



Aid allocation rules

A non-technical summary of the article by Patrick Carter, published in the *European Economic Review* (Volume 71, October 2014).

Paddy Carter

Abstract

Multilateral donors allocate aid using a rule that responds to recipients' need for aid and ability to use it. Donors are frequently criticised for giving too little to the poorest countries. Should allocation rules be more responsive to poverty? An optimal allocation rule gives the poorest recipients as much aid as they can use effectively. Under some plausible assumptions about aid absorption constraints, this point may have been reached, implying allocation rules may need to be *less* responsive to poverty, especially if donors make progress towards the 0.7% aid target. But we know very little about absorption constraints and other scenarios imply a more pro-poor allocation rule. The analysis also demonstrates that donors serving different sets of recipients may need to use quite different allocation rules. The case for using rules that target aid at recipients where it will stimulate growth is also tested. Instead of allocating aid to target growth, donors may do more good by raising consumption in stagnant economies.

Many multilateral agencies, such as the World Bank's International Development Association (IDA), use an aid allocation rule. In their simplest form, these rules place weights upon two recipient characteristics: their need for aid and ability to use it. The IDA rule is:

$$\text{Aid per capita} = \kappa \cdot y^\beta \cdot P^\gamma$$

Here each recipient's need for aid is measured by y income per capita, and its ability to use aid is measured by P , a subjective index of institutional quality (based on the Bank's CPIA ratings) that captures recipient absorptive capacity, and κ adjusts for the aid budget. The weight β is negative, so directs aid toward the poor, whilst the weight γ is positive, and directs aid towards countries with better institutions hence, it is presumed, greater absorptive capacity. But what should these weights β and γ be?

The analysis falls into three parts. Firstly, numerical experiments illustrate the principles that determine the optimal weights β and γ , secondly the optimal weights are located for a set of 20 simulated recipients calibrated to match countries in sub-Saharan Africa under a range of scenarios for absorption constraints, and thirdly the question of whether donors should target aid where it will stimulate growth is investigated.

The principles behind an optimal aid allocation rule.

What is the best allocation for a donor who cares about alleviating poverty? Translated into the jargon of economics, this amounts to having the objective of maximizing recipient welfare. When donors have this objective, under the standard economic assumption of diminishing marginal utility of consumption the optimal β is chosen so that the **poorest recipients receive as much aid as they can use effectively**. The analysis assumes that recipients face absorption constraints, in the form of diminishing returns to aid. In this setting, the three most important considerations that determine the appropriate β are the size of the aid budget, the extent of income inequality across recipients, and the nature and severity of the absorption constraints.

To understand the role of aid generosity, suppose we start from an optimal β and then increase the aid budget. That would increase the quantity of aid given to the poorest recipients. But under the previously optimal β they were already being given as much as they could cope with, so further aid is either wasteful or positively harmful. Hence β must become less negative as aid generosity increases, and may even need to be positive, to avoid directing too much at the poorest recipients.

A similar logic applies to the extent of income inequality amongst recipients. The weight β determines how the allocation responds to how incomes *differ* across recipients. Imagine holding the aid budget and the total sum of recipient incomes constant, but making some recipients poorer and others richer. For any given β this would entail a larger share of the budget going to the poorest recipients, who are less able to absorb it. So again as income inequality increases β should become less negative.

Finally, even when the optimal weight γ is placed upon the index of recipient absorptive capacity, the optimal β still responds to the distribution and nature of absorptive capacity amongst recipients. Suppose poorer countries also happen to have less absorptive capacity at all levels of aid intensity than richer countries, then the optimal β is less negative.

Interpreting empirical aid allocation research

Many papers analyse the allocation of aid by running a regression and looking at the estimated coefficients on recipient characteristics such as income per capita. Although the specification varies, these regressions often resemble a log-linearized aid allocation rule:

$$\ln \text{Aid} = \kappa + \beta \cdot \ln y + \gamma \cdot \ln P + \delta \cdot \ln N + \varepsilon$$

Where population N has been taken to the right-hand side, κ is a donor-specific time-dummy that captures variations in aid generosity over time, and ε is the error term (see full paper for details). A larger negative number for β is generally interpreted as desirable. Besides demonstrating that this is not necessarily the case, this paper also shows that we should expect β to become more positive as the quantity of aid being disbursed rises, and that different donors serving different sets of recipients should have dramatically different β . Such considerations are routinely ignored when interpreting empirical allocation patterns.

The optimal rule for 20 calibrated aid recipients based on sub-Saharan Africa.

What would realistic values of β and γ be? To answer this question, twenty artificial aid recipients were calibrated using data from twenty countries in sub-Saharan Africa, and simulations run to find the optimal weights in the rule. Because we do not know how our implementation of absorption constraints maps onto the measures used by donors, we focus on sensitive to recipient income, when the optimal weight has been placed on recipient absorptive capacity. In other words, the focus is on the value of β when γ is optimal, not the value of γ itself.

The cross-country relative distribution of absorptive capacity was calibrated using an index of public sector investment efficiency created by researchers from the IMF (Dabla-Norris et al., 2012). But because we cannot be sure what the right level of absorptive capacity is, three scenarios were explored: low, medium and high absorption. These calibrations imply a turning point when more aid starts to have a negative effect, in the case of a quadratic functional form, of 8, 16 and 24 per cent of recipient GDP, respectively.

When the turning point is calibrated at 24 per cent, if every recipient was to receive an aid flow equivalent to 10 per cent of national income, which corresponds to the mean level of aid intensity across countries in sub-Saharan Africa in 2010, the mean level of wastage across the twenty calibrated recipients would be just 20 per cent, much lower than estimates of wastage from most estimates from individual projects. Two forms of absorptive constraint are studied – a quadratic labelled V_A and a logistic labelled V_B (see following section on absorption constraints for details). Under V_A too much aid is actually harmful, whereas under V_B aid gradually becomes useless at high levels.

Four levels of aid generosity are tested: an aid budget equivalent to 4 per cent of total recipient income, corresponding to roughly the level of generosity in 2010 for sub-Saharan Africa including South Africa; 8.6 per cent, corresponding to the 2010 allocation for the twenty recipients chosen for this calibration; and 13.4 and 18.7 per cent, corresponding to the level of aid generosity supposing OECD donations reach 0.5 per cent and 0.7 per cent of total OECD income, and that the aid allocated to these twenty recipients is increased in proportion.

The current value for β in the World Bank IDA rule is -0.125. This exercise suggests that would be about right in the medium absorptive capacity scenario, for this set of recipients, assuming a quadratic functional form V_A, but if aid does no harm at high levels – the logistic case V_B – then aid should be more sensitive to need. However if aid budgets increase, then positive values for β are