1.07	0.31	0.31
Guinea	410	6.02	1.50	–1.45	0.21	0.31
Chad	277	5.62	1.61	–1.52	0.19	0.31
Argentina	9,894	9.20	0.58	–0.27	0.52	0.30
Saudi Arabia	10,250	9.24	0.57	–0.25	0.53	0.30
Singapore	27,991	10.24	0.28	1.57	1.01	0.28
Congo, Dem. Rep.	97	4.57	1.91	–1.69	0.15	0.28
Lebanon	5,814	8.67	0.73	–0.79	0.38	0.28
Bahrain	16,968	9.74	0.43	0.24	0.66	0.28
Turkmenistan	1,700	7.44	1.09	–1.28	0.26	0.28
Israel	21,869	9.99	0.35	0.59	0.75	0.26
Libya	7,685	8.95	0.65	–0.77	0.39	0.25
Sudan	532	6.28	1.42	–1.66	0.15	0.22
Hong Kong, China	34,587	10.45	0.22	1.47	0.98	0.22
Venezuela, RB	5,964	8.69	0.73	–1.15	0.29	0.21
Afghanistan	426	6.05	1.49	–1.74	0.13	0.20
Macao, China	33,732	10.43	0.23	0.51	0.73	0.17
Equatorial Guinea	8,692	9.07	0.62	–1.29	0.25	0.16
Iraq	3,000	8.01	0.92	–1.63	0.16	0.15

[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.

Figure 1. Average size weight in CDI versus average log aid activity commitment, 2003

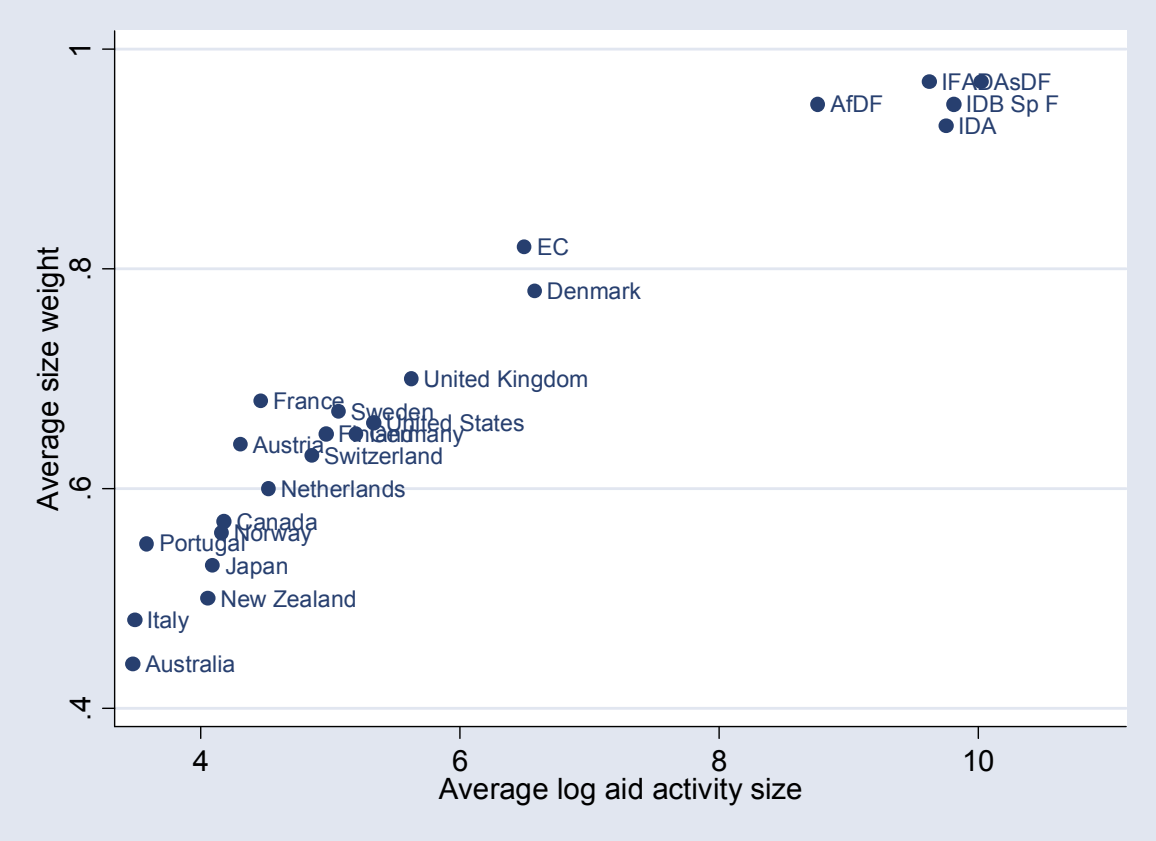


Table 2. Quality-adjusted aid quantity by donor, bilateral or multilateral, 2008

Donor	Gross aid (according to DAC)	Gross aid excluding forgiveness of non-concessional loans	Amor-tization	Inter-est	Net aid	Tying cost	Selectivi-ty weight	Size weight	Quality-adjusted aid
Australia	2,653	2,397	0	0	2,397	24	0.55	0.65	994
Austria	1,237	504	4	0	500	44	0.58	0.59	167
Belgium	1,421	1,321	45	3	1,273	15	0.59	0.66	549
Canada	3,396	3,263	39	0	3,224	56	0.58	0.73	1,573
Denmark	1,862	1,774	33	1	1,741	4	0.68	0.84	1,065
Finland	693	692	0	0	692	5	0.62	0.67	329
France	7,697	6,676	1,236	517	4,923	156	0.61	0.66	1,772
Germany	10,346	7,753	1,284	287	6,182	426	0.55	0.58	1,915
Greece	312	312	0	0	312	28	0.51	0.74	121
Ireland	931	931	0	0	931	0	0.70	0.76	547
Italy	2,064	1,175	226	0	950	65	0.46	0.62	299
Japan	13,634	11,892	6,810	2,230	2,852	68	0.67	0.57	309
Netherlands	5,318	5,234	119	31	5,084	80	0.64	0.79	2,821
New Zealand	278	278	0	0	278	6	0.59	0.63	113
Norway	3,036	3,036	0	0	3,036	0	0.59	0.65	1,356
Portugal	380	380	7	9	364	7	0.60	0.59	138
South Korea	579	579	39	26	513	70	0.57	0.71	185
Spain	5,066	4,912	264	0	4,648	238	0.54	0.73	1,878
Sweden	3,142	3,142	0	0	3,142	0	0.60	0.65	1,481
Switzerland	1,562	1,464	12	0	1,452	10	0.61	0.59	577
United Kingdom	7,844	7,336	477	0	6,860	0	0.60	0.71	3,382
United States	24,648	24,439	788	282	23,369	1,100	0.41	0.72	9,387
AfDF	1,733	1,733	108	119	1,506	0	0.77	0.88	1,003
Arab Agencies	729	729	282	14	433	0	0.65	0.76	206
Arab Countries	6,491	6,491	577	0	5,914	0	-0.38	0.71	1,663
AsDF	2,330	2,330	677	256	1,398	0	0.52	0.96	854
CarDB	83	83	19	11	54	0	0.51	0.74	21
Czech Republic	117	116	0	0	116	0	0.38	0.78	36
EBRD	7	7	0	0	7	0	0.62	0.78	3
EC	14,779	14,779	351	172	14,256	0	0.57	0.87	8,163
GEF	814	814	0	0	814	0	0.58	0.67	317
GFATM	2,168	2,168	0	0	2,168	0	0.64	0.93	1,286
Hungary	15	15	0	0	15	0	0.43	0.77	5
Iceland	36	36	0	0	36	0	0.63	0.75	17
IDA	8,990	8,980	2,301	934	5,746	0	0.65	0.93	3,805
IDB Sp.Fund	552	552	242	93	216	0	0.50	0.92	129
IFAD	491	491	144	46	301	0	0.60	0.88	177
Luxembourg	279	279	0	0	279	0	0.69	0.60	122
Montreal Protocol	76	76	0	0	76	0	0.58	0.60	26
Nordic Dev.Fund	104	104	13	6	84	0	0.72	0.73	44
Other Donors	816	816	0	0	816	0	0.54	0.72	316
Poland	89	89	5	0	84	0	0.51	0.70	30
SAF+ESAF(IMF)	1,026	1,008	719	60	229	0	0.80	0.80	115
Slovak Republic	41	41	0	0	41	0	0.57	0.81	19
Turkey	736	736	0	0	736	0	0.34	0.76	203
UNAIDS	209	209	0	0	209	0	0.58	0.74	89
UNDP	495	495	0	0	495	0	0.58	0.58	202
UNFPA	273	273	0	0	273	0	0.56	0.58	90
UNHCR	278	278	0	0	278	0		0.74	
UNICEF	984	984	0	0	984	0	0.55	0.77	441
UNRWA	807	807	0	0	807	0	0.48	0.68	262
UNTA	645	645	0	0	645	0	0.56	0.71	254
WFP	316	316	0	0	316	0	0.61	0.76	162

Table 3. Calculation of policy-induced charitable giving, 2008

Country	A. Tax deduction?	B. Marginal income tax rate (%)[1]	C. Tax credit (%)	D. Deduction or credit capped?	E. Tax incentive (%)[3]	F. Increase in giving with incentive (%)	G. Tax revenue/ GDP (%)	H. Giving increase because of smaller government (%)	I. Combined increase (%)	J. Grants by NGOs (million $)[2]	K. Giving in absence of favorable tax policies	Giving attributed to tax policies
Formula:						(1–E)^price elasticity–1[4]		((1–G)/(1–51.9%))^income elasticity–1[5]	(1+F)×(1+H)–1		J/(1+I)	J–K
Australia	Yes	41.5	0.0	No	41.5	30.7	30.8	49.2%	95.1%	670	343	326
Austria	No	37.5	40.0	No	40.0	29.1	42.9	20.8%	56.0%	137	88	49
Belgium	Yes	46.7	0.0	No	46.7	36.9	44.3	17.5%	60.9%	361	224	137
Canada	No	33.0	45.0	No	45.0	34.8	32.2	46.0%	96.8%	1,491	758	733
Denmark	Yes	55.0	0.0	Yes	27.5	17.4	48.3	8.3%	27.2%	129	101	27
Finland	No	41.6	0.0	No	0.0	0.0	42.8	21.0%	21.0%	13	10	2
France	No	30.1	66.0	No	66.0	71.5	43.1	20.4%	106.4%	280	136	144
Germany	Yes	44.3	0.0	No	44.3	34.0	36.4	35.9%	82.1%	1,626	893	733
Greece	Yes	31.1	0.0	No	26.1	16.3	31.3	48.0%	72.1%	2	1	1
Ireland	Yes	41.0	0.0	No	41.0	30.2	28.3	55.2%	102.1%	273	135	138
Italy	No	38.7	19.0	No	19.0	11.1	43.2	20.1%	33.5%	105	79	26
Japan	Yes	25.6	0.0	No	25.6	15.9	28.3	55.1%	79.8%	452	251	201
Netherlands	Yes	52.0	0.0	No	52.0	44.3	37.5	33.4%	92.5%	330	171	159
New Zealand	No	39.0	33.3	No	33.3	22.5	34.5	40.5%	72.1%	48	28	20
Norway	Yes	40.0	0.0	Yes	20.0	11.8	42.1	22.7%	37.1%	452	329	122
Portugal	No	34.0	25.0	No	25.0	15.5	36.5	35.8%	56.8%	1	1	1
South Korea	Yes	17.2	0.0	No	17.2	9.9	26.6	59.2%	74.9%	131	75	56
Spain	No	37.0	25.0	No	25.0	15.5	33.0	44.0%	66.3%	133	80	53
Sweden	No	56.4	0.0	No	0.0	0.0	47.1	11.0%	11.0%	25	23	2
Switzerland	Yes	26.8	0.0	No	26.8	16.9	29.4	52.4%	78.1%	398	223	175
United Kingdom	Yes	40.0	20.0	No	40.0	29.1	35.7	37.6%	77.6%	462	260	202
United States	Yes	31.7	0.0	No	31.7	21.0	26.9	58.6%	91.9%	17,122	8,922	8,200

[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 4. Quality-adjusted aid quantity with multilateral aid allocated back to bilateral, 2007

Country	Bilateral quality-adjusted aid[1]	Quality-adjusted aid allocated from multi-laterals	Total quali-ty-adjusted official aid	Policy-induced charitable giving	Quality-adjusted charitable giving	Final score: Adjusted (aid+charitabl e giving)/GDP	Memo: Offi-cial aid quali-ty (Adjusted aid/net trans-fers)
Australia	994	185	1,178	326	135	0.14%	44%
Austria	167	278	444	49	20	0.12%	45%
Belgium	549	578	1,127	137	57	0.24%	49%
Canada	1,573	763	2,336	733	304	0.18%	51%
Denmark	1,065	516	1,581	27	11	0.46%	58%
Finland	329	266	595	2	1	0.22%	51%
France	1,772	2,746	4,518	144	60	0.16%	48%
Germany	1,915	2,660	4,575	733	304	0.13%	43%
Greece	121	227	347	1	0	0.10%	49%
Ireland	547	224	771	138	57	0.37%	58%
Italy	299	1,840	2,139	26	11	0.10%	53%
Japan	309	1,628	1,936	201	83	0.04%	35%
Netherlands	2,821	946	3,767	159	66	0.44%	55%
New Zealand	113	32	145	20	8	0.13%	42%
Norway	1,356	421	1,776	122	51	0.41%	45%
Portugal	138	147	285	1	0	0.12%	46%
South Korea	185	170	355	56	23	0.04%	46%
Spain	1,878	1,182	3,061	53	22	0.20%	46%
Sweden	1,481	851	2,332	2	1	0.48%	49%
Switzerland	577	250	827	175	72	0.19%	43%
United Kingdom	3,382	2,315	5,697	202	84	0.22%	52%
United States	9,387	1,714	11,101	8,200	3,404	0.10%	42%

[1]From Table 2.

Trade

The focus of the trade component is a measure of barriers in rich-counties to goods exports from poorer ones. The index has two major parts. The first, getting 75% weight, is an aggregate measure of protection (AMP), which estimates the combined effect of tariffs, non-tariff measures, and domestic production subsidies on an *ad valorem* tariff-equivalent basis. Out of concern that unmeasured (tacit) barriers may be an important factor in reducing access of developing countries to rich country markets, especially in Japan, the remaining 25% weight goes to an indicator of "revealed openness," which is essentially imports from developing countries as a share of importer's GDP. William Cline (2002; 2004, ch. 3) develops the original trade index.

Starting in 2005, Roodman (2007) preserves the structure while substantially improving the underlying calculations of border measures (tariffs and quotas) by switching to a different dataset and refining some of the methods. The CDI now takes advantage of the Market Access Map (MAcMap) data set of the Centre d'Etudes Prospectives et d'Informations Internationales (CEPII) (Bouët et al. 2004). The MAcMap data are unfortunately not updated often. The 2001 data are used for CDI years 2003–05 and the 2004 updates for the 2006–10 CDIs. The data set has several strengths, including fairly good coverage of "preferences" for least-developed countries (special low tariffs for their exports), such as under the EU's Everything But Arms program and the U.S. Africa Growth and Opportunity Act. This is made possible by the high detail in the 60 million–row dataset: one protection estimate for each importer, exporter, and six-digit line in the Harmonized System (HS6) classification of traded goods.

MAcMap embodies a particular approach to the perennial problem of the endogeneity of import-based weights, whereby the highest tariffs can get the least weight because the country imposing the tariffs imports hardly any of the goods in question. In order to reduce endogeneity, the CEPII authors cluster importing coun-

tries into reference groups. The weight for a given trade barrier is imports not just of the country imposing the barrier but of all countries in its group. However, it appears that MAcMap weights do not solve the endogeneity problem, at least for purposes of aggregating across major product groups as in the CDI (Roodman 2007). For example, using MAcMap weights, border measures in Japan in 2001 were equivalent to a 4.1% across the board *ad valorem* tariff for middle-income nations and 2.0% for least-developed countries (Bouët et al. 2004; these figures exclude quotas on textiles and apparel, as well as agricultural subsidies). Numbers for other rich countries are similarly low, and seem to imply that rich-country trade barriers hardly affect developing countries. But this contradicts most of the rest of the literature (Cline 2004; World Bank 2005, ch. 4).

For this reason, the CDI uses detailed MAcMap protection data while eschewing MAcMap weights where possible.[20] Instead, it weights trade barriers as much as possible by the value of exporter's production (in dollar terms), which is less endogenous than exports to protection faced. Production is not a perfect indicator of propensity to export—thus of the welfare cost of barriers against such exports—but in areas such as agriculture where the barriers are quite high, it seems more meaningful. Thailand's share of world rice production seems a better predictor of what its share of world rice exports to Japan would be in a free-trade world than actual exports to Japan, which are greatly suppressed by tariffs.

The data on production by country and product come from the GTAP 6.0 database.[21] GTAP 6.0 divides the world into 87 countries or regions and organizes products and services into 57 groups (oil, wood products, etc.). The production data used for weights are at this resolution. So to incorporate them, the CDI first aggregates from HS 6 lines to GTAP product categories using MAcMap-weighted averages, and across countries within GTAP country/regions based on their exchange rate GDPs. Table 5 displays some of the intermediate results of particular interest, on rich-country agricultural protection.

Before aggregating all the way to the level of the rich country, two other kinds of information are integrated in the protection data. The first is on textile and apparel quotas that were imposed by Canada, the European Union, and the United States until the beginning of 2005. The current CDI does not count them, but back-calculated versions to 2003 and 2004 do. In these cases, estimates of the export tax equivalents of the quotas are taken from Francois and Spinanger (2004)—separately for textiles and apparel—and chained with the corresponding tariff levels derived from MAcMap.[22]

The second source of additional data is on agricultural subsidies, which are not included in MAcMap but do obstruct developing-country exports. It is often said that OECD governments spend more than $300 billion a year subsidizing agricultural production. Although aid to rich-country farmers is copious, the $300 billion "fact" is wrong, so phrased. Rather, OECD farmers and food buyers receive support by virtue of government policy that is *equivalent* to more than $300 billion in subsidies, as measured by the OECD's Total Support Estimate (TSE). Much of this benefit is actually delivered to farmers in the form of tariffs, which the OECD converts to subsidy equivalents. Much of the rest includes "general services" such as agricultural education and R&D, transfers to consumers rather than producers, and transfers to producers in ways that create little incentive for additional production, thus little trade distortion.

Since the CDI aims to measure trade distortions, and handles tariffs separately, it uses a narrower definition of subsidy, while still drawing on the OECD (2007) subsidy data. Table 6 shows the full OECD agricultural subsidy typology, and how the TSE and the CDI subsidy totals are arrived at. The OECD lists three major kinds of support: support to producers, general services such as agricultural extension and inspection services, and support to consumers. The first major subcategory of producer support is Market Price Support (MPS, row B of

[20] William Cline guided this approach.
[21] I thank Betina Dimaranan for her assistance with the data.
[22] The CDI uses the estimates from the version of Francois and Spinanger's model that is free of some restrictions imposed for consistency with GTAP 6.0.

the table), which is the additional income accruing to producers because their farmgate prices are higher than world prices. Governments maintain these price differentials with two kinds of border measures: barriers to imports (tariffs) and subsidies for exports. Import barriers account for the lion's share of MPS in OECD countries and, because they generate transfers from domestic consumers to domestic producers, they also show up as negative entries under consumer support (row T). Spending on export subsidies can be inferred by taking the algebraic sum of MPS and transfers from consumers to producers, which carry a negative sign (see rows Y and AC). The other subcategories of OECD producer support are in fact subsidies in the sense of government expenditure.

The OECD's TSE counts all producer support, including MPS, as well as general services and taxpayers subsidies to consumers—$345.8 billion/year average in 2006–08 for the 22 CDI countries plus the Czech Republic, Hungary, Poland, and the Slovak Republic (row AB). In contrast, the subsidy measure in the CDI consists only of certain subcategories of producer support, those that are true government expenditures that distort production (rows AC and AD). From the MPS it takes only export subsidies. It discounts payments based on historical production figures (area, animal numbers, receipts, or income) by half. In theory, these subsidies too are decoupled from present production and shouldn't distort it, but they are often administered in ways that stimulate production. For example, the U.S. formally decoupled many support payments in 1996—but then disbursed an extra $8.6 billion/year in "emergency assistance" during 1998–2001, and in 2002 allowed farmers to update the base figures for their "decoupled" subsidies. And some EU payments are decoupled only at the national or regional level. Allocation within regions is still based on actual production (de Gorter, Ingco, and Ignacio 2003).

Throughout the agricultural subsidy calculation, averages for the last three years with available data are used because subsidy levels are sensitive to the weather and volatile world prices. For the 22 scored countries, plus the Czech Republic, Hungary, Poland, and the Slovak Republic, total trade-distorting subsidies are estimated at $91.8 billion/year.

The agricultural subsidy totals having been arrived at, they are then converted to *ad valorem* tariff equivalents. The methodology is summarized in Cline (2004, ch. 3). As of 2009—and, in effect, the 2010 CDI—the OECD does not make subsidy data available for just the EU-15, all of which are CDI countries except for Luxembourg. So starting in 2010, the CDI uses the EU-19 subsidy rate for all EU countries in the CDI. These tariff equivalents are then chained with the actual tariff levels derived from MAcMap to reach overall levels of protection for agriculture. These in turn are averaged with protection in other sectors, weighting by the value of production in non-CDI countries, to produce estimates of overall levels of protection. (See Table 7.)

These estimates may still miss important but less formal barriers to trade. So the CDI trade component gives 25% weight to a direct measure of imports from non-DAC countries as a share of importer's GDP, called "revealed openness," based on data from the United Nations Commodity Trade Statistics Database database. Imports from the least developed countries (LDCs) are double-weighted to reflect the extra potential for trade to reduce poverty in countries where it is highest. Imports of manufactures too are double-weighted because they seem more likely than, say, oil imports, to be subject to the tacit barriers this component tries to detect (Cline 2004). As a result, manufactures imports from LDCs are quadruple-weighted. All EU members are assigned the same revealed openness score.[23] (See Table 8.)

These two top-level indicators—measured protection and revealed openness—have opposite senses: lower measured protection and higher openness should be rewarded. Because they are in effect separate esti-

[23] We experimented with computing revealed openness separately for each EU member, but found that it gave the Netherlands and Belgium outsized scores, probably because they have small economies and are ports of entry for the continent. The two probably ship a good share of their reported imports from developing countries on to other nations.

mates of the same underlying variable, the true level of protection, they are combined in a way that is unique within the CDI. The revealed openness scores are linearly transformed to have the same mean, standard deviation, and sign sense as the measured protection results (higher being worse). Once the two indicators are on the same scales, they are combined in a 75-25 ratio. (See Table 9.)

Agricultural tariffs are the dominant source of inter-country variation, giving Japan, Norway, and Switzerland a low one as well. The sources of the very high numbers for Norway, Switzerland, and Japan are agricultural tariff-rate quotas (TRQs), which were enacted under the Uruguay Round agreement of the World Trade Organization to replace actual quotas. They are pairs of tariffs, a low one that applies to imports of some product up to some level and a high one that applies to imports above the level. That said, in the remaining countries, which represent the lion's share of the rich-country agricultural market, the protective effect of agricultural subsidies is of the same order of magnitude as the tariffs.

Table 5. Estimated uniform *ad valorem* tariff-equivalents of tariff regimes against agricultural commodities, 2004 (percent)

	Animal products other	Bovine cattle, sheep and goats, horses	Bovine meat products	Cereal grains other	Crops other	Dairy products	Meat products other	Oil seeds	Paddy rice	Plant-based fibers	Processed rice	Sugar	Sugar cane, sugar beet	Vegetable oils and fats	Vegetables, fruit, nuts	Wheat
Australia	0.0	0.0	0.0	0.0	0.0	6.6	0.6	0.7	0.0	0.0	0.0	0.0	0.0	1.0	0.6	0.0
Austria	4.9	13.1	75.7	36.8	4.1	61.7	20.1	0.0	76.9	0.0	135.0	115.5	144.5	4.7	21.7	24.1
Belgium	4.9	13.1	75.7	36.8	4.1	61.7	20.1	0.0	76.9	0.0	135.0	115.5	144.5	4.7	21.7	24.1
Canada	6.0	0.0	6.6	5.5	0.4	100.4	41.8	0.0	0.0	0.0	0.0	4.5	0.0	2.8	1.4	18.0
Denmark	4.9	13.1	75.7	36.8	4.1	61.7	20.1	0.0	76.9	0.0	135.0	115.5	144.5	4.7	21.7	24.1
Finland	4.9	13.1	75.7	36.8	4.1	61.7	20.1	0.0	76.9	0.0	135.0	115.5	144.5	4.7	21.7	24.1
France	4.9	13.1	75.7	36.8	4.1	61.7	20.1	0.0	76.9	0.0	135.0	115.5	144.5	4.7	21.7	24.1
Germany	4.9	13.1	75.7	36.8	4.1	61.7	20.1	0.0	76.9	0.0	135.0	115.5	144.5	4.7	21.7	24.1
Greece	4.9	13.1	75.7	36.8	4.1	61.7	20.1	0.0	76.9	0.0	135.0	115.5	144.5	4.7	21.7	24.1
Ireland	4.9	13.1	75.7	36.8	4.1	61.7	20.1	0.0	76.9	0.0	135.0	115.5	144.5	4.7	21.7	24.1
Italy	4.9	13.1	75.7	36.8	4.1	61.7	20.1	0.0	76.9	0.0	135.0	115.5	144.5	4.7	21.7	24.1
Japan	9.2	148.6	35.8	47.3	7.4	75.0	31.4	8.9	527.1	0.0	543.9	214.3	0.0	3.6	23.0	183.2
Netherlands	4.9	13.1	75.7	36.8	4.1	61.7	20.1	0.0	76.9	0.0	135.0	115.5	144.5	4.7	21.7	24.1
New Zealand	0.1	0.0	0.0	0.0	0.3	3.9	3.1	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.1	0.0
Norway	64.5	88.6	196.8	118.7	10.4	141.7	280.2	47.8	39.8	0.0	27.1	53.0	90.3	47.1	14.7	209.7
Portugal	4.9	13.1	75.7	36.8	4.1	61.7	20.1	0.0	76.9	0.0	135.0	115.5	144.5	4.7	21.7	24.1
South Korea	38.2	12.5	30.8	388.4	22.4	73.7	24.6	363.5	981.5	1.1	981.4	21.7	3.3	12.4	85.7	2.4
Spain	4.9	13.1	75.7	36.8	4.1	61.7	20.1	0.0	76.9	0.0	135.0	115.5	144.5	4.7	21.7	24.1
Sweden	4.9	13.1	75.7	36.8	4.1	61.7	20.1	0.0	76.9	0.0	135.0	115.5	144.5	4.7	21.7	24.1
Switzerland	58.3	72.3	359.2	95.9	15.7	198.7	232.6	23.4	9.3	0.0	10.1	123.8	44.3	73.0	58.7	155.7
UK	4.9	13.1	75.7	36.8	4.1	61.7	20.1	0.0	76.9	0.0	135.0	115.5	144.5	4.7	21.7	24.1
United States	0.3	0.1	9.6	0.5	11.1	37.6	3.4	23.4	4.3	5.1	4.1	73.5	0.3	2.5	4.3	2.9
Production in non-CDI countries (million $)	202.7	76.4	77.1	67.5	114.0	69.1	111.5	50.2	73.0	29.4	92.4	65.5	26.8	63.1	322.7	71.3

Table 6. Calculations of production-distorting agricultural subsidies for CDI and of Total Support Estimate of OECD, 2006–08

	Australia	Canada	EU-19	Japan	N. Zealand	Norway	South Korea	Switzerland	United States	Total ($)
National currency figures										
A. Producer Support Estimate (PSE)	2,686	7,209	97,642	4,357	147	19,764	22,980	6,083	29,473	
B. Support based on commodity output	1	3,645	37,134	3,931	86	9,906	20,522	3,107	7,188	
C. Market Price Support	1	3,644	36,263	3,746	86	8,487	20,522	2,799	6,299	
D. Payments based on output	0	1	872	185	0	1,419	0	309	888	
E. Payments based on input use	1,799	682	10,974	154	58	1,131	723	230	9,141	
F. Payments based on current area/animal numbers/receipts/ income (A/An/R/I), production required	47	1,742	16,529	34	3	6,097	986	1,074	3,778	
G. Payments based on non-current A/An/R/I, production required	0	218	0	0	0	2,629	0	1,264	3,778	
H. Payments based on non-current A/An/R/I, production not required	799	890	31,167	238	0	0	750	140	0	
Payments based on non-commodity criteria	41	2	1,970	0	0	0	0	140	2,401	
I. Miscellaneous payments	0	37	–131	0	0	0	0	175	0	
K. General Services Support Estimate (GSSE)	1,132	2,839	10,517	1,083	272	2,019	3,416	482	42,830	
L. Research and development	619	465	2,033	88	88	858	783	89	2,111	
M. Agricultural schools	2	260	987	28	24	0	95	16	1	
N. Inspection services	86	890	576	10	80	315	129	11	875	
O. Infrastructure	411	554	4,200	916	80	313	1,825	96	5,123	
P. Marketing and promotion	14	670	2,513	4	0	70	45	54	32,501	
Q. Public stockholding	0	0	166	20	0	0	539	42	66	
R. Miscellaneous	0	0	42	17	0	463	0	175	2,154	
S. Consumer Support Estimate (CSE)	–248	–4,173	–33,926	–5,044	–87	–9,134	–26,952	–3,630	20,087	
T. Transfers to producers from consumers	–1	–3,630	–35,240	–3,746	–84	–9,095	–20,441	–2,850	–5,946	
U. Other transfers from consumers	–7	–543	–1,377	–1,303	–2	–543	–6,572	–932	–1,054	
V. Transfers to consumers from taxpayers	–240	0	1,779	2	0	449	62	90	27,087	
W. Excess feed cost	0	0	912	3	0	56	0	62	0	
X. *OECD Total Support Estimate (A+K+V)*	3,577	10,048	109,938	5,443	419	22,232	26,459	6,655	99,390	
Y. Export subsidies (B+T)	0	14	1,022	1	2	–608	81	–52	354	
Z. Other direct trade–distorting subsidies (D+E+F+G/2+H/2)	2,245	2,979	43,958	492	61	9,962	2,084	2,316	15,696	
AA. Exchange rate/$	1.23	1.09	0.74	0.11	1.44	5.95	0.98	1.18	1.00	
Dollar figures										
AB. OECD Total Support Estimate (X/AA)	2,901	9,192	149,159	48,533	291	3,737	26,929	5,661	99,390	**345,792**
AC. Export subsidies (Y/AA)	0	13	1,387	5	1	–102	82	–44	354	1,695
AD. Other trade–distorting subsidies (Z/AA)	1,820	2,725	59,639	4,387	42	1,674	2,121	1,970	15,696	90,076
Total trade–distorting subsidies (AC+AD)	1,820	2,738	61,027	4,392	43	1,572	2,203	1,926	16,050	**91,771**

Table 7. Computation of measured protection, *ad valorem* tariff equivalents (%)

	Agricultural commodities			Other	Weighted
	Tariffs	Subsidies	Total	goods:	average
Australia	0.5	12.5	13.1	3.4	4.7
Austria	38.7	14.1	58.2	3.6	11.0
Belgium	38.7	13.0	56.6	3.6	10.8
Canada	13.3	9.8	24.4	2.4	5.4
Denmark	38.7	14.2	58.3	3.6	11.0
Finland	38.7	7.6	49.1	3.6	9.8
France	38.7	11.6	54.8	3.6	10.5
Germany	38.7	12.3	55.8	3.6	10.7
Greece	38.7	13.5	57.4	3.6	10.9
Ireland	38.7	14.8	59.1	3.6	11.1
Italy	38.7	9.1	51.3	3.6	10.1
Japan	124.8	3.2	132.0	3.4	20.8
Netherlands	38.7	7.1	48.5	3.6	9.7
New Zealand	0.6	2.6	3.2	6.0	5.6
Norway	98.4	13.6	125.4	3.4	19.9
Portugal	38.7	10.3	53.0	3.6	10.3
South Korea	198.3	7.1	219.6	11.2	39.4
Spain	38.7	10.6	53.4	3.6	10.3
Sweden	38.7	9.2	51.4	3.6	10.1
Switzerland	102.8	13.2	129.5	5.7	22.4
United Kingdom	38.7	12.9	56.6	3.6	10.8
United States	10.6	9.6	21.1	2.4	4.9
Weight: value of production in non-CDI			1,163	7,427	

Table 8. Revealed openness, 2008

	Imports (billion $)						
	A	B	C	D			
	Least developed countries only		All low and middle income		Weighted total		
	Manu-factures	Total imports	Manu-factures	Total imports	(A+B+C+D)	GDP	Weighted imports/GDP
Australia	0.16	0.18	61.02	88.61	149.97	1,015	0.15
Canada	0.98	3.80	80.71	107.87	193.36	1,400	0.14
European Union	14.40	36.39	1,065.19	1,649.55	2,765.54	16,798	0.16
Japan	0.74	7.46	221.65	492.41	722.27	4,909	0.15
New Zealand	0.02	0.03	9.11	14.37	23.52	131	0.18
Norway	0.15	0.33	18.48	21.38	40.34	450	0.09
South Korea	0.48	1.81	115.62	258.96	376.85	929	0.41
Switzerland	0.20	0.24	20.91	26.63	47.98	488	0.10
United States	7.98	35.40	781.93	1,190.89	2,016.20	14,204	0.14

Table 9. Computation of overall trade score

	Measured protection (75% of score)	Revealed openness (25% of score)			**Standardized score**
		Raw value	Transformed to protection scale	Composite	
	---------- (%)----------				
Australia	4.7	14.8	9.0	5.8	7.5
Austria	11.0	16.5	5.0	9.5	6.0
Belgium	10.8	16.5	5.0	9.3	6.0
Canada	5.4	13.8	11.3	6.9	7.1
Denmark	11.0	16.5	5.0	9.5	5.9
Finland	9.8	16.5	5.0	8.6	6.3
France	10.5	16.5	5.0	9.2	6.1
Germany	10.7	16.5	5.0	9.3	6.1
Greece	10.9	16.5	5.0	9.4	6.0
Ireland	11.1	16.5	5.0	9.6	5.9
Italy	10.1	16.5	5.0	8.8	6.2
Japan	20.8	14.7	9.2	17.9	2.4
Netherlands	9.7	16.5	5.0	8.5	6.4
New Zealand	5.6	18.0	1.4	4.5	8.1
Norway	19.9	9.0	22.8	20.6	1.2
Portugal	10.3	16.5	5.0	9.0	6.2
South Korea	39.4	40.6	-52.0	16.5	3.0
Spain	10.3	16.5	5.0	9.0	6.2
Sweden	10.1	16.5	5.0	8.8	6.2
Switzerland	22.4	9.8	20.8	22.0	0.6
United Kingdom	10.8	16.5	5.0	9.3	6.0
United States	4.9	14.2	10.4	6.3	7.3
Average	11.2	13.9	4.7	11.7	
Standard deviation	4.6	1.9	13.4		

Investment

Investment flows from abroad have long played a major role in economic development—from the 19th century in the United States to the 21st century in China. Source-country policies can affect capital flows, and given the magnitude of the capital flows relatively small policy changes on the source side could make a significant difference for countries on the receiving side.

But incorporating investment into the CDI is difficult for two reasons. First, not all investment is good for development, or at least is not as good as it should be. Prime examples include oil industry ventures in Nigeria and Angola, and foreign-financed factories with inhumane working conditions.

Second, the role of rich-country policies in stimulating and guiding investment is subtle and difficult to quantify. Theodore Moran has designed the investment component of the CDI since 2004. Moran's approach , adopted without modification, is based on a survey of government policies using a checklist approach. Countries can gain or lose points based on the answers to 20 questions. A perfect score would be 106. For example, countries get 15 points for having programs to insure nationals against political risks for investment in developing countries. But they lose 4 if they do not screen for and monitor environmental, labor, and human rights problems.

The 20 questions fit into five categories. The full list is:

1) Official provision of political risk insurance, which protects investors against such risks as the host country government nationalizing their factories (25 points)

   a) Is the country a member of the Multilateral Investment Guarantee Agency (5 points) and the International Finance Corporation (3), both part of the World Bank Group, and regional development banks (2)? All provide political risk insurance.
   b) Does the country have a national political risk insurance agency (15)?
   c) Does the national agency fail to screen for environmental, labor standards, and human rights issues (–4)?
   d) Does the agency have a history of covering inefficient projects that make financial sense thanks only to subsidies and import protection, for example, to subsidized sugar projects (–2)?
   e) Does the agency avoid projects in "sensitive" sectors that could threaten certain source-country commercial interests (–2)?
   f) Does the agency impose inappropriate national economic interest tests for eligibility, such as that the project would not cost a single job at home (–2)?
   g) Does the agency offer coverage to firms majority-owned by nationals, as opposed to any firm with a significant presence in the home economy (–2)?

2) Procedures to prevent double taxation of profits earned abroad—taxation, that is, in both source and receiving countries (20 points)

   a) Does the county have tax sparing agreements with developing countries, whereby the government allows investors to pay taxes only under the (potentially favorable) tax code of the receiving country (20)? Or does the country at least offer a tax credit for foreign taxes paid so that there is no double taxation (18)?
   b) Does the developed country deny investors the benefits from favorable tax treatment in developing countries (–6)?
   c) Does it treat foreign taxes paid as a deductible expense rather than providing a full credit (–10)?

3) Actions to prevent bribery and other corrupt practices abroad (36 points)

   a) How has the country progressed in implementing the OECD Convention against Bribery of Foreign Public Officials in International Business Transactions? Has it begun Phase II monitoring to evaluate whether it is effectively implementing the Convention in its own laws (6)? Did it complete Phase II by the end of 2004 (4)?
   b) Do the country's laws make it easy for domestic corporations to circumvent the intent of the OECD convention, for example by entering Enron-like partnerships with relatives of foreign officials, as documented in Moran (2006a) (–2 points)? This question is new in 2006 and all countries receive the penalty.
   c) Has it participated in "publish what you pay" initiatives to promote transparency in payments, taxes, receipts, and expenditures that its multinationals pay to foreign governments (up to 16 points). Examples: the Extractive Industries Transparency Initiative (EITI), the G–8 Anti-Corruption and Transparency Action Plan, the Kimberly Process to control trade in "blood diamonds," and the World Bank trust fund to combat bribery.
   d) Has the country shown real leadership on such issues (bonus up to 6 points)? For example, Norway has been a leader of the EITI effort, has made its national oil company, Statoil, a model, has helped convince several least-developed countries to join, and is one of four contributors to the World Bank–administered Multi-Donor Trust Fund for the EITI. This item too is new for 2006.

e) Score on Transparency International's Bribe Payers' Index, which measures the perceived propensity of nationals to bribe abroad: 5 minus the country's score quintile, with countries excluded from the survey receiving 2 (4 points maximum).
f) Has the country been negligent in enforcing laws against deferred gift payments, which are thinly disguised bribes (up to –6)?

4) Other measures to support foreign direct investors in developing countries (5 points)

a) Does the country assist its firms in identifying investment opportunities (2)?
b) Does it advocate against receiving countries applying labor, environmental, or human rights standards to FDI (–5)?

5) Policies that affect portfolio flows (20 points)

a) Does it provide support for portfolio flows, for example by lending start-up capital to mutual funds investing in developing countries (4)?
b) Does the country eschew restrictions on portfolio investments in developing countries by home country pension funds, beyond the "prudent man" fiduciary rule on diversification (12)?

The first four categories, worth a maximum of 86 points, pertain to foreign direct investment. The last, with 20 points, obviously relates to portfolio flows. (See Table 10 for the results.)

Table 10. Summary of Investment Component

	Factor	Australia	Austria	Belgium	Canada	Denmark	Finland	France	Germany	Greece	Ireland	Italy	Japan	Netherlands	New Zealand	Norway	Portugal	South Korea	Spain	Sweden	Switzerland	U.K.	U.S.
Political risk insurance	Multilateral Insurance?	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	Official national agency?	15	15	15	15	15	15	15	15	15	0	15	15	15	0	15	15	15	15	15	0	15	15
	Agency monitors environment/labor/ human rights?	0	0	0	0	0	0	–2	0	0	0	0	0	0	0	0	–2	0	0	–2	0	0	–2
	Investors in all sectors eligible?	0	–2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	No inappropriate national economic interest tests?	0	–2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	–2
	Extending coverage to inefficient import-substituting projects?	–2	–2	–2	–2	–2	–2	–2	–2	–2	0	–2	–2	–2	0	–2	0	0	–2	0	0	–2	–2
	International companies with a significant presence in this country eligible?	0	0	0	0	0	0	0	0	–2	0	0	0	0	0	0	0	0	0	0	0	0	–2
Double taxation	Avoids double taxation?	18	2	18	20	18	18	20	18	18	8	14	18	18	18	18	18	20	20	18	16	18	18
	Doesn't let investors enjoy developing country tax incentives?	0	0	–6	0	–6	0	0	0	–4	0	0	0	–2	0	0	0	0	0	–6	–6	0	0
	Treats foreign taxes as deductible rather than credit?	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Corrupt practices	OECD convention—participation level?	10	10	10	10	10	10	10	10	10	6	10	10	10	10	10	10	10	10	10	10	10	10
	Laws make avoidance easy?	0	–2	–2	–2	–2	–2	–2	–2	–2	–2	–2	–2	–2	–2	–2	–2	–2	–2	–2	–2	–2	–2
	EITI or other initiatives?	16	6	17	16	6	14	16	20	6	6	16	16	12	8	16	6	10	12	16	16	16	16
	Bribe Payers Index Score Cluster	4	2	4	4	2	2	3	4	2	2	2	4	4	2	2	2	2	2	2	4	4	3
	Strong leadership on EITI?	2	0	0	0	0	0	0	4	0	0	0	0	4	0	6	0	2	6	0	2	4	4
	Punish bribe payers or negligent about this?	0	0	0	0	0	0	0	0	0	0	0	–4	0	0	0	0	0	0	0	0	–4	–4
Other FD	"Negative advocacy"?	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Foreign or commerical services finds investment opportunities?	5	5	1	5	5	5	5	5	5	2	5	5	5	5	5	5	5	5	5	5	5	0
Portfolio	Support for portfolio flows?	0	0	5	0	0	5	5	0	5	0	0	0	5	5	5	5	0	0	5	0	5	5
	No restrictions on pension fund investment?	15	0	15	17	15	0	0	15	0	15	15	0	15	15	15	15	15	15	15	15	15	7
	Total	93	42	85	93	71	75	78	97	61	47	83	70	92	71	98	82	87	91	86	70	94	74
	Standardized score	6.2	2.8	5.6	6.2	4.7	5.0	5.2	6.4	4.1	3.1	5.5	4.6	6.1	4.7	6.5	5.4	5.8	6.0	5.7	4.6	6.2	4.9

Migration

Migration is one of the thornier topics in the index. Though it is widely agreed that migration and migration policy greatly affect many poor people in poor countries, the effects have not been as extensively studied as those of aid and trade polices. There is no widely accepted analytical framework from the perspective of development, and little empirical evidence. In addition, there are data problems, including lack of comprehensive information on remittances and illegal immigration, and a paucity of internationally comparable information on rich countries' migration policies.

The CDI migration component is built on the conviction that migration advances development in source countries because it "provides immigrants with access to labor markets and higher wages which, in turn, increase the potential for individual immigrants to remit money or goods to the sending country…and enables migrants to establish migrant networks, which encourage continuous and expanding economic relations between sending and receiving countries." (Hamilton and Grieco, 2002)

In addition, freer flows of people, like freer flows of goods, should contribute to global convergence in factor markets. The easier it is for a Vietnamese woman to get a job in Japan, the more Nike will have to pay her to keep her sewing clothes in its Vietnam factories. And emigration of workers that are unskilled (by rich-world standards) should increase the wages of those who do not leave by reducing labor supply. It should be said that while freer migration may directly benefit rich countries too, it can lower pay for nationals facing more intense competition for their jobs. This is not a major consideration for the CDI, however, not because it doesn't worry us, but because the purpose of the CDI is to focus on effects on developing countries.

What happens when professionals leave developing countries—the so-called "brain drain"—is more heavily debated. Some worry that, say, the U.K. health care industry is emptying Ghanaian clinics of nurses. Even here, however, the harm is not obvious. Factors besides the emigration opportunities draw health professionals away from serving the poor, including low pay and terrible working conditions in public clinics (Clemens 2007). Meanwhile, sometimes professionals gain skills abroad and then return home: Returned Indian expatriates are playing a big role in the software and services boom in Bangalore. Even when professionals remain abroad, they often retain links with industry and research at home. And they send home money.

The current migration component descends from a design by Grieco and Hamilton (2004). They proposed taking a weighted average of six indicators:

1) gross non-DAC immigrant inflow/receiving-country population;

2) gross non-DAC immigrant inflow/total immigrant inflow;

3) net migrant inflow over five years/receiving-country population—this includes inflows from DAC countries too for lack of resolution in the data;

4) the difference between the unemployment rates for natives and immigrants, which is supposed to reflect barriers to immigrants entering the work force;

5) the share of foreign students that are from non-DAC countries; and

6) an index from the United Nations High Commissioner for Refugees (UNHCR) measuring countries' contributions to aiding refugees and asylum seekers.

The CDI adopts these recommendations with some substantial changes. It drops the second indicator because of conceptual overlap with the first. In place of indicator 3, it uses a series from a data set by Docquier,

Marfouk, and Lowell (2007), which is new to the CDI this year and contains some significant revisions of the earlier Docquier and Marfourk (2005). They use 1990 and 2000 census data to estimate immigrant stocks by country of origin and skill level, providing one of the first glimpses of differences in the movement of skilled and unskilled workers. The series used in the CDI is the change in the stock of immigrants from developing countries who are unskilled, meaning having no tertiary education. As far as this indicator goes then, unskilled immigration is rewarded while skilled immigration is treated neutrally, as a reflection of theoretical and empirical uncertainty about the effect of skilled migration on the sending country. This measure can be expected to count illegal immigrants, but may undercount them. As a net stock change measure it differs from a flow measure in being net of immigrant deaths during the period.

The CDI also includes indicator 1, which Jeanne Batalova of the Migration Policy Institute maintains by contacting national statistical agencies. In contrast with the Docquier and Marfouk series, this is a flow rather than a stock measure; it is gross, not net of outflows; it includes skilled migrants; it probably counts few illegal immigrants, since it is based on migration rather than census data; and is for the most recent available year rather than the 1990s as a whole. Taken together, the two indicators can be seen as two imperfect snapshots of migration patterns, each with advantages and disadvantages, and both strongly determined by the limits of available data. The net stock change measure, for example, allows the distinction between skilled and unskilled, but is old, thus a poorer indicator of current policy. Note that overall, skilled immigration is still rewarded, but less than unskilled migration, since it is counted in one of the two indicators. The two each get 32.5% of the weight in the migration component, for a total of 65%.

Starting in 2010, the CDI *weights* the two indicators of immigration flow—net stock change of unskilled immigrants between the last two censuses, and gross inflow of legal immigrants—to reflect the poverty of sending nations. The method is in principle the same as that used to discount aid for poverty of the receiving country (see above). The poverty weights shown Table 1 are scaled to range over [0, 1]. Thus, immigration from Haiti is discounted less than that from Estonia. We call the ratio of the weighted to the unweighted flow "migrant selectivity." The major impediment to this calculation is that for some receiving countries, the data on inflows that Jeanne Batalova is able to collect are not fully disaggregated by sending country. Particularly coarse are the data from France, Ireland, and Japan. Fortunately, the Docquier and Marfouk census-based data are consistently disaggregated. So as a practical expedient, the CDI copies the average discount for the net stock change indicator, based on this census data, over to the gross inflow indicator.

The CDI leaves out Grieco and Hamilton's indicator 4, the unemployment rate difference. Higher unemployment among immigrants might actually reflect the *greater* attractiveness of a country's labor market to foreign workers. "Unemployment," after all, is the state of not having a job, yet being in the job market. If there are many immigrants "in the market for a job," this could reflect policy barriers to employment, which the CDI ought to penalize, or policies that facilitate entrance to the market, which the CDI ought to reward. Because of this ambiguity in sign, it seemed appropriate to leave this indicator aside.

The CDI adopts Grieco and Hamilton's indicator 5, the share of the foreign student population that is non-DAC, without change. This deserves comment since it could be misleading. A country could host almost no non-DAC students, yet have a high non-DAC *ratio* if it hosts even fewer DAC students. Japan is a case in point. Its 2001 non-DAC student body was 60,687, which was 95% of its total foreign student body, the highest in the sample. But that was only 0.05% of Japan's population, which is barely above the 0.03% of Italy and Portugal, which are lowest on this measure, and far behind Australia's 0.47%. The essential question is, which indicator is more likely to capture differences in *policy*—non-DAC students/total foreign students or non-DAC students/total population? For students much more than unskilled workers, language is likely to be a major non-policy barrier, and probably does much to explain Japan's low foreign student numbers across the board. It seems more meaningful, then, to abstract from the predominantly non-policy factors that reduce the foreign student body altogether, by taking foreign student population as the denominator. The data are from the OECD.

The CDI also uses a simplified version of the UNHCR index. The CGD version is computed as total of three quantities, all taken over receiving-country GDP: the number of refugees hosted domestically; the number of other people "of concern" to UNHCR, such as those internally displaced; and the number of asylum applications taken.[24]

In 2006, B. Lindsay Lowell and Valerie Edwards Carro of the Institute for the Study of International Migration at Georgetown University took on the difficult task of developing additional indicators for the component (Lowell and Carro 2006). They proposed the following for consideration:

1) Financial contributions to the International Organization for Migration and UNHCR.

2) Membership in various U.N. and International Labour Organization (ILO) conventions. Namely: the ILO Migration for Employment Convention (number C97, 1949), Equality of Treatment (Social Security) Convention (C118, 1962), Migrations in Abusive Conditions (C143, 1975), Maintenance of Social Security Rights (C157, 1982); and the U.N. Convention Relating to the Status of Refugees (1951), Protocol Relating to the Status of Refugees (1967), ICPMW (1990), Convention against Transnational Organized Crime (2000), Trafficking Protocol (2000), and Smuggling Protocol (2000).

3) An indicator of whether foreigners pay higher tuition at a country's universities, this being penalized.

4) The number of resident foreign-born people with tertiary education, low being rewarded.

5) An indicator of the government's intentions, reported by knowledgeable officials to a particular U.N. agency, about whether it plans to increase, hold steady, or decrease skilled immigration flows, prospective decreases being rewarded.

6) A pair of similar indicators of prospective changes in openness to unskilled immigrants and inducements for them to return, both being rewarded.

7) An indicator of how much a donor's aid goes to the countries its immigrants come from.

In the end, only indicator 3 made it into the CDI. Nevertheless, Lowell and Carro's work is valuable in demonstrating that we have for now hit diminishing returns to design effort on the migration component, which highlights the need for researchers and governments to improve collective understanding of the issues and improve the data.

The concern with indicator 1 is that it is already counted as aid, thus factored into the aid component; and it is not clear that the ILO and UNHCR represent a particularly high-value use of aid or are nearly as important to most migrants as the donors' own immigration policies. As for indicator 2, Lowell and Carro doubted the practical importance of these treaties and gave them little weight. Indicator 4 penalizes brain drain but the CDI historically has not done so. Work by CGD fellow Michael Clemens has strongly questioned the seeming worst-case example of brain drain, the departure of health professionals from Africa. As suggested above, emigration appears to be a minor factor in the lack of access among poor Africans to good health care. Indicators 5 and 6 are based on *predictions* of future policy *changes* rather than *evidence* of past policy *states* and therefore are not consistent with the CDI construct. Finally, indicator 7 overlaps with the CDI aid component. In addition, it is premised on the debatable argument that countries where people are hostile to the influx of migrants ought to be proactive about improving conditions back home for would-be migrants, so they feel less compelled to leave. But to avoid complicated normative debates—do Guatemalan villagers deserve aid more than those in

[24] The UNHCR ranks all countries—not just rich countries—on the three indicators, averages the ranks, then reorders the countries and assigns final ranks.

Benin because it is relatively practical for them to come to the United States?—the CDI strives for utilitarianism, simply asking where aid will do the most good. Thus the pertinent question is whether there is an *interaction* that makes aid more valuable in countries that are major sources of a donor's immigrants. There appears to be no evidence of this.

Indicator 3, however, offers a nice complement to Grieco and Hamilton's statistic on foreign-born students since it is a more direct measure of policy. The OECD (2005a) reports on whether foreign students in general, or, for some European countries, non-European students, pay higher or the same tuition as nationals at public universities—or get in free, along with nationals. The three possibilities are translated into a 3-point scale.

Accepting the considered judgment of Grieco and Hamilton (2004), openness to foreign students, now comprising two indicators, gets 15% weight; and the modified UNHCR index gets 20%. The 15% for foreign students is now split between the outcome indicator, the share of foreign students who are from developing countries, and the policy indicator, on tuition levels. The remaining weight goes to the indicators of migration flows. Before combining the various measures, each is rescaled so that the back-calculated scores for 2003, the CDI's first year, average 5.0. Table 11 shows the calculations. Austria emerges on top. The major reason appears to be its acceptance of immigrants from the nearby the former Yugoslavia, which many people fled in the 1990s. With the revision of the Docquier and Marfouk data, Switzerland's reported value for the net stock change statistic has fallen substantially, from 331 million to 98 million, enough to pull it out of the top ranks on migration.

Table 11. Summary of migration component

	Net stock change, unskilled non-DAC immigrants, 1990–2000				Non-DAC immigrant gross inflow, most recent available year			Non-DAC students		Tuition for foreigners		Refugee population[1] + asylum applications		
	% of population	Migrant selectivity	Weighted % of population	Standardized score	% of population	Weighted % of population	Standardized score	% of foreign students	Standardized score	Points	Standardized score	Per billion $ GDP	Standardized score	**Overall**
Australia	0.82	0.59	0.49	4.5	0.43	0.25	4.3	88	6.4	1	2.8	42.6	1.5	**3.9**
Austria	4.14	0.50	2.05	19.1	0.78	0.39	6.5	49	3.6	1	2.8	291.1	10.1	**10.8**
Belgium	0.58	0.55	0.32	3.0	0.47	0.26	4.4	38	2.7	1	2.8	136.4	4.7	**3.7**
Canada	0.87	0.61	0.53	5.0	0.60	0.37	6.2	83	6.0	1	2.8	218.8	7.6	**5.9**
Denmark	1.27	0.57	0.73	6.7	0.56	0.32	5.4	65	4.7	1	2.8	159.0	5.5	**5.7**
Finland	0.64	0.51	0.33	3.0	0.30	0.16	2.6	75	5.5	3	8.5	83.1	2.9	**3.4**
France	0.37	0.64	0.23	2.2	0.20	0.13	2.2	84	6.1	2	5.6	121.1	4.2	**3.1**
Germany	0.97	0.49	0.47	4.4	0.52	0.25	4.3	79	5.7	2	5.6	244.4	8.5	**5.4**
Greece	0.12	0.59	0.07	0.7	1.13	0.67	11.2	95	6.9	2	5.6	237.7	8.2	**6.5**
Ireland	0.59	0.56	0.33	3.0	1.13	0.63	10.6	50	3.6	1	2.8	120.5	4.2	**5.8**
Italy	0.50	0.57	0.29	2.7	0.42	0.24	4.0	77	5.6	2	5.6	46.3	1.6	**3.3**
Japan	0.18	0.54	0.10	0.9	0.20	0.11	1.8	79	5.7	2	5.6	2.0	0.1	**1.8**
Netherlands	1.08	0.52	0.56	5.2	0.46	0.24	4.0	40	2.9	1	2.8	170.4	5.9	**4.6**
New Zealand	1.65	0.56	0.92	8.5	0.74	0.41	6.9	86	6.2	1	2.8	30.9	1.1	**6.0**
Norway	1.10	0.61	0.67	6.2	0.83	0.50	8.5	70	5.1	3	8.5	298.3	10.3	**7.8**
Portugal	0.70	0.61	0.43	4.0	0.68	0.42	7.0	86	6.2	2	5.6	3.7	0.1	**4.5**
South Korea	-0.01	0.64	-0.01	-0.1	0.00	0.00	0.0	93	6.8	2	5.6	1.7	0.1	**1.0**
Spain	1.14	0.52	0.59	5.5	1.01	0.52	8.8	77	5.6	2	5.6	7.1	0.2	**5.5**
Sweden	1.26	0.60	0.76	7.0	0.73	0.44	7.3	57	4.1	3	8.5	475.1	16.4	**8.8**
Switzerland	1.37	0.56	0.76	7.1	0.63	0.35	5.9	38	2.8	1	2.8	277.4	9.6	**6.6**
United Kingdom	0.37	0.69	0.26	2.4	0.23	0.16	2.7	64	4.7	1	2.8	162.8	5.6	**3.4**
United States	2.13	0.45	0.97	9.0	0.33	0.15	2.5	70	5.1	1	2.8	29.6	1.0	**4.6**
Average			0.54			0.30		69		1.8		144.4		
Weight				32.5%			32.5%		10%		5%		20%	

[1] "People of concern" to the U.N. High Commissioner for Refugees.

Environment

The environmental realm offers a wealth of potential indicators expressed in various units. Considerations run from treaty ratifications to dollar amounts of subsidies to rates of pollution. The approach taken in the component, as with migration, is to choose a set of indicators, translate each onto a standard scale, then combine them in a weighted average. Roodman (2003) set forth the original design. In 2005, Amy Cassara and Daniel Prager (2005) of the World Resources Institute proposed a revamping, dropping a few old indicators and adding a collection of new ones that deepened the component. The CDI version differs from their initial proposal in number of ways. Some of the changes the authors suggested in response to reviewers' comments; others CGD made.

The CDI version contains indicators in three major areas: global climate, fisheries, and biodiversity and global ecosystems. Each indicator is assigned 5%, 10%, or 15% weight in the whole. Most of the indicators are translated into standardized scores in the usual CDI way, such that 5 is average in the reference year of 2008 (meaning in the back-calculated 2008 edition of the current methodology, for which pre-2008 data would be used) while 0 indicates the complete absence of a good (such as gasoline taxes) or 10 indicates complete absence of a bad (such as greenhouse gas emissions). Exceptions are noted below. Table 12 shows results on all the indicators and Table 13 shows the standardized scores. The indicators are:

1) Global climate (60% of total)

   a) Greenhouse gas emissions per capita plus carbon equivalent of fossil fuel production (10%). The risks of climate change bear particularly on developing countries in part because they have less capacity to adapt. Climate change could affect agriculture and aid in the spread of diseases such as malaria and cholera (Gross 2002). The numerator includes many different gases converted to carbon dioxide–equivalent amounts. Population rather than GDP is the denominator in order to avoid sending the odd message that the richer a country is, the more acceptable it is for it to harm shared resources. Emissions, of course, are not a policy but an outcome. But policies ranging from land use planning to utility regulation do affect emissions, and are themselves hard to quantify. The indicator includes net emissions from land use and land use change, such as from deforestation and reforestation.

      Starting in 2010, the indicator adds in the carbon dioxide equivalent of fossil fuel *production*, on the idea that producer and consumer are co-responsible for emissions from fossil fuel burning. This penalty bears heavily on Norway, a major oil producer, and the Australia, a major coal producer.
   b) Average annual change in greenhouse gas emissions per unit GDP, last 10 years (15%). Most rich countries' economies are growing faster than their emissions, so that their greenhouse gas intensity (emissions/GDP) is falling. Their economic growth tends to take place in low-polluting industries such as information technology. But *differences* in the rate of decline appear to be a relatively good proxy for policy. The rates in the CDI are "least squares" decline rates for the last 10 years of available data—1996–2006 for the 2008 CDI. If decline rates were constant in percentage terms over time, then graphs of the log of emissions/GDP over time would be perfectly linear. In reality, they are not, so log emissions/GDP is regressed on time to find the best fit, and the corresponding average decline rate. This least squares approach, in contrast to the more obvious approach of looking at the difference between first and last years, reduces sensitivity to aberrations such as a cold winter in an end-point year. The GDP figures are converted to dollars on a purchasing power parity (PPP) basis. Emissions figures here too take into account land use and land use change.
   c) Gasoline taxes in PPP dollars per liter (15%). Gasoline taxes are indicative of motor fuel taxes in general (the other major fuel being diesel), which are collectively the major form of energy taxation in most rich countries. And there is a clear negative correlation across CDI countries between motor fuel taxes and motor fuel use (Roodman 1998, p. 174).

d) Consumption of ozone-depleting substances per capita (10%). Pursuant to the Montreal Protocol on Substances that Deplete the Ozone Layer, rich countries have radically reduced their consumption and production of ozone-depleting substances since a hole was discovered in the ozone layer over the Arctic in the 1980s. And more reductions can be expected as countries comply with increasingly tight limits on the chemicals. The indicator used here is consumption of ozone-depleting substances on an ozone-depleting-potential (ODP) basis, for 2003, the latest year with complete data. ODP-tons are a unit analogous to CO_2-equivalent tons of greenhouse gas emissions, allowing comparison of several different chemicals. The total includes chlorfluorocarbons (CFCs), hydrochlorfluorocarbons (HCFCs), and methyl bromide.[25] As with greenhouse gases, consumption of ozone-depleting substances is divided by population. Since the European Union reports as a single country under the Montreal Protocol, all 14 EU members scored for this index receive the same mark on this indicator.

e) Ratification of the Kyoto Protocol (10%). Finalized in 1997, this is the most important international effort to date to prevent climate change. It set important precedents by establishing emissions targets for industrial countries, and opening the way for international trading in emissions rights. Russia ratified the treaty in November 2004; as a result, it went into effect 90 days later, with only the United States remaining outside the treaty. This is a rare indicator with both a clear minimum (no ratification) and clear maximum (ratification). So in a departure from the usual scaling rules, a country gets a simple 10 points for ratification, so that the averages score is 9 rather than 5.

2) Fisheries (10% of total)

a) Fishing subsidies per capita (5%). Marine fisheries are most heavily exploited by rich countries, sometimes at the immediate expense of fishers from poorer countries. Half of all major marine fisheries are now fully exploited, and another quarter are overexploited, or have experienced a crash (FAO 2000). Most rich countries subsidize their fishing fleets. Landlocked Austria and Switzerland naturally do not. Dollar values for the subsidies are from OECD (2005b). They include direct payments and cost-reducing transfers but exclude general services, such as funding for the coast guard, fisheries management, membership in international organizations, and infrastructure construction, since the latter do not obviously increase fishing effort in waters near developing countries.[26]

b) Ratification of the United Nations Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (5%). The U.N. fisheries agreement is a treaty that helps nations coordinate management of fish stocks that migrate or are in international waters, including whales. It went into effect in 2001 and most rich countries have signed on to it—and most therefore get 10 points on this indicator.

3) Biodiversity and global ecosystems (30% of total)

a) Completeness of required reporting to multilateral treaties relating to biodiversity (15%). Following a recommendation of Cassara and Prager (2005), the 2005–08 editions of the CDI counted imports per capita of selected threatened species. However, the indicator proved hard to update and as we probed the matter we became convinced that the indicator is problematic. Today, most *reported* imports of species listed under the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES) have been specifically approved under rules set forth by that convention. So penalizing imports

[25] Data on other ozone-depleting substances is available but domestic consumption in rich countries is now very low. According to the U.N. Environment Programme, in fact, consumption of some of these chemicals is substantially negative because rich countries are exporting existing stocks, and consumption is defined as domestic production minus net exports. These negative values lead to strange results if included in the CDI.

[26] Originally the CDI also counted general services, but they were dropped in 2006. I thank Otto Gregussen for pointing us to this improvement.

has become hard to defend.

The 2009 CDI drops the measure of species imports. Replacing it is a new indicator, of how well countries comply with reporting requirements under four biodiversity-related treaties: CITES, the Convention on Biodiversity (CBD), the Convention on Migratory Species, and the Ramsar Convention on Wetlands of International Importance.[27] This new indicator also supplants another old one: that of ratification of the CBD. Each treaty requires signatories to report periodically, typically every two or three years, on actions they have undertaken to comply with the treaty. Some countries have reported more completely and promptly than others, and this appears to be a good indicator of their commitment to the treaties' aims. The scoring starts by assigning, for each required report, 2 points for complete, on-time reporting; 1 for reporting that is late or contains errors; and 0 when no report is filed or the country is not a member of the convention. Reporting histories back to 2001 are averaged together, with more recent data given more weight, according to a discount rate of 21% per year (50% per typical three-year cycle). Averaged scores for each of the four treaties are in turn simple-averaged for an overall score.

b) Value of tropical timber imports per capita (15%). Perhaps no other commodity import from developing countries is associated with as much environmental destruction as tropical wood. Some 70,000–170,000 square kilometers of tropical forests disappear annually in Latin America, Africa, and Asia. Although there are short-term economic benefits for some in the exporting countries, the lion's share of the income goes to a small group of timber company owners and the government rent-seekers that control timber licenses, while harming those who harvest wood more sustainably or harvest non-timber forest products such as wicker. Timber imports are not obviously a proxy for policy, but Cassara and Prager argue that rich-country governments have a responsibility to the global environmental impact of their societies, so that high imports indicate a failure to act. Because tropical timber ships in many forms—various species, plywood, pulp—it is difficult to measure total imports in physical units. So the dollar value of imports is used.[28] Some small European countries have extremely high tropical timber imports per capita, probably because they are ports of entry for the entire continent. So all 16 scored European nations are assigned the same, averaged score. Imports data are from the United Nations Commodity Trade Statistics Database.

[27] I thank Jon Hutton, Director of the U.N. Environment Programme World Conservation Monitoring Centre in Cambridge, UK, for suggesting this indicator.

[28] Tropical timber is defined as all goods in Harmonized System 2-digit codes 44 and 45 coming from non-CDI countries.

Table 12. Indicators used in environment component

	Global climate					Fisheries		Biodiversity and global ecosystems	
	Greenhouse gas emissions + fuel production/ capita, 2008	Annual change in greenhouse gas emissions/ PPP GDP, 1998–2008 (%)	Gasoline taxes, 2009 (PPP $/ liter)	Consumption of ozone-depleting substances/ capita, 2008	Kyoto Protocol ratification, end-2009	Fishing subsidies/ capita, 2006 ($)	UN Fisheries Agreement ratification, end-2009	Biodiversity treaties participation (average for 4 treaties, 2=full)	Tropical timber imports/ capita, 2008 ($)
Australia	29.4	–0.2	0.39	2.8	✓	0.00	✓	1.2	17.25
Austria	8.4	–0.3	0.92	4.0	✓	0.00	✓	1.2	14.69
Belgium	12.7	–3.1	1.16	4.0	✓	0.67	✓	1.3	14.69
Canada	21.7	–1.9	0.29	15.3	✓	8.60	✓	1.0	5.69
Denmark	12.0	–2.6	1.14	4.0	✓	3.30	✓	1.6	14.69
Finland	6.6	–5.7	1.19	4.0	✓	0.96	✓	1.3	14.69
France	7.3	–3.1	1.12	4.0	✓	0.32	✓	1.2	14.69
Germany	12.0	–1.6	1.24	4.0	✓	0.02	✓	1.4	14.69
Greece	11.5	–3.6	0.77	4.0	✓	3.93	✓	0.7	14.69
Ireland	15.9	–5.3	0.97	4.0	✓	4.92	✓	0.6	14.69
Italy	7.8	–1.0	1.07	4.0	✓	1.12	✓	1.5	14.69
Japan	9.5	–1.4	0.66	8.0	✓	0.13	✓	1.1	24.70
Netherlands	12.6	–2.6	1.28	4.0	✓	0.97	✓	1.2	14.69
New Zealand	11.6	–2.8	0.45	4.2	✓	0.00	✓	1.3	7.31
Norway	5.4	–6.7	1.22	2.3	✓	1.95	✓	1.3	14.69
Portugal	7.1	–0.4	1.10	4.0	✓	0.09	✓	1.3	14.69
South Korea	13.0	–2.0	0.74	63.4	✓	1.87	✓	1.1	17.49
Spain	8.7	–1.6	0.78	4.0	✓	3.99	✓	1.7	14.69
Sweden	5.4	+0.1	1.04	4.0	✓	0.22	✓	1.5	14.69
Switzerland	7.0	–1.4	0.79	1.2	✓	0.00	✓	0.9	14.69
United Kingdom	10.3	–3.4	1.05	4.0	✓	0.03	✓	1.5	14.69
United States	19.8	–2.7	0.13	22.7		0.95	✓	0.9	7.62

Table 13. Summary of environment component

	Global climate					Fisheries		Biodiversity and global ecosystems		
	Greenhouse gas emissions + fuel production/ capita, 2008	Annual change in greenhouse gas emissions/ PPP GDP	Gasoline taxes	Consumption of ozone-depleting substances/ capita	Kyoto Protocol ratification	Fishing subsidies/ capita	UN Fisheries Agreement ratification	Biodiversity treaties participation	Tropical timber imports/capita	**Overall**
Australia	–6.3	0.4	2.5	8.6	10.0	10.0	10.0	4.8	3.9	4.0
Austria	8.2	0.7	5.9	8.0	10.0	10.0	10.0	4.6	4.8	6.0
Belgium	7.3	6.4	7.5	8.0	10.0	7.5	10.0	5.2	4.8	7.0
Canada	–0.8	4.0	1.9	2.1	10.0	–21.4	10.0	3.8	8.0	3.2
Denmark	5.0	5.4	7.3	8.0	10.0	–2.1	10.0	6.3	4.8	6.3
Finland	8.6	11.8	7.7	8.0	10.0	6.5	10.0	5.0	4.8	7.9
France	8.5	6.4	7.2	8.0	10.0	8.8	10.0	4.7	4.8	7.1
Germany	6.9	3.4	8.0	8.0	10.0	9.9	10.0	5.4	4.8	6.7
Greece	6.9	7.5	5.0	8.0	10.0	–4.3	10.0	2.9	4.8	5.8
Ireland	6.7	11.1	6.3	8.0	10.0	–8.0	10.0	2.3	4.8	6.2
Italy	8.2	2.1	6.9	8.0	10.0	5.9	10.0	5.8	4.8	6.3
Japan	8.0	2.9	4.3	5.9	10.0	9.5	10.0	4.1	1.2	5.2
Netherlands	5.6	5.4	8.3	8.0	10.0	6.5	10.0	4.7	4.8	6.7
New Zealand	6.5	5.9	2.9	7.9	10.0	10.0	10.0	5.3	7.4	6.7
Norway	–16.0	13.9	7.9	8.8	10.0	2.9	10.0	5.2	4.8	5.7
Portugal	8.5	0.8	7.1	8.0	10.0	9.7	10.0	5.3	4.8	6.3
South Korea	7.2	4.2	4.8	–22.6	10.0	3.2	10.0	4.5	3.8	2.7
Spain	8.0	3.4	5.0	8.0	10.0	–4.5	10.0	6.5	4.8	5.8
Sweden	8.9	–0.3	6.7	8.0	10.0	9.2	10.0	5.8	4.8	6.2
Switzerland	8.5	2.9	5.1	9.4	10.0	10.0	10.0	3.6	4.8	6.2
United Kingdom	6.4	7.2	6.8	8.0	10.0	9.9	10.0	5.7	4.8	7.1
United States	2.7	5.6	0.8	–1.7	0.0	6.5	10.0	3.7	7.3	3.6
Weight	10%	15%	15%	10%	10%	5%	5%	15%	15%	

Security

Internal stability and freedom from fear of external attack are prerequisites for development. Sometimes a nation's security is enhanced by the actions of other nations. But as recent events have made obvious, one person's liberation is another's destructive intervention, so choosing what to reward or penalize in the CDI is inherently controversial.

The 2004 security component, done under the guidance of Michael O'Hanlon and Adriana Lins de Albuquerque of the Brookings Institution (2004), counted contributions to peacekeeping operations and forcible humanitarian interventions. In 2005, we added two new sections to the component, on protection of sea lanes for global trade and on arms exports. In 2008, two analysts based at the International Institute for Strategic Studies (IISS) in London, Mark Stoker and Jason Alderwick, revamped the database on which these additions are based by going directly to official documents and sources of the individual CDI countries.

Examples of peacekeeping and humanitarian interventions operations counted include the Australian-led intervention in East Timor in 1999 to halt Indonesian repression after the territory had voted for independence, and the NATO-led war against the Serbian army in Kosovo. This subcomponent uses data from 1993 to 2007. The rationale for this long period is that total government contributions to such operations is a particularly volatile variable—Kosovo's and East Timor's do not come along that often. A decade or more of history gives more insight than two years into a government's *current* capacity and willingness to intervene. However, older data get less weight, as explained below.

Because of the inherent controversy in choosing which rich-country interventions to reward, it seems essential for validity, in considering the universe of interventions over the last decade or so, to apply either a weighting system in counting interventions—analogous to the aid component's weighting based on recipient poverty and governance—or a filter, which is actually an extreme form of weighting. The CDI follows O'Hanlon and de Albuquerque's advice for a filter: it only counts operations that have been endorsed by an international body such as the U.N. Security Council, NATO, or the African Union.[29]

To be precise, five costs of peacekeeping and humanitarian interventions are counted, all taken as a share of rich-country GDP:

1) Dollar contributions to the U.N. peacekeeping budget. These are averaged over 1998–2009. Data are not available for 1993–97. Data are from the U.N. Department of Peacekeeping Operations (UNDPKO).

2) The cost of *maintaining capacity* for contributing personnel to U.N.-run peacekeeping operations. To estimate this, a country's *peak* personnel contribution to such operations during 1993–2009 as a share of its standing military forces is computed. This percentage is then applied to its military budget for the year. Personnel tabulations are also from the UNDPKO.

3) The cost of *deploying* personnel in U.N.-run peacekeeping operations. This is estimated at $9,000/person/month. (The full cost is estimated at $10,000, but the U.N. reimburses contributing countries at the rate of about $1,000/person/month.) This too is averaged over 1993–2009.

4) The cost of maintaining capacity for contributing personnel to peacekeeping and forcible humanitarian operations that are *not* U.N.-run but receive international approval. This is calculated in the same way as item

[29] The component excludes a pair of operations that technically make it through the filter: the U.S. and French peacekeeping interventions in Rwanda immediately after the genocide and revolution in 1994. These interventions were approved by the U.N. Security Council, but the overall behavior of rich countries with respect to Rwanda during the genocide was totally contrary to the spirit of this component.

2. (Table 14 lists some operations counted.) Information on non-U.N. operations comes from the Institute for International Strategic Studies (IISS, 2008).

5) The cost of *deploying* personnel in such non-U.N. operations—calculated the same way as item 3, except using $10,000/person/month.

Two aspects of this methodology need to be explained. First, in a departure from O'Hanlon and de Albuquerque, all the tabulations incorporate a discount rate of 7%/annum, equivalent to 50%/decade, on the grounds that a recent contribution is more indicative of present policy stance than an old one. Thus the averages described above are weighted averages, with each year getting 7% less weight than the next. And the peaks are discounted too. Absent the discounting, we would face each year a choice between dropping the oldest year's data as we shift the time frame forward, which could introduce unrealistic discontinuities, and expanding the time frame across which equal weighting occurs, a choice that, if perpetuated for many years, would create absurdities as ancient events received as much weight as current ones. The discounting allows us to formally expand the time frame while smoothly phasing out old data.

Second, neither the U.S.-led invasion of Iraq nor the "postwar" military presence approved by the U.N. Security Council on October 16, 2003 are counted. The invasion is left out because it lacked an international imprimatur. The later, U.N.-approved operations technically pass through the filter. However, including them would completely change the security component results and would go against the spirit of the filter, rewarding the United States, and, to a lesser extent, Britain, for spending hugely to continue a "job" that never won approval from the international community.

The security component also attempts to capture the contribution that global sea powers make by securing important international trading routes against piracy or threat from hostile governments, or supporting the kinds of operations discussed above with their navies. The indicator is meant to proxy for the larger contribution of the major powers to securing the international economic order, which has allowed many developing countries to grow fast and reduce poverty through trade. The approach, developed by O'Hanlon, is rough but ready. His short note describing it reads in substantial part:

> Based on the premise that key ocean trading routes require some level of protection or presence, even today, to ensure their availability for global trade—a necessary feature of any development strategy—we estimate here the corresponding financial contributions (in dollar equivalent value) of the 21 CGD countries for this purpose. Deployments to the Mediterranean, Persian Gulf, Western Pacific including Northeast Asia and the Indonesian Straits, and Indian Ocean are all viewed as serving this purpose. (Deployments in the Caribbean are not, given the relatively benign character of those waters; the Mediterranean is a judgment call, but included here nonetheless.) The presence of ships in these waters can reduce and deter piracy, reduce the chances that countries in Southeast Asia will use force to compete for disputed resources in the South China Sea, and possibly lower the risks of terrorism against a merchant ship in key shipping lanes.
>
> The methodology is simple. The fraction of a country's Navy ships typically deployed for such purposes is calculated…and multiplied by the country's Navy budget (or an estimate of it, where need be—assuming somewhat crudely that whatever the Navy's fraction of a country's total military manpower might be, that is also the fraction of its defense budget allocated to naval forces). This may understate a fair estimate of actual contributions, since ships cannot be continuously deployed (so it typically takes 3x or 4x ships in the fleet to keep x deployed). But it may also overstate, in some ways, given that those deployed ships clearly have other tasks besides defending sea lanes. Also, this approach implicitly assumes that aircraft and other naval assets are deployed roughly in comparable proportions to how ships are deployed.

Until 2008, the underlying data were culled from the IISS's annual *Military Balance* and yielded credits for only four countries: France, the Netherlands, the United Kingdom, and the United States. However, this year, Jason Alderwick, one of the authors of that report, contributed a much more comprehensive data set. The

data and calculations are in Table 16. These credits are then multiplied by developing countries' share in total world trade (exports plus imports), 29.3% for the 2009 CDI, to reflect the reality that only part of the benefits of global sea lanes protection goes to developing countries.

Finally, there is a penalty for arms exports, which was developed in consultation with O'Hanlon.[30] The question of how and whether to penalize arms exports to developing countries has been with the CDI project since the start, and the absence of any penalty in the first two editions was noted by commentators such as Picciotto (2003) and the U.K. House of Commons International Development Committee (2004). Certainly, putting weapons in the hands of despots can increase repression at home and the temptation for military adventures abroad. And when the weapons are sold instead of given, they siphon away money that could be better spent on teachers or transit systems. But arms exports are not always bad. Countries need guns as well as butter. Arming a police force can strengthen the rule of law. So it is not obvious how to develop a defensible system for deciding which exports to penalize and which not.

Since 2005, the CDI has contained what can be seen as an attempt at consensus on how to judge rich countries' overall policies on arms exports. Until 2008, it drew exclusively on a database of the Stockholm International Peace Research Institute on transfers of major conventional weapons systems, broken down by importer-exporter pair.[31] The SIPRI database does not distinguish between market-price sales, subsidized sales, and outright grants. In fact, because the value of transfers is often difficult to determine from press reports and other sources, SIPRI uses standard conversion factors—say, $100 million each for a certain class of fighter jet—to express transfers in dollar terms, yielding what it calls "trend indicator values."

Starting in 2008, the data were collected differently. Mark Stoker, based at the IISS, has collected arms exports data directly from official documents of each of the CDI countries, the latest data being for 2007. The SIPRI data come primarily from press reports, which may be a necessary basis for a database that aims for global coverage, including opaque and authoritarian regimes. The new data collection strategy takes advantage of the higher quality of available data from the comparatively transparent CDI countries. For the 2009 edition, Stoker expanded his database back to 2001 for most exporters.

The arms export penalty works from these data, weighting exports depending on which countries they go to. To be precise, three weights are applied multiplicatively. The computation of these weights has been changed in 2009. The first weight depends on how democratic the recipient is, according to the subcomponent of the Kaufmann-Kraay index on "voice and accountability" (VA). Previously, sales to countries above average on this index (above 0) were zeroed out. Sales to those below average were multiplied by the recipient's (negative) VA score. Thus the CDI was neutral on arms exports to governments that are reasonably accountable to the governed and penalizes those to undemocratic governments. As of 2009, however, the weight is simply VA–2. Since VA scores range largely between +2 and –2, subtracting 2 creates a negative weight that puts the greatest emphasis on countries with the lowest VA scores.

The second weight is based on how heavily recipients spend on the military in general. Previously, exports to those that spend below average for developing countries also got 0 weight. This was meant to acknowledge that military spending—and arms exports—can be appropriate up to some point in every country. Exports to the rest were weighted by the extent to which their spending exceeds the average. But here too, the threshold has been eliminated for 2009, and the weight is now simply the country's military spending as a percentage of GDP.

The last weight is based on the recipient's GDP/capita—the same as is used to weight aid in the selectivity calculation of the aid component. It is meant to capture the opportunity cost of giving arms to the poorest

[30] Ethan Kapstein's advice was also critical.
[31] I thank Michiko Yamashita for alerting us to this data set.

countries. Whether sold or granted, the resources used to arm the poorest countries have high opportunity cost if they come at the expense of meeting basic needs. Thus exports to the poorest countries, provided they are relatively unaccountable and heavy military spenders, are penalized more heavily. For lack of data, exports of machine guns and other small arms are not included in the SIPRI database, thus neither in the CDI.

The threshold structure in the VA and military spending weighting was eliminated in order to reduce the skew in scores on this component, which can generate explosively large negative scores under the CDI's mean-5 transformation. For intuition, imagine that only 1 of the 22 CDI countries exports any weapons to nations with non-zero weights, ones that are below average on VA and above average on military spending. Under the mean-5 normalization that country would score –100, regardless of how tiny its export volume, while the other exporters scored perfect 10's (producing an average of 5 for the 22). Eliminating the threshold lifted the average value of weighted arms exports/GDP for the 22 countries, relative to which the largest values on this indicator (for France, the U.K., and the U.S.) shrank, producing less extreme scores. As it is, France still scores –14.0, the U.K. –25.2, and the U.S. –1.0.

Table 17 shows the weight derivations for these countries and their total imports according to the 2007 data. It is evident that exports to a handful of nations in the Middle East and South Asia drive the results. Because arms exports, like armed interventions, are volatile in quantity from year to year, here too multi-year discounted averages are taken. We use a discount rate of 13% per annum, so that exports five years ago matter half as much as today's. This rate is higher than that for armed interventions because arms exports policy is more changeable.

Table 18 runs the arms exports numbers.

The three major sections of the security component are combined as follows. Since the final results for humanitarian interventions and sea lanes protection are both government spending as fractions of GDP, they are simply added together. The results are put on the standard mean-5 scale, as are those for arms exports, and the two are averaged in a 87.5/12.5 ratio. The relatively low 12.5% weight for arms exports is meant to damp the extreme skew in the indicator, with France and the United Kingdom scoring below –10 (meaning that they have more than four times the average amount of weighted arms transfers).

Table 19 computes the overall security results for 2008.

Table 14. Selected non–U.N.-run military operations counted in CDI security component

Where	When	Major participants
Afghanistan (postwar)	2001–present	Canada, France, Germany, Italy, Spain, U.K.
Albania (aid for Kosovo refugees)	1999	Italy
Bosnia[1]	1996–present	Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Italy, Netherlands, Norway, Portugal, Spain, Sweden, U.K., U.S.
Bougainville, Papua New Guinea	1998–2003	Australia, New Zealand
Côte d'Ivoire	2002–03	France
East Timor	1999–2000	Australia
Egypt and Israel	1982–present	U.S.
Haiti	1994–95	U.S.
Kosovo (air war)	1999	Belgium, France, Germany, Italy, Netherlands, U.K., U.S.
Kosovo (postwar)[2]	1999–present	Germany, Italy, Netherlands, Norway, Portugal, Spain, Sweden, U.K., U.S.
Iraq (Northern no-fly zone)	1997–2003	U.K., U.S.
Sierra Leone	2000	U.K.
Solomon Islands	2003–04	Australia, New Zealand
Somalia	1992–93	U.S.

[1]Includes implementation force (IFOR), stabilization force (SFOR), and operation Deliberate Forge.
[2]Includes operation Joint Guardian and Kosovo Force (KFOR).

Table 15. Summary of measurement of contributions to peacekeeping and forcible humanitarian interventions (% of GDP), 2009

	U.N.-run peacekeeping operations and humanitarian interventions			Non–U.N.-run PKO and humanitarian interventions		
	Contributions to U.N. peacekeeping	Cost of maintaining personnel	Cost of using personnel	Cost of maintaining personnel	Cost of using personnel	Total
Australia	0.015	0.034	0.010	0.108	0.016	0.183
Austria	0.017	0.014	0.025	0.018	0.022	0.095
Belgium	0.018	0.011	0.010	0.025	0.030	0.094
Canada	0.015	0.021	0.008	0.065	0.026	0.135
Denmark	0.017	0.031	0.012	0.048	0.043	0.151
Finland	0.016	0.022	0.029	0.043	0.044	0.154
France	0.019	0.018	0.010	0.059	0.036	0.141
Germany	0.019	0.005	0.002	0.042	0.028	0.097
Greece	0.013	0.004	0.003	0.030	0.073	0.124
Ireland	0.011	0.027	0.048	0.028	0.014	0.129
Italy	0.016	0.021	0.005	0.044	0.037	0.123
Japan	0.027	0.002	0.000	0.000	0.000	0.029
Netherlands	0.017	0.023	0.007	0.073	0.041	0.161
New Zealand	0.015	0.065	0.028	0.085	0.028	0.220
Norway	0.012	0.057	0.020	0.056	0.037	0.181
Portugal	0.016	0.022	0.033	0.028	0.041	0.140
South Korea	0.011	0.002	0.004	0.001	0.001	0.018
Spain	0.016	0.010	0.004	0.015	0.023	0.068
Sweden	0.018	0.019	0.011	0.072	0.025	0.145
Switzerland	0.013	0.006	0.001	0.049	0.006	0.075
United Kingdom	0.019	0.030	0.006	0.140	0.042	0.238
United States	0.010	0.003	0.001	0.217	0.023	0.253

Table 16. Details of calculation of contribution to protecting sea lanes, 2009

		Major Ships							Naval budget (first row of each block), and estimated part devoted to each operation based on ship counts		Estimated cost of operations as share of
Country	Operation	Sub-marines	Principle surface com-batants	Mine warfare ships	Amphib-ious	Principle support & logistics	Patrol & coastal com-batants	Total	($ million)	GDP ($ billion)	GDP (%)
Australia	Full fleet	6	12	8	3	18	14	61	5,140		
	CMF		1					1	84.26	1,119	0.0075
Belgium	Full fleet		2	6		7	1	16	447		
	NATO			1				1	27.94	479	0.0117
	EUNAVFOR		1					1	27.94		
Canada	Full fleet	4	15	12		10		41	4,028		
	CMF		1					1	98.24	1,470	0.0134
	NATO/Active Endeavour[2]		1					1	98.24		
Denmark	Full fleet			8		12	19	39	1,079		
	NATO/Active Endeavour[2]					2		2	55.33	337	0.0164
Finland	Full fleet			6	7	26	8	47	474		
	OSCE/Partnership for Peace[4]			1				1	10.09	258	0.0039
France	Full fleet	9	33	21	8	15	17	103	9,510		
	National standing commitments		3		3	1	8	15	1,384.95		
	EUNAVFOR	1	3			1		5	461.65	2,870	0.0708
	CMF		1			1		2	184.66		
Germany	Full fleet	12	18	14	3	17	10	74	5,414		
	UNIFIL[3]					1	2	3	219.49	3,400	0.0215
	NATO/Active Endeavour[2]		2	2				4	292.65		
	EUNAVFOR		2					2	146.32		
	CMF		1					1	73.16		
Greece	Full fleet	8	17	11	5	18	40	99	1,702		
	UNIFIL[3]						1	1	17.19		
	NATO/Active Endeavour[2]		1	1				2	34.38	390	0.0176
	EUNAVFOR		1					1	17.19		
Italy	Full fleet	6	26	12	3	14	14	75	4,609		
	NATO/Active Endeavour[2]		1	2				3	184.36	2,260	0.0109
	UNIFIL[3]		1					1	61.45		

Japan	Full fleet	16	52	32	5	18	7	130	12,029		
	MSO		2					2	185.06	5,300	0.0052
	CMF		1					1	92.53		
Netherlands	Full fleet	4	6	10	2	3		25	3,093		
	National standing commitments		1					1	123.72		
	EUNAVFOR		1					1	123.72	860	0.0432
	NATO/Active Endeavour[2]			1				1	123.72		
New Zealand	Full fleet		2			4	6	12	344	132	-
Norway	Full fleet	6	3	6		7	6	28	1,661		
	EUNAVFOR		1					1	59.32	435	0.0136
Portugal	Full fleet	1	12		1	5	18	37	968		
	NATO/Active Endeavour[2]		1					1	26.16	240	0.0109
Spain	Full fleet	4	12	7	4	12	31	70	3,384		
	EUNAVFOR		1					1	48.34	1,540	0.0063
	NATO/Active Endeavour[2]			1				1	48.34		
Sweden	Full fleet	4	5	11	17	12	14	63	1,391		
	EUNAVFOR					1		1	22.08	429	0.0051
United Kingdom	Full fleet	13	28	16	7	18	23	105	8,665		
	NATO/EUNAVFOR		1	1				2	165.05		
	CMF		3	4	2	1		10	825.24	2,260	0.0621
	National standing commitments		2			2	1	5	412.62		
United States	Full fleet	71	106	9	31	44	16	277	160,566		
	NATO		2					2	1,159.32		
	CMF		2					2	1,159.32		
	4th Fleet - Caribbean & S Atlantic		8		2	3		13	7,535.59	13,800	0.2730
	5th Fleet + African Part Station	1	9	4	3	5	5	27	15,650.84		
	6th Fleet - Meditterranean		1			1		2	1,159.32		
	7th Fleet - Western Pacific	2	11	2	3	1		19	11,013.55		

[1]Afghanistan. [2]Mediterranean. [3]Lebanon. [4]Organization for Security and Cooperation in Europe.

Table 17. Arms transfer penalty weights, 2008

Importer	A. Voice and accountability	B. Defense expenditure/GDP	C. GDP/ capita	D. Log GDP/ capita	E. GDP weight	Penalty weight ((A – 2) × B × F)	Total arms transfers (million $)
Saudi Arabia	–1.74	8.15	10,250	9.24	0.57	–17.37	4,903.54
Poland	0.86	2.03	6,222	8.74	0.71	–1.66	1,723.50
Israel	0.69	8.01	21,869	9.99	0.35	–3.68	1,648.30
Egypt, Arab Rep.	–1.19	2.30	1,786	7.49	1.07	–7.89	1,481.96
India	0.45	2.45	718	6.58	1.34	–5.07	1,449.45
Malaysia	–0.58	1.96	5,151	8.55	0.77	–3.90	1,413.15
Singapore	–0.41	4.13	27,991	10.24	0.28	–2.79	858.98
Pakistan	–1.01	3.27	650	6.48	1.37	–13.43	845.58
Turkey	–0.19	2.17	5,099	8.54	0.77	–3.66	809.63
South Africa	0.68	1.36	3,764	8.23	0.86	–1.54	709.12
Jordan	–0.71	5.88	2,476	7.81	0.98	–15.64	357.25
Morocco	–0.70	3.31	1,718	7.45	1.09	–9.70	351.88
Colombia	–0.26	3.72	2,986	8.00	0.93	–7.78	293.03
Brazil	0.51	1.48	4,448	8.40	0.81	–1.79	179.64
Bahrain	–0.82	2.67	16,968	9.74	0.43	–3.20	172.17
Bulgaria	0.60	2.19	2,570	7.85	0.97	–2.98	140.17
Czech Republic	1.02	1.48	7,593	8.94	0.66	–0.95	139.64
China	–1.72	1.96	1,965	7.58	1.05	–7.65	137.81
Mexico	0.08	0.40	6,591	8.79	0.70	–0.53	133.21
Indonesia	–0.14	0.98	1,087	6.99	1.22	–2.56	132.26
Thailand	–0.56	1.51	2,640	7.88	0.96	–3.71	116.58
Chile	0.98	3.51	6,212	8.73	0.71	–2.56	113.00
Russian Federation	–0.97	3.50	3,030	8.02	0.92	–9.57	111.14
Algeria	–1.05	3.11	2,190	7.69	1.02	–9.62	103.72
Romania	0.48	1.50	2,845	7.95	0.94	–2.14	93.23
Kazakhstan	–1.01	0.99	2,378	7.77	0.99	–2.96	73.27
Ukraine	–0.03	2.67	1,156	7.05	1.20	–6.49	66.92
Latvia	0.86	1.88	6,034	8.71	0.72	–1.54	62.48
Tunisia	–1.26	1.31	2,744	7.92	0.95	–4.07	61.29
Libya	–1.90	1.18	7,685	8.95	0.65	–3.01	59.82
Lithuania	0.85	1.56	5,996	8.70	0.72	–1.30	58.76
Nigeria	–0.60	0.00	491	6.20	1.45	–0.00	49.32
Slovenia	1.02	1.64	13,784	9.53	0.48	–0.78	38.65
Venezuela, RB	–0.62	1.06	5,964	8.69	0.73	–2.02	31.84
Hungary	1.00	1.21	6,228	8.74	0.71	–0.86	31.05
Estonia	1.03	2.24	7,048	8.86	0.68	–1.47	29.68
Cyprus	0.99	3.68	15,510	9.65	0.45	–1.67	29.48
Slovak Republic	0.89	1.55	8,591	9.06	0.62	–1.07	29.20
Philippines	–0.20	0.81	1,225	7.11	1.18	–2.11	28.97
Argentina	0.32	0.76	9,894	9.20	0.58	–0.74	28.79
Georgia	–0.25	8.11	1,268	7.15	1.17	–21.44	28.02
Ecuador	–0.22	2.83	1,746	7.47	1.08	–6.79	26.09
Lebanon	–0.40	4.45	5,814	8.67	0.73	–7.83	24.78
Peru	0.02	1.24	2,921	7.98	0.93	–2.29	19.88
Bangladesh	–0.61	1.13	462	6.14	1.46	–4.32	16.57
Kenya	–0.16	1.96	453	6.12	1.47	–6.21	15.53
Albania	0.13	2.03	1,799	7.50	1.07	–4.08	14.12
Yemen	–1.18	4.50	561	6.33	1.41	–20.13	13.49
Croatia	0.48	1.82	6,796	8.82	0.69	–1.90	12.92
Bolivia	–0.01	1.50	1,173	7.07	1.19	–3.59	11.58
Angola	–1.07	2.86	1,338	7.20	1.16	–10.14	11.32
Azerbaijan	–1.23	2.68	2,131	7.66	1.02	–8.87	10.66

Chad	–1.45	0.96	277	5.62	1.61	–5.36	9.22
Uzbekistan	–1.90	0.54	840	6.73	1.29	–2.71	8.90
Ethiopia	–1.30	1.53	190	5.25	1.72	–8.66	8.14
Bosnia and Herzegovina	0.00	1.40	2,155	7.68	1.02	–2.84	7.82
Vietnam	–1.62	2.02	647	6.47	1.37	–9.97	7.10
Sudan	–1.77	4.22	532	6.28	1.42	–22.63	7.04
Belize	0.74	1.00	3,691	8.21	0.86	–1.09	6.41
Dominican Republic	0.14	0.58	3,623	8.20	0.87	–0.95	6.39
Kyrgyz Republic	–0.72	2.42	376	5.93	1.52	–10.04	6.28
Macedonia, FYR	0.16	2.05	2,178	7.69	1.02	–3.83	6.23
Uruguay	1.02	1.22	8,788	9.08	0.61	–0.74	5.99
Botswana	0.55	3.38	4,497	8.41	0.81	–3.98	5.56
Turkmenistan	–2.06	2.90	1,700	7.44	1.09	–12.83	5.48
Djibouti	–1.12	4.14	847	6.74	1.29	–16.65	5.05
Sri Lanka	–0.44	3.02	1,199	7.09	1.19	–8.74	4.62
Papua New Guinea	0.09	0.43	676	6.52	1.35	–1.10	4.14
Benin	0.34	1.01	360	5.89	1.54	–2.58	3.70
Armenia	–0.66	3.18	1,520	7.33	1.12	–9.48	3.60
Mongolia	0.24	1.44	735	6.60	1.33	–3.37	3.60
El Salvador	0.06	0.53	2,676	7.89	0.96	–0.99	3.08
Uganda	–0.47	2.26	348	5.85	1.55	–8.63	2.67
Jamaica	0.61	0.55	3,795	8.24	0.86	–0.65	1.70
Guatemala	–0.26	0.48	1,906	7.55	1.06	–1.15	1.66
Congo, Dem. Rep.	–1.48	1.37	97	4.57	1.91	–9.12	1.46
Ghana	0.48	0.68	329	5.80	1.56	–1.61	1.44
Senegal	–0.16	1.63	536	6.28	1.42	–5.02	1.40
Honduras	–0.29	0.67	1,437	7.27	1.14	–1.76	1.34
Tajikistan	–1.32	2.17	245	5.50	1.65	–11.87	1.25
Mali	0.28	1.97	295	5.69	1.59	–5.41	1.19
Nicaragua	–0.14	0.63	905	6.81	1.27	–1.72	1.17
Zambia	–0.09	1.83	387	5.96	1.51	–5.79	1.13
Moldova	–0.27	0.44	588	6.38	1.39	–1.41	1.04
Cameroon	–1.02	1.48	703	6.56	1.34	–6.00	1.04
Mauritius	0.88	0.16	4,813	8.48	0.79	–0.14	0.98
Malawi	–0.18	1.16	158	5.06	1.77	–4.49	0.95
Panama	0.59	0.98	5,580	8.63	0.75	–1.03	0.81
Gabon	–0.84	1.06	4,168	8.34	0.83	–2.50	0.76
Tonga	–0.08	1.48	1,666	7.42	1.09	–3.36	0.71
Nepal	–0.79	1.47	254	5.54	1.64	–6.71	0.69
Rwanda	–1.24	1.52	313	5.75	1.58	–7.74	0.61
Central African Republic	–1.00	1.58	232	5.45	1.66	–7.90	0.59
Syrian Arab Republic	–1.75	3.38	1,330	7.19	1.16	–14.68	0.46
Guinea	–1.32	2.23	410	6.02	1.50	–11.10	0.37
Guyana	0.17	0.79	1,104	7.01	1.21	–1.75	0.31
Fiji	–0.65	1.34	2,181	7.69	1.02	–3.61	0.31
Namibia	0.57	3.02	2,714	7.91	0.95	–4.11	0.30
Paraguay	–0.33	0.83	1,516	7.32	1.12	–2.16	0.28
Belarus	–1.60	1.38	2,485	7.82	0.98	–4.85	0.28
Tanzania	–0.09	0.93	373	5.92	1.53	–2.95	0.26
Cape Verde	0.95	0.55	1,576	7.36	1.11	–0.64	0.20
Liberia	–0.29	0.49	148	5.00	1.79	–2.01	0.19
Burundi	–0.66	3.77	111	4.71	1.87	–18.80	0.15
Seychelles	–0.04	0.98	8,208	9.01	0.63	–1.27	0.15
Gambia	–0.97	0.70	374	5.93	1.52	–3.16	0.12
Mozambique	–0.02	0.85	357	5.88	1.54	–2.64	0.09
Sierra Leone	–0.28	2.28	261	5.57	1.63	–8.48	0.07
Niger	–0.41	0.00	180	5.19	1.74	–0.00	0.07

Togo	–1.13	1.97	245	5.50	1.65	–10.13	0.05
Cambodia	–0.94	1.11	511	6.24	1.43	–4.66	0.04
Bahamas, The	1.14	0.71	17,323	9.76	0.42	–0.26	0.04

Table 18. Summary of penalty for arms exports (% of exporter's GDP), 2008

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Weighted average
Australia	–0.0106	–0.0141	–0.0149	–0.0040			–0.0089	–0.0129	–0.0157						
Austria			–0.0026	–0.0670	–0.0563	–0.0171	–0.1387	–0.1016	–0.0701	–0.0360	–0.0539	–0.0924	–0.0552	–0.0563	–0.0563
Belgium	–0.3372	–0.0699	–0.0253	–0.0222	–0.0251	–0.0458	–0.7390	–0.3743	–0.7466	–0.1994	–0.1958	–0.2136	–1.7168	–2.2552	–2.2552
Canada	–0.1223	–0.1175	–0.0843	–0.0769	–0.0470	–0.0445	–0.0673	–0.0805	–0.2227	–0.2871	–0.0234			–0.0656	–0.0656
Denmark							–0.0015	–0.0100	–0.0030	–0.1620	–0.0075	–0.0144	–0.0229	–0.0288	–0.0288
Finland	–0.3284		–0.0009	–0.0007		–0.0074	–0.0199	–0.1615	–0.0634	–0.0258	–0.1110	–0.0600	–0.0659	–0.0522	–0.0522
France	–0.3447	–0.5501	–0.3650	–0.4655	–0.8630	–0.4243	–0.8772	–2.3291	–1.1590	–3.4890	–1.0379	–1.1854	–0.9142	–0.7793	–0.7793
Germany	–0.3545	–0.3432	–0.0973	–0.3039	–0.2690	–0.3111	–0.3303	–0.1844	–0.4739	–0.3249	–0.3903	–0.3908	–0.4466	–0.4079	–0.4079
Greece		–0.0116	–0.0232	–0.0055	–0.0019		–0.0147	–0.0016	–0.0055	–0.0043	–0.0186	–0.0169	–0.0090	–0.1676	–0.1676
Ireland							–0.0618	–0.0532	–0.0316	–0.0061	–0.0141	–0.0061	–0.0016	–0.0037	–0.0037
Italy	–0.1796	–0.2098	–0.2459	–0.0348	–0.0816	–0.0930	–0.1111	–0.1125	–0.1360	–0.0645	–0.1203	–0.1507	–0.1806	–0.1973	–0.1973
Japan															
Netherlands	–0.3570	–0.8012	–0.6130	–0.4524	–0.3302	–0.2175	–0.0117	–0.1369	–0.2592	–0.0318	–0.1631	–0.1775	–0.1134	–0.2759	–0.2759
New Zealand					–0.0034	–0.0027									
Norway	–0.0046						–0.1061	–0.2230	–0.1358	–0.2464	–0.1483	–0.0915	–0.1911	–0.3335	–0.3335
Portugal							–0.0092	–0.0020	–0.0351	–0.0184	–0.0090	–0.0000	–0.0293	–0.1555	–0.1555
South Korea															
Spain	–0.0879	–0.1121	–0.3413	–0.1449	–0.0033	–0.0109	–0.0911	–0.0180	–0.0677	–0.1148	–0.1458	–0.1070	–0.5362	–0.1885	–0.1885
Sweden	–0.3912	–0.1225	–0.1147	–0.0414	–0.0715	–0.1993	–0.1313	–0.1139	–0.2802	–0.2545	–0.2165	–1.2502	–0.8079	–0.9676	–0.9676
Switzerland	–0.0557	–0.2322	–0.2288	–0.0498	–0.0421	–0.1265		–0.0514	–0.1236	–0.1420	–0.0538	–0.0738	–0.2082	–0.7414	–0.7414
United Kingdom	–0.5415	–0.7979	–2.1200	–1.3766	–0.2628	–0.3211	–3.4818	–3.1680	–1.9892	–1.7314	–1.6122	–1.6675	–3.2346	–2.5775	–2.5775
United States	–0.7047	–0.7187	–0.8030	–0.9392	–0.5387	–0.2008	–0.7328	–0.6018	–0.3844	–0.4883	–0.6183	–0.6886	–0.4565	–0.3361	–0.3361
Discount weight	0.16	0.19	0.22	0.25	0.29	0.33	0.38	0.44	0.50	0.57	0.66	0.76	0.87	1.00	

Table 19. Summary of security component

	Spending				Arms exports		
	Peacekeeping & humanitarian interventions (% of GDP)	Sea lanes protection (% of GDP)	Total (% of GDP)	Score	Weighted exports (% of GDP)	Score	**Overall**
Australia	0.183	0.002	0.185	6.8	−0.004	9.9	**7.2**
Austria	0.095	0.000	0.095	3.5	−0.061	8.2	**4.1**
Belgium	0.094	0.003	0.098	3.6	−0.767	−13.3	**1.5**
Canada	0.135	0.004	0.139	5.1	−0.080	7.6	**5.4**
Denmark	0.151	0.005	0.156	5.7	−0.025	9.2	**6.2**
Finland	0.154	0.001	0.155	5.7	−0.062	8.1	**6.0**
France	0.141	0.021	0.162	6.0	−1.184	−26.0	**2.0**
Germany	0.097	0.006	0.103	3.8	−0.360	−0.9	**3.2**
Greece	0.124	0.005	0.129	4.7	−0.033	9.0	**5.3**
Ireland	0.129	0.000	0.129	4.8	−0.013	9.6	**5.4**
Italy	0.123	0.003	0.126	4.6	−0.141	5.7	**4.8**
Japan	0.029	0.002	0.030	1.1	0.000	10.0	**2.2**
Netherlands	0.161	0.013	0.174	6.4	−0.220	3.3	**6.0**
New Zealand	0.220	0.000	0.220	8.1	−0.000	10.0	**8.4**
Norway	0.181	0.004	0.185	6.8	−0.153	5.3	**6.6**
Portugal	0.140	0.003	0.143	5.3	−0.033	9.0	**5.7**
South Korea	0.018	0.000	0.018	0.7	0.000	10.0	**1.8**
Spain	0.068	0.002	0.070	2.6	−0.170	4.8	**2.9**
Sweden	0.145	0.002	0.146	5.4	−0.507	−5.4	**4.0**
Switzerland	0.075	0.000	0.075	2.7	−0.204	3.8	**2.9**
United Kingdom	0.238	0.018	0.257	9.5	−2.061	−52.7	**1.7**
United States	0.253	0.080	0.333	12.3	−0.538	−6.4	**9.9**
Average			0.136		-0.16434		
Weight				87.5%		12.5%	

Technology

Technology is an essential factor in development. Innovations in medicine, communications, agriculture, and energy meet societal needs, improve quality of life, increase productivity, and facilitate industrialization in poorer countries. Taking the long view, a fundamental reason that China's economy has grown at rates of 7% or more for many years is because the country is taking up innovations developed elsewhere over the last century. Vaccines and antibiotics led to major gains in life expectancy in Latin America and East Asia in the 20th century, achieving in a few decades improvements that took Europe almost 150 years. Cell phones have brought electronic communications to the masses even in Africa. The Internet helps developing countries access and disseminate information, form civil society movements, and do commerce with rich-world economies.

Thus people in developing countries benefit from technological advances as both producers and consumers. Recognizing the link between technology and development, the 2004 edition of the index introduced a technology component (Bannon and Roodman 2004). In 2005, Keith Maskus of the University of Colorado refined and elaborated the design. It is unchanged since.

Technology policy can be divided into two areas, pertaining to generation and diffusion of innovations. In Maskus (2005), as in Bannon and Roodman (2004), the starting point for the assessment of government policy regarding generation is OECD data on direct government R&D, whether performed by public agencies or by private parties on contract. Maskus refines the calculation by discounting by 25% certain kinds of first-world R&D as having somewhat less value for developing countries—namely in agriculture, energy, and industrial development. As in Bannon and Roodman, military R&D is discounted by half because while some of it does

have useful civilian spin-offs (including the Internet), much does more to improve the destructive capacity of rich countries than the productive capacity of poor ones. (See Table 20.)

To this is added an estimate of the subsidy value of tax incentives for private R&D. The OECD publishes a "B index" that measures the rate of tax subsidization for business expenditure on R&D. We use the simple average of the rates for small and large companies. On this B index, a 1 indicates full subsidization, 0 indicates no subsidization or taxation, and negative values indicate taxation. The benchmark is full expensing. That is, a 0 means that the tax code treats R&D as an ordinary expense, allowing it to be fully deducted from taxable corporate income in the year the expenditure is made. If a governments does not allow immediate full deduction, this is considered taxation. Tax treatment more favorable than simple expensing is a subsidy. This tax or subsidy rate is multiplied by a country's total business enterprise expenditure on R&D (BERD) to generate an estimate of government tax expenditures on R&D. This estimate is discounted in order to produce a figure that is more comparable to the discounted government R&D spending figure described above. There R&D spending in various categories faces a discount between 0% and 50%; but we know little about which sectors benefit most from tax subsidies, so we use the central figure of 25% for a uniform discount on these subsidies. The subsidy figures being made comparable, they are added together and taken over GDP for an overall measure of government support for R&D with relevance to developing countries. (See Table 21.)

Measuring variation in policies relating to *diffusion* is challenging, in part because intellectual property right (IPR) protection is primarily governed internationally by the World Trade Organization Trade-Related Aspects of Intellectual Property Rights (TRIPS) agreement. All CDI countries have signed this agreement, making their policies more similar than different. The CDI subcomponent on technology dissemination imposes penalties for seven kinds of IPR policies that restrict the flow of innovations to developing countries. All of these go beyond TRIPS and therefore exhibit variation between countries. It should be noted that stronger IPR protection also increases incentives for creating innovations that help developing countries in the first place. But Maskus (2005) concludes that the instances he penalizes harm developing countries more by restricting the flow of those innovations once created. The penalties fall into three groups:

1) Patent coverage (20% weight)

    a) Patentability of plant and animal species. Some rich countries grant patents for plant and animal varieties developed through, for example, genetic engineering. Patent monopolies can deprive poor countries with low purchasing power of access to such innovations, including ones that could be valuable for food production.

    b) Similarly, some countries allow patenting of software innovations (which are distinct from copyrights on specific programs).

2) Lack of certain limitations on patent rights ("rights loss provisions") (30%)

    a) Lack of provision for revocation due to discontinuing working. Some countries revoke a patent if the holder does not "work" it—implement or license it—within a certain period. Countries that have few or no such provisions lose a point.

    b) Lack of compulsory licensing. Some countries can force patent holders to allow use of their patents if it serves a pressing social need, such as a vaccine might in the face of an epidemic. Those that largely do not are penalized.

    c) Lack of a patent opposition system, which would allow third parties to challenge the validity of patent applications before they are granted. (New in 2010.)

d) Lack of exceptions to patents to facilitate research. (New in 2010.) All CDI countries except the U.S. make reasonable exemptions for the sake of research. The U.S. does have a law known as the Bolar exemption, , which allows generic firms to "infringe" a patent for the purposes relating to securing government permission to market their drug on expiry of the patent. So the U.S. gets a 0.5 rather than 1. All other countries get a 0 (no penalty).

3) Other IPR extensions (50%)

a) "TRIPS+" measures. Some rich countries use their leverage to insert IPR provisions in bilateral (two-country) trade agreements that go beyond TRIPS. For example, the United States persuaded Morocco to accept a provision in their trade treaty that test data submitted to the Moroccan government for approval of new drugs be kept secret for 5 years, and agricultural chemicals for 10 years. In many other bilateral agreements, such as that with Vietnam, these periods are five years, consistent with the comparable U.S. standard. A longer period means delayed access to information useful to companies that would develop competing drugs—possibly deferring the day when life-saving drugs become affordable for people in poor countries. While TRIPS contains a provision under which countries are supposed to protect such data, it specifies no such period. The U.S. has also pushed its treaty partners to limit compulsory licensing domestically and give patents for genetic sequences. For all this, the United States is dinged a full point. The European Union tends to push for "geographical indications," which are private rights to use product names derived from places, such as "Bordeaux." This earns EU nations a half-point penalty. Finally, European Free Trade Area members (among the index countries, Norway and Switzerland) tend, like the U.S., to push for limits on compulsory licensing and strong test data protections, for which they are also penalized 0.5.

b) Anti-circumvention rules. Some countries have enacted strong criminal penalties for development or use of technologies that can copy copyrighted digital materials by circumventing encryption devices. This is penalized as unnecessarily restrictive.

c) Database protections. European nations have granted restrictive patent-like rights to compilers of databases even when those include publicly funded data that is itself in the public domain. This too is penalized, for limiting the flow of useful, public information to developing countries.

In each of the three areas, penalties are summed, and then rescaled in the usual way, so that a penalty-free country would get a 10 and an average country in 2008, the benchmark year, would get a 5. Scores in the three areas are then averaged using the weights shown above. (See Table 22.) Finally, the results are combined in a 1:2 ratio with the scores for R&D support to yield overall technology scores. (See Table 23.)

Table 20. Calculation of weighted R&D/GDP (million $), 2008

Country	Agriculture	Environment	Defence	Exploration and exploitation of space	Exploration and exploitation of the Earth	General advancement of knowledge: R&D financed from General University Funds (GUF)	General advancement of knowledge: R&D financed from other sources than GUF	Industrial production and technology	Transport, telecommunication and other infrastructures	Energy	Health	Education	Culture, recreation, religion and mass media	Political and social systems, structures and processes	Total, weighted	Weighted R&D/GDP
Australia	330	142	293	5	269	837	438	663	43	146	570	12	24	33	3,375	0.44
Austria	45	36	0	5	35	1,269	322	332	23	20	70	24	11	33	2,126	0.67
Belgium	33	52	6	309	24	400	610	859	48	39	51	7	63	78	2,343	0.63
Canada	543	332	245	274	144	2,193	701	891	194	409	1,341	..	..	..	6,684	0.55
Denmark	64	43	10	29	8	731	318	172	13	67	130	43	35	48	1,629	0.81
Finland	100	27	51	35	23	460	313	412	42	162	118	10	11	80	1,649	0.88
France	292	422	4,407	1,397	141	4,347	714	1,337	150	928	1,110	..	..	402	12,803	0.61
Germany	657	701	1,392	1,134	444	9,009	4,043	2,733	386	853	1,005	218	252	407	21,477	0.73
Greece	53	25	5	20	30	476	107	84	15	19	65	21	9	10	897	0.27
Ireland	131	13	0	0	6	231	260	126	15	29	53	89	0	16	898	0.46
Italy	518.28	478.49	145.7	778.27	324.487	3593.82	659.406	1330	223.15	693	1442	312.4	119.33	1073.3	10983.5	0.5966
Japan	1,129	284	1,580	2,156	565	10,410	5,272	2,249	1,259	4,212	1,254	73	99	101	27,956	0.64
Netherlands	271	22	88	152	13	2,242	759	459	203	129	214	14	20	157	4,483	0.67
New Zealand	4	86	0	0	0	177	303	1	5	1	57	3	2	5	642	0.56
Norway	148	39	98	47	46	694	259	138	50	58	309	15	19	100	1,886	0.68
Portugal	169	93	12	12	31	892	384	334	243	31	185	63	11	58	2,378	0.97
South Korea	808	402	2,235	502	259	0	2,936	3,207	208	847	764	0	0	0	9,835	0.72
Spain	982	588	2,205	247	181	2,542	1,532	1,922	1,263	607	1,753	199	180	251	12,473	0.86
Sweden	45	41	346	21	25	1,179	684	159	121	99	18	7	3	41	2,540	0.74
Switzerland	47	8	14	104	4	0	667	9	7	18	11	7	7	33	911	0.28
United Kingdom	381	309	3,051	306	376	3,395	2,676	65	182	106	2,492	115	293	242	12,325	0.57
United States	2,376	728	80,639	11,677	1,017	0	8,744	522	1,417	2,460	31,560	495	19	760	100,754	0.71
Weight	75%	100%	50%	100%	100%	100%	100%	75%	100%	75%	100%	100%	100%	100%		

Table 21. Calculation of scores for government support for R&D

	A. Tax subsidy rate for R&D, manufacturers (average small/large companies, %)[1]	B. Business expenditure on R&D/ GDP (%)	C. Tax expenditure on R&D/ GDP (%), weighted[1]	D. Direct government R&D expenditure/ GDP, weighted (%)[2]	Total government support/GDP (%)	**Score**
Formula:			A×B×75%		C+D	
Australia	11.7	1.20	0.11	0.44	0.55	**3.7**
Austria	8.8	1.79	0.12	0.67	0.79	**5.3**
Belgium	8.9	1.32	0.09	0.63	0.72	**4.9**
Canada	25.3	1.08	0.20	0.55	0.76	**5.1**
Denmark	13.8	1.91	0.20	0.81	1.01	**6.9**
Finland	–0.8	2.52	–0.02	0.88	0.86	**5.9**
France	42.5	1.27	0.41	0.61	1.01	**6.9**
Germany	–2.0	1.83	–0.03	0.73	0.71	**4.8**
Greece	1.0	0.16	0.00	0.27	0.27	**1.9**
Ireland	10.9	0.93	0.08	0.46	0.53	**3.6**
Italy	11.7	0.64	0.06	0.60	0.65	**4.4**
Japan	13.8	2.68	0.28	0.64	0.92	**6.2**
Netherlands	15.7	0.97	0.11	0.67	0.78	**5.3**
New Zealand	–2.0	0.51	–0.01	0.56	0.55	**3.7**
Norway	21.9	0.87	0.14	0.68	0.82	**5.6**
Portugal	28.1	0.76	0.16	0.97	1.13	**7.7**
South Korea	16.9	2.45	0.31	0.72	1.03	**7.0**
Spain	34.9	0.74	0.19	0.86	1.05	**7.2**
Sweden	–1.5	2.78	–0.03	0.74	0.71	**4.8**
Switzerland	–0.8	2.14	–0.01	0.28	0.27	**1.8**
United Kingdom	14.2	1.21	0.13	0.57	0.70	**4.7**
United States	6.6	2.01	0.10	0.71	0.81	**5.5**
Average					0.73	

[1]A figure of 0 indicates that R&D spending can be fully deducted like other business expenditures. Positive values indicate active subsidization relative to this benchmark. Negative values indicate businesses cannot fully deduct in the year of expenditure. [2]From previous table.

Table 22. Calculation of scores for technology dissemination

	Patent coverage				Rights loss provisions						Other					
	Plant/ animal patents	Software patents	Total	Score	Lack of revocation for not working patents	Compulsory licenses not issued	Patent opposition system	Experi-mental use exception or defense	Total	Score	TRIPS+ policy	Anti-circum-vention rules	Data-base Pro-tection	Total	Score	Overall score
Australia	1	1	2	3.0	0	0	0	0	0	10.0	0.0	0.9	0	0.9	7.8	7.5
Austria	0.9	0.5	1.4	5.1	0	1	0.5	0	1.5	6.1	1.0	0.8	1	2.8	3.1	4.4
Belgium	0.9	0.5	1.4	5.1	1	0.5	0.5	0	2	4.9	1.0	0.4	1	2.4	4.1	4.5
Canada	0.5	0.75	1.25	5.6	1	0	0.75	0	1.75	5.5	0.0	0.5	0	0.5	8.8	7.2
Denmark	0.9	0.5	1.4	5.1	1	1	0.5	0	2.5	3.6	1.0	0.9	1	2.9	2.9	3.5
Finland	0.9	0.5	1.4	5.1	1	0.5	0.5	0	2	4.9	1.0	0.4	1	2.4	4.1	4.5
France	0.9	0.5	1.4	5.1	1	1	0.5	0	2.5	3.6	1.0	0.4	1	2.4	4.1	4.1
Germany	0.9	0.5	1.4	5.1	1	1	0.5	0	2.5	3.6	1.0	0.9	1	2.9	2.9	3.5
Greece	0.9	0.5	1.4	5.1	1	0	0.5	0	1.5	6.1	1.0	0.9	1	2.9	2.9	4.3
Ireland	1	0.5	1.5	4.8	1	1	0.5	0	2.5	3.6	1.0	0.65	1	2.65	3.5	3.8
Italy	1	0.5	1.5	4.8	1	0.5	0.5	0	2	4.9	1.0	0.4	1	2.4	4.1	4.5
Japan	1	1	2	3.0	1	0.5	0.75	0	2.25	4.2	0.0	1	0	1	7.5	5.6
Netherlands	0.9	0.5	1.4	5.1	1	1	0.5	0	2.5	3.6	1.0	0.4	1	2.4	4.1	4.1
New Zealand	1	0.75	1.75	3.9	1	0	0.5	0	1.5	6.1	0.0	0.25	0	0.25	9.4	7.3
Norway	0.9	0.25	1.15	6.0	1	1	0.5	0	2.5	3.6	0.8	0.4	1	2.15	4.7	4.6
Portugal	1	1	2	3.0	1	0	0.5	0	1.5	6.1	0.0	0.75	0	0.75	8.2	6.5
South Korea	0.9	0.5	1.4	5.1	0	0.5	0.5	0	1	7.4	1.0	0.4	1	2.4	4.1	5.3
Spain	0.9	0.5	1.4	5.1	0	0.5	0.5	0	1	7.4	1.0	0.4	1	2.4	4.1	5.3
Sweden	0.9	0.5	1.4	5.1	1	1	0.5	0	2.5	3.6	1.0	0.75	1	2.75	3.2	3.7
Switzerland	0.9	0.5	1.4	5.1	0	1	0.5	0	1.5	6.1	0.8	0.75	1	2.5	3.8	4.8
United Kingdom	1	0.5	1.5	4.8	1	1	0.5	0	2.5	3.6	1.0	0.65	1	2.65	3.5	3.8
United States	1	1	2	3.0	1	1	0.75	0.5	3.25	1.6	1.0	0.9	0	1.9	5.3	3.8
Average			1.4						1.9					2.0		
Weight				20%						30%					50%	

Table 23. Summary of technology component

	Government support for R&D[1]	IPRs/ restrictions on dissemination[1]	**Overall score**
Australia	3.7	7.5	**5.0**
Austria	5.3	4.4	**5.0**
Belgium	4.9	4.5	**4.8**
Canada	5.1	7.2	**5.8**
Denmark	6.9	3.5	**5.7**
Finland	5.9	4.5	**5.4**
France	6.9	4.1	**6.0**
Germany	4.8	3.5	**4.4**
Greece	1.9	4.3	**2.7**
Ireland	3.6	3.8	**3.7**
Italy	4.4	4.5	**4.4**
Japan	6.2	5.6	**6.0**
Netherlands	5.3	4.1	**4.9**
New Zealand	3.7	7.3	**4.9**
Norway	5.6	4.6	**5.3**
Portugal	7.7	6.5	**7.3**
South Korea	7.0	5.3	**6.5**
Spain	7.2	5.3	**6.5**
Sweden	4.8	3.7	**4.4**
Switzerland	1.8	4.8	**2.8**
United Kingdom	4.7	3.8	**4.4**
United States	5.5	3.8	**4.9**
Weight	67%	33%	

3. Overall results

As explained in section 1, the overall scores from each of the seven components are rescaled where necessary so that those in the benchmark year of 2008 average 5. The parameters of these transformations are held fixed over time, to allow meaningful comparisons of results over time. Component scores are then averaged across components to yield final scores. Table 24 and Figure 2 show the final results for 2009.

Since one purpose of the CDI is to track policy change over time, Table 25 back-calculates the current methodology to all the years in which the CDI has been produced.[32]

One important question about the results is how sensitive they are to changes in the component weights. To investigate the effect of raising weights on individual components, I generate 63 non-standard versions of the CDI: first with the weight on aid raised to 2, then 3, and so on up to 10 (while weights on the other components are held at 1), then the same for trade, and then the other components. For each version I calculate the correlation of overall scores with the standard CDI, and the average absolute change in rank.[33] Figure 3 and Figure 4 show the results. The CDI proves reasonably stable despite large overweighting. Tenfold overweighting yields a correlation ranging from 0.56 to 0.85. As for ranks, tenfold-overweighting moves countries an average of 2.9–4.4 spots up or down in the standings. Whether these numbers are small or large is perhaps in the eye of the beholder. Since most countries are clumped in the middle of the score range, one would expect small changes in weights to disproportionately affect rankings, so that Figure 3 is more meaningful than Figure 4.

[32] The public spreadsheet includes full details of these calculations. See cgdev.org/cdi.

[33] I am indebted to Michael Clemens for this technique. Details of these calculations are also in the public spreadsheet.

Table 24. Commitment to Development Index: scores

	Aid	Trade	Invest-ment	Migra-tion	Environ ron-ment	Securi-ty	Tech-nology	Aver-age	Rank	2009 rank, 2009 meth-odology
Australia	4.0	7.5	6.2	3.9	4.0	7.2	5.0	5.4	11	7
Austria	3.3	6.0	2.8	10.8	6.0	4.1	5.0	5.4	11	9
Belgium	6.7	6.0	5.6	3.7	7.0	1.5	4.8	5.1	14	15
Canada	5.1	7.1	6.2	5.9	3.2	5.4	5.8	5.5	9	11
Denmark	13.1	5.9	4.7	5.7	6.3	6.2	5.7	6.8	2	2
Finland	6.3	6.3	5.0	3.4	7.9	6.0	5.4	5.8	6	9
France	4.6	6.1	5.2	3.1	7.1	2.0	6.0	4.9	17	12
Germany	3.8	6.1	6.4	5.4	6.7	3.2	4.4	5.1	14	12
Greece	2.9	6.0	4.1	6.5	5.8	5.3	2.7	4.7	19	18
Ireland	10.4	5.9	3.1	5.8	6.2	5.4	3.7	5.8	6	6
Italy	2.7	6.2	5.5	3.3	6.3	4.8	4.4	4.8	18	18
Japan	1.1	2.4	4.6	1.8	5.2	2.2	6.0	3.3	21	21
Netherlands	12.5	6.4	6.1	4.6	6.7	6.0	4.9	6.7	3	3
New Zealand	3.8	8.1	4.7	6.0	6.7	8.4	4.9	6.1	5	5
Norway	11.4	1.2	6.5	7.8	5.7	6.6	5.3	6.4	4	3
Portugal	3.5	6.2	5.4	4.5	6.3	5.7	7.3	5.6	8	15
South Korea	1.1	3.0	5.8	1.0	2.7	1.8	6.5	3.1	22	22
Spain	5.7	6.2	6.0	5.5	5.8	2.9	6.5	5.5	9	7
Sweden	13.6	6.2	5.7	8.8	6.2	4.0	4.4	7.0	1	1
Switzerland	5.3	0.6	4.6	6.6	6.2	2.9	2.8	4.1	20	20
United Kingdom	6.1	6.0	6.2	3.4	7.1	1.7	4.4	5.0	16	12
United States	2.8	7.3	4.9	4.6	3.6	9.9	4.9	5.4	11	17
Average	5.9	5.6	5.3	5.1	5.8	4.7	5.0	5.3		
Standard dev.	3.7	1.9	1.0	2.2	1.3	2.2	1.1	1.0		

Figure 2. Commitment to Development Index: scores

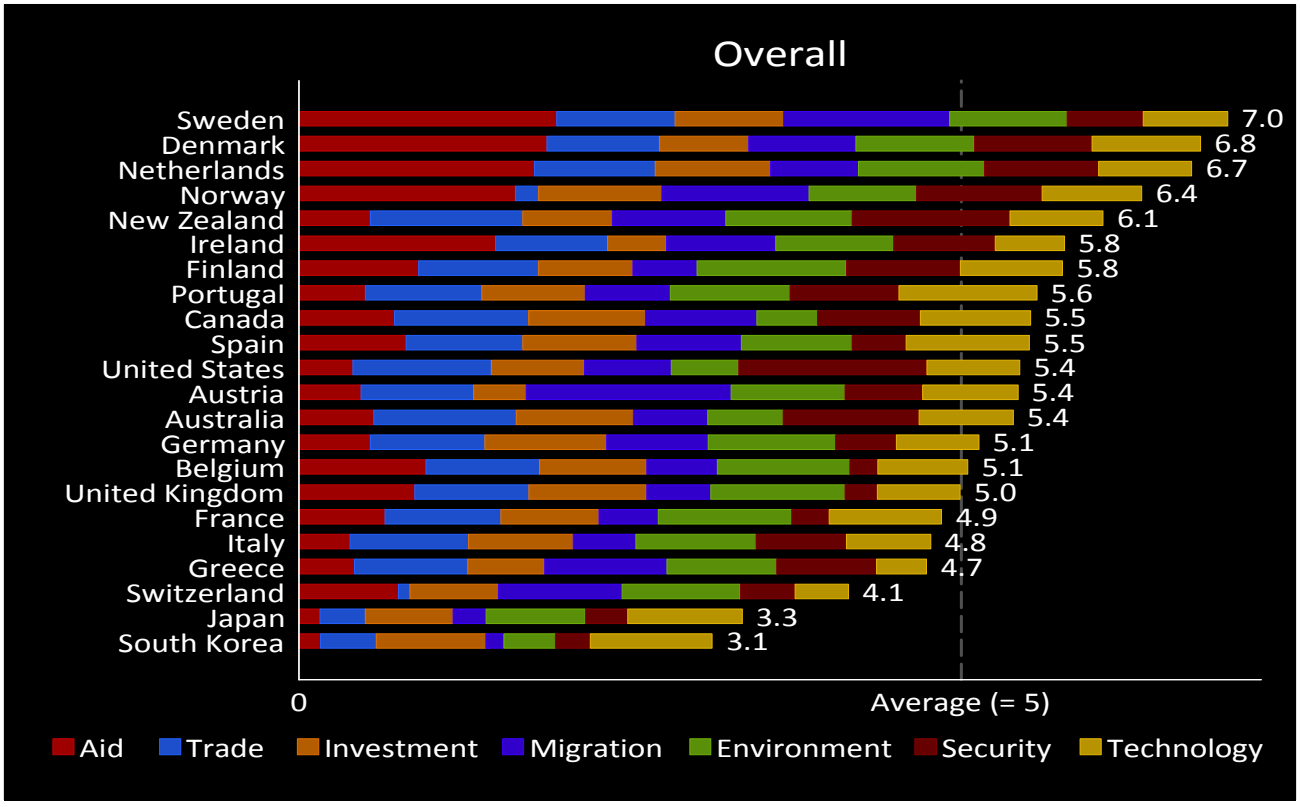


Table 25. Commitment to Development Index: 2003–09 scores using 2009 methodology

	2003	2004	2005	2006	2007	2008	2009	2010	Change, 2003–10[1]
Australia	5.4	5.2	5.2	5.1	5.1	5.3	5.3	5.4	–0.0
Austria	5.1	5.1	5.2	5.3	5.3	5.2	5.4	5.4	+0.2
Belgium	4.4	4.5	4.8	5.0	4.9	4.9	5.0	5.1	+0.5
Canada	4.9	5.0	5.3	5.3	5.4	5.3	5.3	5.5	+0.5
Denmark	7.0	7.0	6.7	6.6	6.6	6.5	6.7	6.8	–0.5
Finland	4.9	5.1	5.3	5.3	5.2	5.3	5.5	5.8	+0.5
France	4.5	4.6	4.7	4.9	4.7	4.8	4.9	4.9	+0.3
Germany	4.8	4.9	5.2	5.1	5.0	5.0	5.1	5.1	+0.2
Greece	3.7	4.0	4.3	4.2	4.2	4.4	4.5	4.7	+0.7
Ireland	5.0	4.7	4.8	5.0	5.3	5.8	5.8	5.8	+0.8
Italy	4.2	4.3	4.5	4.4	4.4	4.3	4.5	4.8	+0.1
Japan	2.4	2.5	2.4	3.0	3.1	3.2	3.2	3.3	+0.7
Netherlands	6.4	6.4	6.5	6.4	6.5	6.6	6.6	6.7	+0.2
New Zealand	5.6	5.6	5.5	5.4	5.5	5.4	5.7	6.1	–0.2
Norway	5.9	6.0	6.3	6.2	6.1	6.1	6.3	6.4	+0.3
Portugal	4.4	4.8	4.8	4.7	4.6	4.9	4.9	5.6	+0.5
Spain	4.2	4.0	4.4	4.4	4.7	5.1	5.5	5.5	+0.9
Sweden	6.1	6.6	6.7	6.5	6.6	6.9	7.0	7.0	+0.8
Switzerland	4.5	4.7	4.9	4.6	4.3	4.4	4.4	4.1	–0.1
United Kingdom	5.2	5.1	5.5	5.4	5.1	5.4	4.8	5.0	+0.3
United States	4.1	4.3	4.5	4.5	4.4	4.6	4.7	5.4	+0.4
South Korea						2.5	2.8	3.1	
Average	4.9	5.0	5.1	5.1	5.1	5.2	5.3	5.4	+0.5

[1]For accuracy, figures are rounded changes in scores rather than the changes in rounded scores.

Figure 3. Correlation of standard CDI with versions with higher weight placed on one component

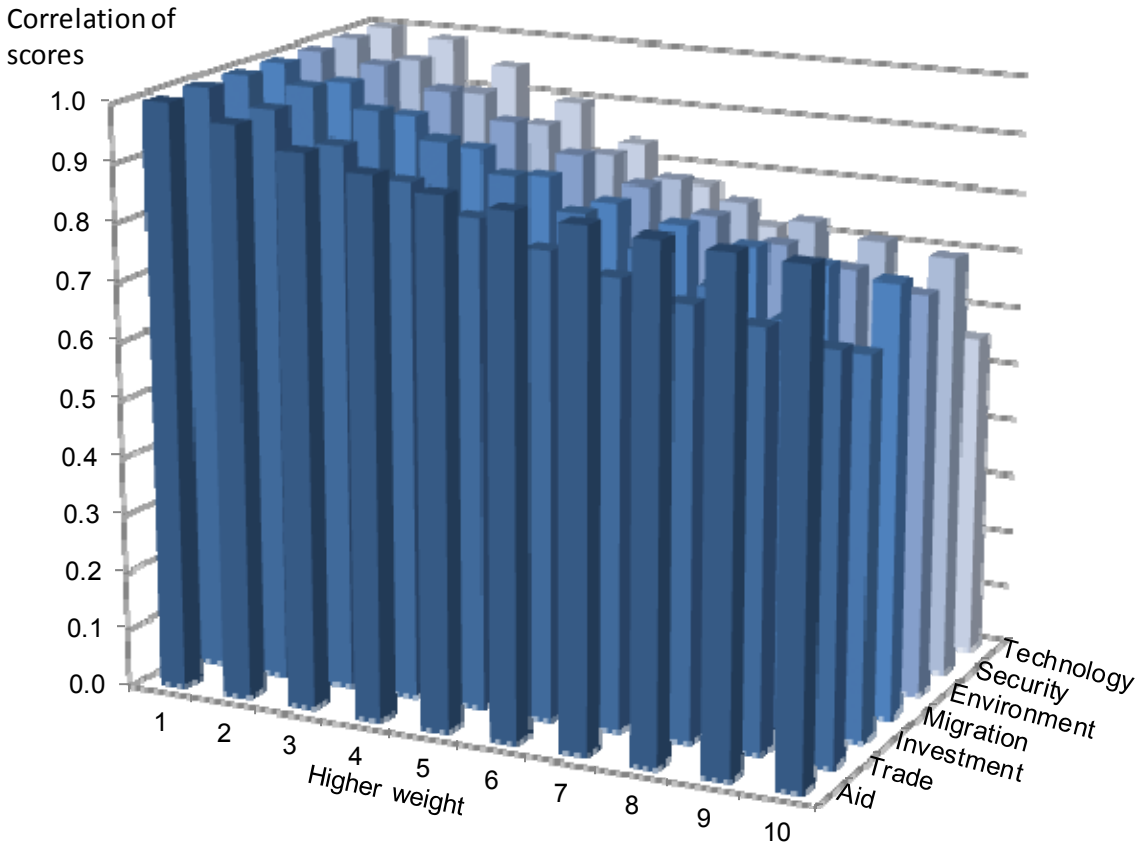
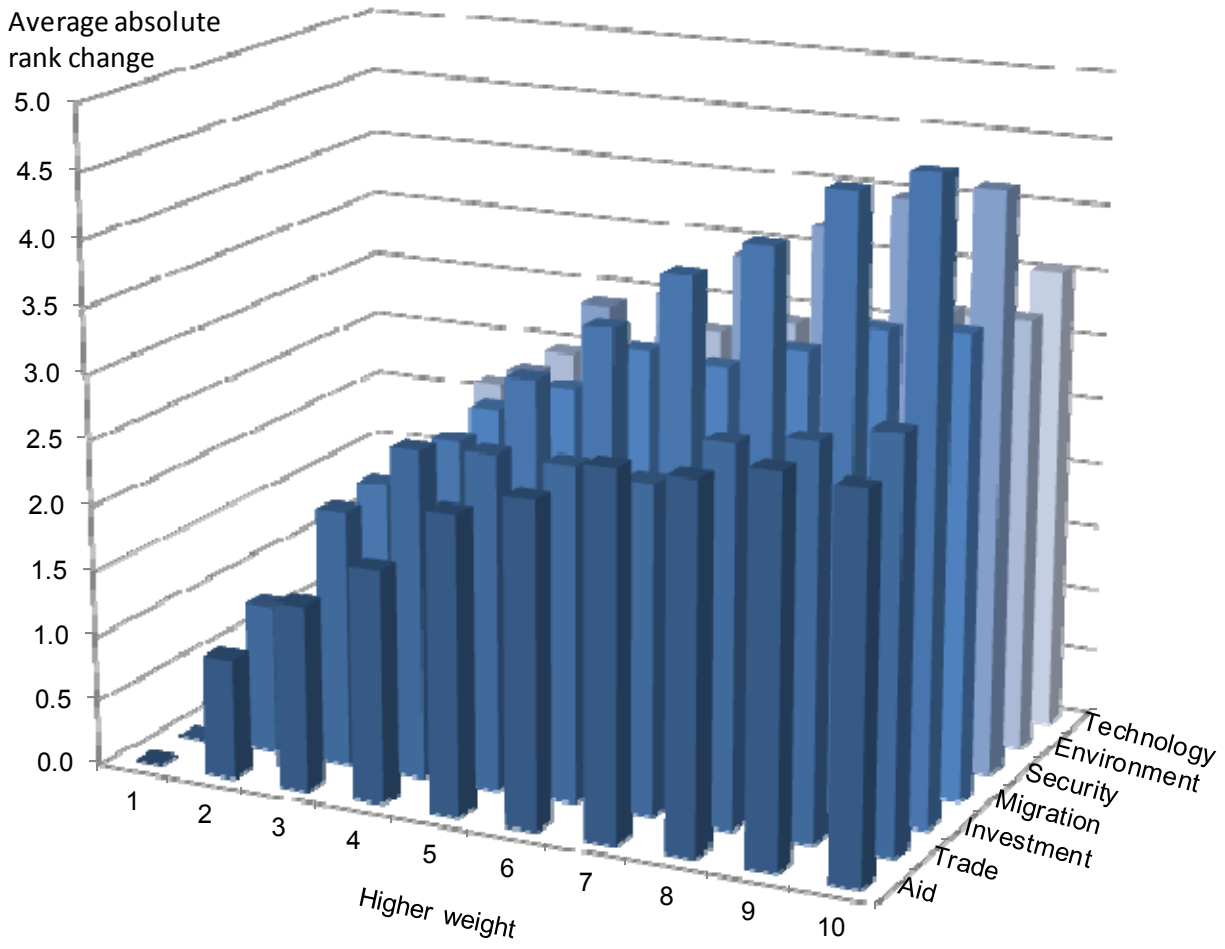


Figure 4. Average absolute change in CDI rank when higher weight placed on one component



4. The regional CDIs

In May of 2008, CGD released the first *regional* CDI, a version of the 2007 CDI oriented to sub-Saharan Africa (Roodman 2008). It measured the quality and quantity of each donor's aid to (sub-Saharan) Africa, the height of its trade barriers with respect to African exports, etc. For the 2008 release variants has been computed for all six World Bank–defined regions: East Asia and Pacific, Europe and Central Asia, Latin America and Caribbean, Middle East and North Africa, South Asia, and Sub-Saharan Africa. The spirit of the exercise is to change the methodology as little as possible in the adaptation. In fact, the investment, environment, and technology components are adapted without modification from the global CDI because the flows they measure, such as greenhouse gas emissions and support for research and development, are not region-specific. Environmental quality and innovation are closest in nature to indivisible, global public goods.

The other four components were adapted as follows:

- The regional aid components are calculated like the global one, except that only aid to the region in question enters. In particular, the global CDI's selectivity weights are used. For example, even though the highest-weighted recipient in South Asia in the reference year of 2001 gets a weight of 0.84 in the global CDI, weights are not rescaled to map India to 1.00, as if South Asia were the full universe of donors. Regional breakdowns of rich-country charitable flows are not available, so to estimate them, we assume that the share a country's private aid going to Africa is the same as for its public aid.

- In the trade component, tariff barriers are aggregated as in the global CDI, over each region. Similarly, the calculation of revealed openness—imports from developing countries—is simply restricted regionally The tariff equivalent of agricultural subsidies, however, is not differentiated: the global CDI numbers are used.

- In the migration component, only the migrant inflow indicators (the first two in Table 11) are differentiated regionally. The Docquier, Marfouk, and Lowell (2007) database that underlies the net stock change variable has the resolution to make this differentiation straightforward, with flows broken out by sending- and receiving-country pair. Unfortunately, the data on gross inflows from developing countries, extracted by Jeanna Batalova at the Migration Policy Institute from individual CDI country statistical offices, are not all broken down by sending country or region. The Canadian, Greek, Irish, and Japanese statistics in particular were too coarse for subdivision along the regional lines used here. For these countries, the gross inflow from a specified region was estimated as a pro-rated fraction of the inflow from all developing countries, where the fraction was taken from the net stock change data. So if in Ireland the 1990s change in the stock of non-native unskilled workers in from sub-Saharan Africa was 30% of that for such workers from all developing countries, then 30% of recorded immigrants from developing countries in subsequent years are also assumed to come from sub-Saharan Africa.

- The indicators on forcible humanitarian interventions and arms exports are differentiated regionally. The naval security indicator is not, on the idea that countries in one part of the world benefit from secure international trade lanes in another.

The following tables and figures present the overall results from the six regional CDIs.

Table 26. Commitment to Development Index East Asia and Pacific: scores

	Aid	Trade	Invest-ment	Migra-tion	Environ ron-ment	Securi-ty	Tech-nology	Aver-age	Rank
Australia	18.2	8.5	6.2	22.2	4.0	19.6	5.0	12.0	2
Austria	3.1	5.2	2.8	8.3	6.0	1.5	5.0	4.6	14
Belgium	5.0	5.3	5.6	3.4	7.0	1.5	4.8	4.7	13
Canada	7.7	7.5	6.2	18.3	3.2	2.5	5.8	7.3	3
Denmark	7.1	5.2	4.7	9.3	6.3	2.3	5.7	5.8	7
Finland	3.0	5.5	5.0	5.3	7.9	1.7	5.4	4.8	12
France	3.6	5.3	5.2	9.3	7.1	1.0	6.0	5.4	9
Germany	3.9	5.3	6.4	4.5	6.7	1.0	4.4	4.6	14
Greece	1.3	5.2	4.1	3.2	5.8	2.3	2.7	3.5	21
Ireland	11.7	5.2	3.1	11.5	6.2	1.5	3.7	6.1	6
Italy	1.3	5.4	5.5	4.4	6.3	1.3	4.4	4.1	20
Japan	–2.5	3.0	4.6	10.5	5.2	2.4	6.0	4.2	19
Netherlands	5.1	5.5	6.1	4.0	6.7	2.3	4.9	4.9	11
New Zealand	18.7	8.7	4.7	33.8	6.7	33.6	4.9	15.9	1
Norway	5.8	3.6	6.5	12.1	5.7	1.9	5.3	5.8	7
Portugal	2.7	5.4	5.4	2.3	6.3	15.8	7.3	6.5	5
South Korea	2.6	–1.8	5.8	0.9	2.7	2.3	6.5	2.7	22
Spain	2.3	5.4	6.0	4.4	5.8	0.3	6.5	4.4	17
Sweden	4.7	5.4	5.7	10.6	6.2	–0.8	4.4	5.2	10
Switzerland	5.7	2.8	4.6	8.0	6.2	0.7	2.8	4.4	17
United Kingdom	3.5	5.3	6.2	4.1	7.1	1.8	4.4	4.6	14
United States	6.4	7.5	4.9	10.1	3.6	12.6	4.9	7.1	4
Average	5.5	5.2	5.3	9.1	5.8	5.0	5.0	5.8	
Standard dev.	4.9	2.1	1.0	7.4	1.3	8.1	1.1	2.8	

Figure 5. Commitment to Development Index East Asia and Pacific: scores

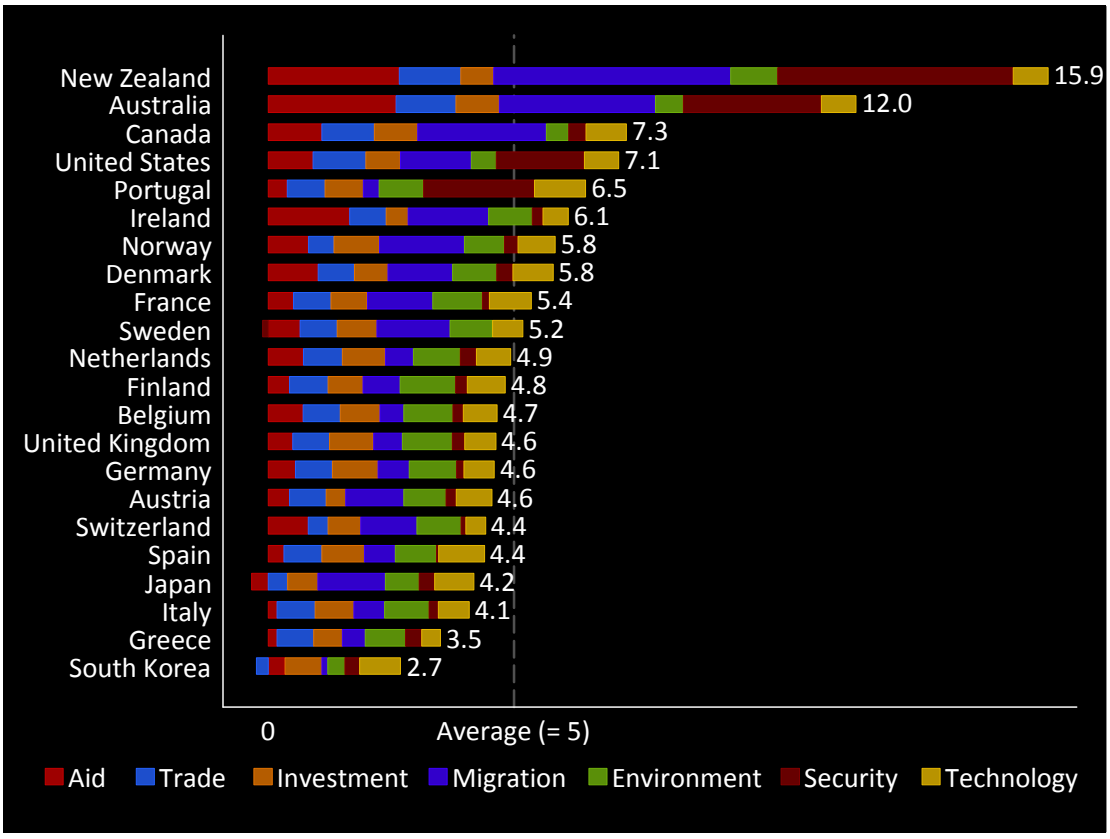


Table 27. Commitment to Development Index Europe and Central Asia: scores

	Aid	Trade	Invest-ment	Migra-tion	Environ ron-ment	Securi-ty	Tech-nology	Aver-age	Rank
Australia	4.7	6.1	6.2	1.0	4.0	1.5	5.0	4.1	19
Austria	7.8	6.3	2.8	34.0	6.0	3.9	5.0	9.4	1
Belgium	7.6	6.3	5.6	6.0	7.0	4.0	4.8	5.9	10
Canada	7.0	5.5	6.2	1.5	3.2	5.0	5.8	4.9	16
Denmark	4.8	6.3	4.7	12.9	6.3	7.9	5.7	6.9	3
Finland	4.2	6.7	5.0	6.9	7.9	6.3	5.4	6.0	9
France	5.9	6.4	5.2	2.2	7.1	4.6	6.0	5.3	14
Germany	5.9	6.4	6.4	14.3	6.7	1.4	4.4	6.5	6
Greece	9.4	6.3	4.1	23.1	5.8	7.9	2.7	8.5	2
Ireland	11.3	6.2	3.1	11.3	6.2	3.3	3.7	6.5	6
Italy	3.3	6.6	5.5	5.1	6.3	4.9	4.4	5.2	15
Japan	0.8	1.4	4.6	0.9	5.2	1.5	6.0	2.9	21
Netherlands	6.8	6.7	6.1	7.9	6.7	5.8	4.9	6.4	8
New Zealand	2.3	5.9	4.7	1.5	6.7	2.5	4.9	4.1	19
Norway	7.2	–0.1	6.5	16.3	5.7	6.7	5.3	6.8	5
Portugal	4.5	6.5	5.4	5.9	6.3	5.4	7.3	5.9	10
South Korea	1.0	–0.0	5.8	1.0	2.7	1.4	6.5	2.6	22
Spain	4.8	6.5	6.0	5.5	5.8	2.9	6.5	5.4	13
Sweden	8.0	6.6	5.7	12.0	6.2	5.2	4.4	6.9	3
Switzerland	7.8	–0.1	4.6	8.3	6.2	4.7	2.8	4.9	16
United Kingdom	4.1	6.3	6.2	1.7	7.1	8.4	4.4	5.5	12
United States	7.8	5.8	4.9	1.1	3.6	4.9	4.9	4.7	18
Average	5.8	5.2	5.3	8.2	5.8	4.5	5.0	5.7	
Standard dev.	2.6	2.3	1.0	8.1	1.3	2.1	1.1	1.5	

Figure 6. Commitment to Development Index Europe and Central Asia: scores

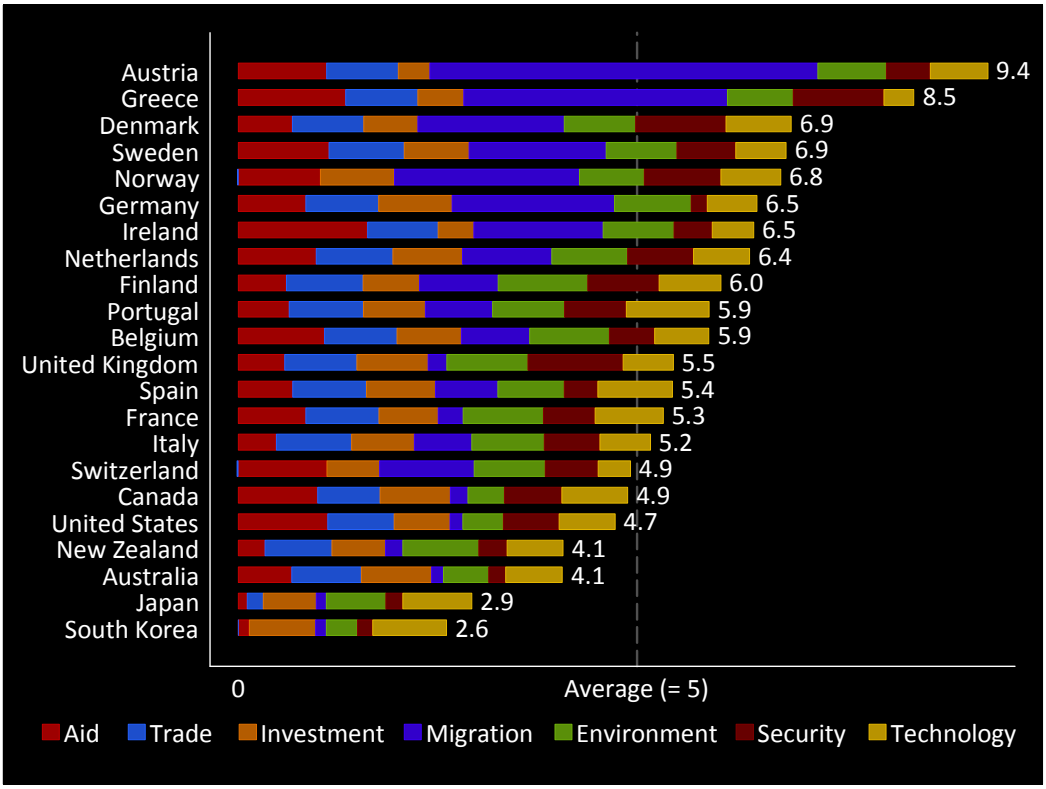


Table 28. Commitment to Development Index 2009 Latin America and Caribbean: scores

	Aid	Trade	Invest-ment	Migra-tion	Environ ron-ment	Securi-ty	Tech-nology	Aver-age	Rank
Australia	3.7	6.9	6.2	2.0	4.0	3.5	5.0	4.5	15
Austria	2.9	5.3	2.8	3.8	6.0	2.7	5.0	4.1	20
Belgium	6.9	5.3	5.6	3.0	7.0	2.3	4.8	5.0	11
Canada	10.1	8.7	6.2	9.4	3.2	15.5	5.8	8.4	3
Denmark	7.0	5.3	4.7	2.8	6.3	4.6	5.7	5.2	9
Finland	3.3	5.7	5.0	2.0	7.9	3.2	5.4	4.6	14
France	3.4	5.4	5.2	2.7	7.1	9.8	6.0	5.7	6
Germany	4.6	5.4	6.4	3.6	6.7	4.5	4.4	5.1	10
Greece	1.1	5.3	4.1	2.7	5.8	3.9	2.7	3.7	21
Ireland	9.1	5.2	3.1	3.1	6.2	2.4	3.7	4.7	13
Italy	1.4	5.6	5.5	4.2	6.3	3.2	4.4	4.4	17
Japan	0.4	4.1	4.6	5.2	5.2	4.9	6.0	4.4	17
Netherlands	6.9	5.7	6.1	7.2	6.7	4.8	4.9	6.0	5
New Zealand	2.3	5.8	4.7	1.9	6.7	2.8	4.9	4.2	19
Norway	6.2	1.0	6.5	4.8	5.7	3.9	5.3	4.8	12
Portugal	1.0	5.5	5.4	16.2	6.3	4.5	7.3	6.6	4
South Korea	1.4	1.7	5.8	1.0	2.7	2.2	6.5	3.0	22
Spain	10.4	5.5	6.0	32.1	5.8	2.5	6.5	9.8	2
Sweden	6.7	5.6	5.7	6.7	6.2	2.8	4.4	5.5	7
Switzerland	6.6	–0.8	4.6	9.7	6.2	2.3	2.8	4.5	15
United Kingdom	2.4	5.3	6.2	1.9	7.1	9.5	4.4	5.3	8
United States	7.2	9.4	4.9	40.1	3.6	30.9	4.9	14.4	1
Average	4.8	5.1	5.3	7.6	5.8	5.8	5.0	5.6	
Standard dev.	3.0	2.1	1.0	9.7	1.3	6.3	1.1	2.4	

Figure 7. Commitment to Development Index 2009 Latin America and Caribbean: scores

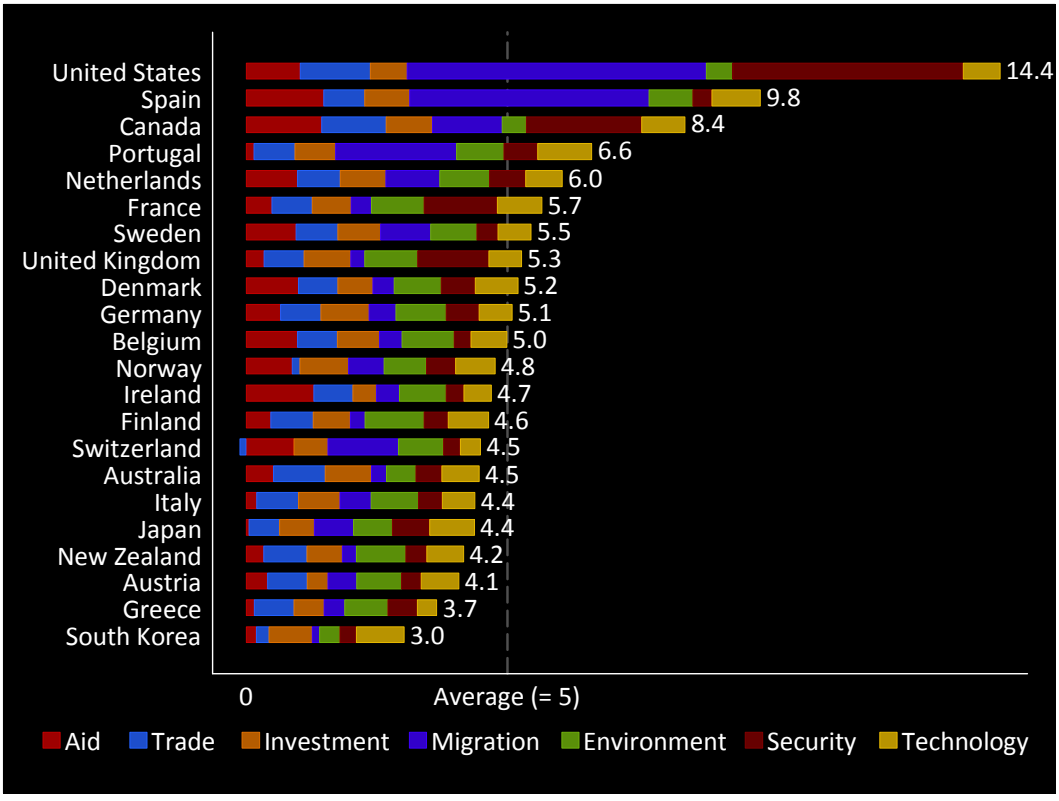


Table 29. Commitment to Development Index Middle East and North Africa: scores

	Aid	Trade	Invest-ment	Migra-tion	Environ ron-ment	Securi-ty	Tech-nology	Aver-age	Rank
Australia	4.7	6.1	6.2	3.1	4.0	2.1	5.0	4.4	17
Austria	3.5	6.0	2.8	7.7	6.0	9.8	5.0	5.8	9
Belgium	7.2	6.0	5.6	15.0	7.0	1.9	4.8	6.8	4
Canada	6.8	5.6	6.2	8.1	3.2	3.0	5.8	5.5	11
Denmark	7.4	5.9	4.7	6.6	6.3	2.7	5.7	5.6	10
Finland	3.7	6.4	5.0	3.6	7.9	11.2	5.4	6.2	8
France	4.8	6.1	5.2	6.3	7.1	2.6	6.0	5.4	12
Germany	5.0	6.1	6.4	4.2	6.7	2.7	4.4	5.1	13
Greece	2.6	6.0	4.1	4.2	5.8	3.3	2.7	4.1	19
Ireland	10.2	5.9	3.1	4.6	6.2	15.9	3.7	7.1	2
Italy	2.7	6.3	5.5	9.9	6.3	9.6	4.4	6.4	7
Japan	0.2	4.6	4.6	1.1	5.2	2.1	6.0	3.4	22
Netherlands	6.8	6.5	6.1	13.8	6.7	3.0	4.9	6.8	4
New Zealand	2.7	8.7	4.7	2.0	6.7	5.0	4.9	5.0	15
Norway	9.2	–0.7	6.5	7.1	5.7	12.6	5.3	6.5	6
Portugal	5.2	6.2	5.4	1.4	6.3	3.8	7.3	5.1	13
South Korea	1.1	9.9	5.8	1.0	2.7	2.4	6.5	4.2	18
Spain	5.2	6.2	6.0	21.6	5.8	5.1	6.5	8.1	1
Sweden	7.7	6.3	5.7	15.4	6.2	3.4	4.4	7.0	3
Switzerland	5.8	–1.5	4.6	6.4	6.2	2.0	2.8	3.8	21
United Kingdom	4.1	6.0	6.2	3.3	7.1	–4.2	4.4	3.9	20
United States	8.8	6.7	4.9	2.5	3.6	2.9	4.9	4.9	16
Average	5.2	5.7	5.3	6.8	5.8	4.7	5.0	5.5	
Standard dev.	2.5	2.4	1.0	5.3	1.3	4.4	1.1	1.2	

Figure 8. Commitment to Development Index Middle East and North Africa: scores

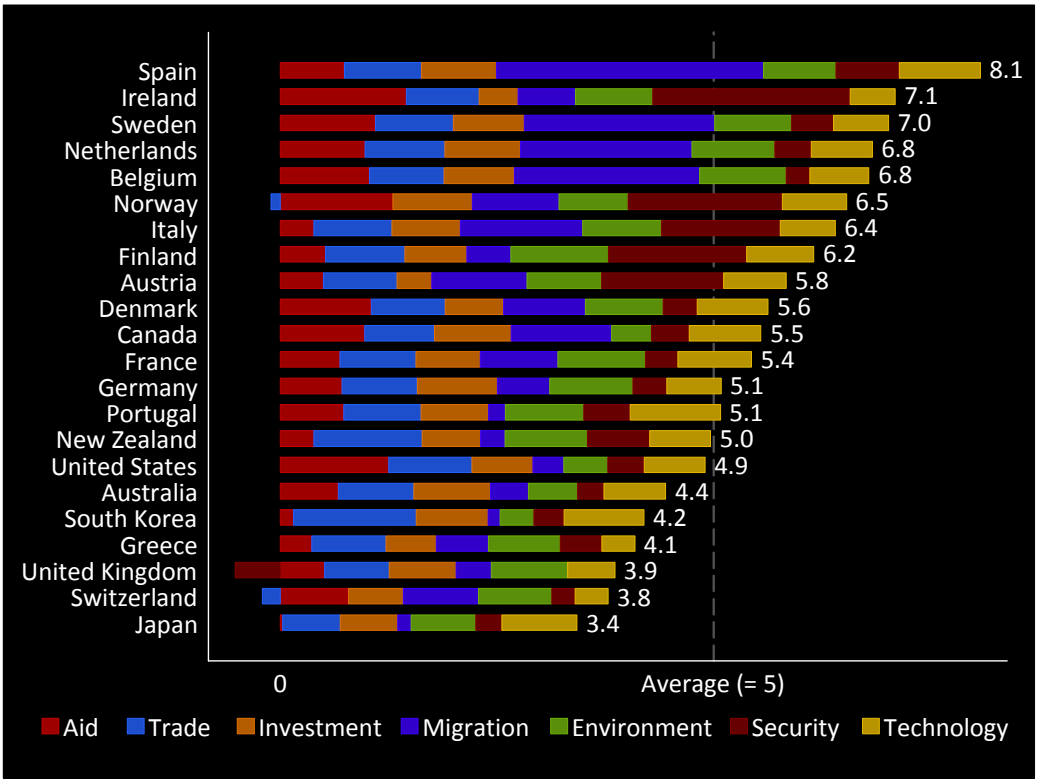


Table 30. Commitment to Development Index South Asia: scores

	Aid	Trade	Invest-ment	Migra-tion	Environ ron-ment	Securi-ty	Tech-nology	Aver-age	Rank
Australia	7.1	7.1	6.2	13.2	4.0	3.2	5.0	6.5	8
Austria	3.5	6.2	2.8	10.2	6.0	1.3	5.0	5.0	18
Belgium	5.7	6.2	5.6	4.9	7.0	2.7	4.8	5.3	15
Canada	7.9	7.6	6.2	32.5	3.2	19.3	5.8	11.8	2
Denmark	10.0	6.2	4.7	11.7	6.3	5.1	5.7	7.1	7
Finland	4.7	6.6	5.0	5.3	7.9	2.7	5.4	5.4	14
France	2.2	6.3	5.2	5.2	7.1	3.8	6.0	5.1	17
Germany	4.9	6.3	6.4	4.0	6.7	8.8	4.4	5.9	11
Greece	2.2	6.2	4.1	3.8	5.8	2.0	2.7	3.8	20
Ireland	8.9	6.1	3.1	13.4	6.2	1.4	3.7	6.1	9
Italy	2.9	6.5	5.5	8.9	6.3	7.6	4.4	6.0	10
Japan	2.4	–1.4	4.6	1.7	5.2	1.3	6.0	2.8	21
Netherlands	7.1	6.6	6.1	3.3	6.7	19.7	4.9	7.8	4
New Zealand	3.2	7.7	4.7	20.2	6.7	5.2	4.9	7.5	5
Norway	10.3	3.8	6.5	16.3	5.7	4.1	5.3	7.4	6
Portugal	2.4	6.4	5.4	3.3	6.3	2.7	7.3	4.8	19
South Korea	1.5	–9.0	5.8	0.9	2.7	1.6	6.5	1.4	22
Spain	3.0	6.4	6.0	5.7	5.8	2.6	6.5	5.2	16
Sweden	8.2	6.5	5.7	11.4	6.2	–4.0	4.4	5.5	12
Switzerland	6.8	5.1	4.6	13.5	6.2	–0.8	2.8	5.5	12
United Kingdom	8.3	6.2	6.2	18.3	7.1	30.6	4.4	11.6	3
United States	6.9	7.6	4.9	7.9	3.6	55.1	4.9	13.0	1
Average	5.5	5.3	5.3	9.8	5.8	8.0	5.0	6.4	
Standard dev.	2.7	3.6	1.0	7.3	1.3	12.8	1.1	2.7	

Figure 9. Commitment to Development Index South Asia: scores

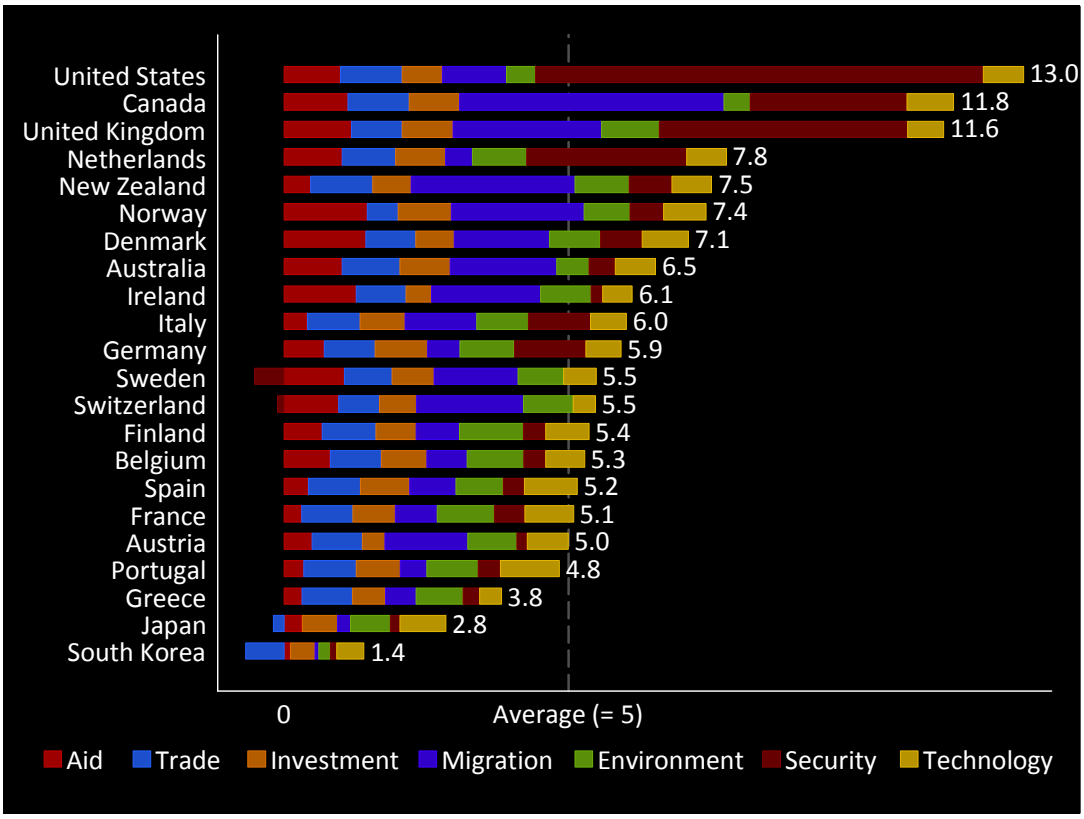
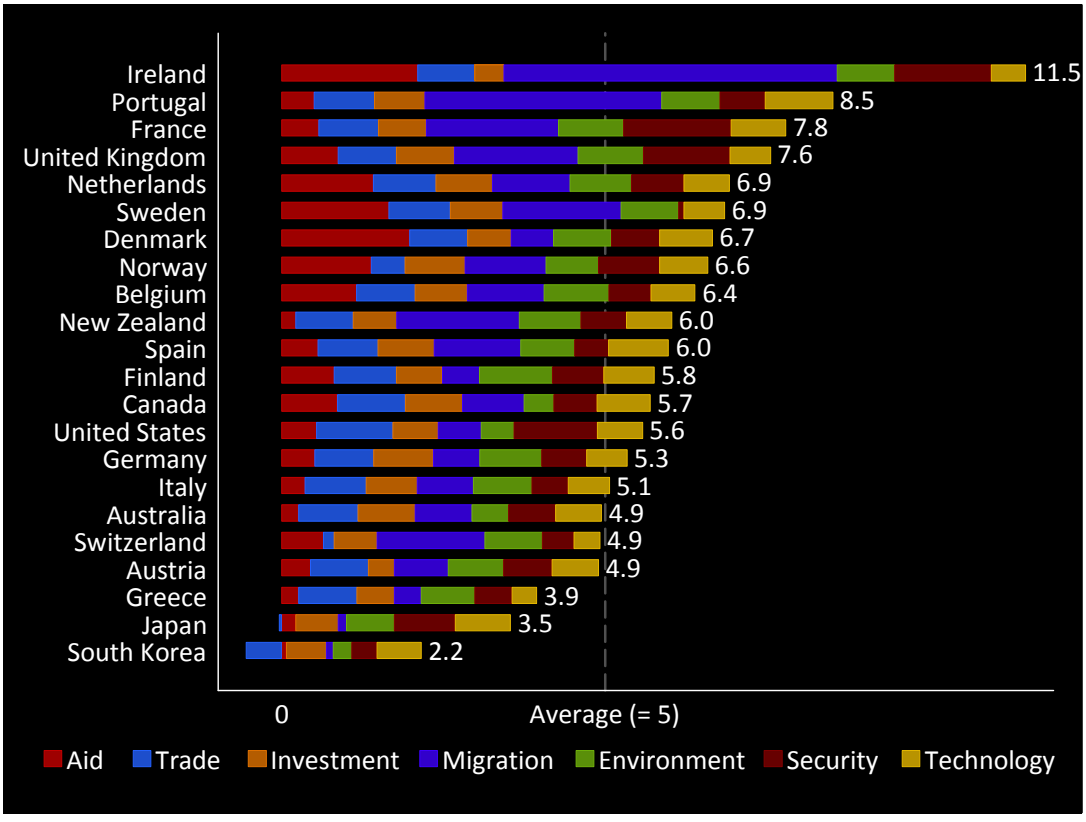


Table 31. Commitment to Development Index Sub-Saharan Africa: scores

	Aid	Trade	Invest-ment	Migra-tion	Environ ron-ment	Securi-ty	Tech-nology	Aver-age	Rank
Australia	1.8	6.4	6.2	6.1	4.0	5.1	5.0	4.9	17
Austria	3.1	6.3	2.8	5.8	6.0	5.2	5.0	4.9	17
Belgium	8.1	6.3	5.6	8.3	7.0	4.6	4.8	6.4	9
Canada	6.0	7.4	6.2	6.7	3.2	4.7	5.8	5.7	13
Denmark	13.9	6.2	4.7	4.6	6.3	5.2	5.7	6.7	7
Finland	5.7	6.7	5.0	4.0	7.9	5.6	5.4	5.8	12
France	4.0	6.4	5.2	14.3	7.1	11.6	6.0	7.8	3
Germany	3.6	6.4	6.4	5.0	6.7	4.9	4.4	5.3	15
Greece	1.8	6.3	4.1	2.9	5.8	4.0	2.7	3.9	20
Ireland	14.7	6.2	3.1	36.1	6.2	10.5	3.7	11.5	1
Italy	2.5	6.6	5.5	6.1	6.3	3.9	4.4	5.1	16
Japan	1.5	–0.3	4.6	0.9	5.2	6.7	6.0	3.5	21
Netherlands	9.9	6.8	6.1	8.4	6.7	5.7	4.9	6.9	5
New Zealand	1.5	6.2	4.7	13.2	6.7	4.9	4.9	6.0	10
Norway	9.7	3.6	6.5	8.7	5.7	6.6	5.3	6.6	8
Portugal	3.5	6.5	5.4	25.6	6.3	4.9	7.3	8.5	2
South Korea	0.7	–5.1	5.8	1.0	2.7	3.6	6.5	2.2	22
Spain	3.9	6.5	6.0	9.4	5.8	3.6	6.5	6.0	10
Sweden	11.6	6.6	5.7	12.8	6.2	0.6	4.4	6.9	5
Switzerland	4.5	1.2	4.6	11.7	6.2	3.4	2.8	4.9	17
United Kingdom	6.1	6.3	6.2	13.4	7.1	9.4	4.4	7.6	4
United States	3.8	8.2	4.9	4.7	3.6	9.0	4.9	5.6	14
Average	5.5	5.4	5.3	9.5	5.8	5.6	5.0	6.0	
Standard dev.	4.0	3.0	1.0	7.9	1.3	2.5	1.1	1.8	

Figure 10. Commitment to Development Index Sub-Saharan Africa: scores



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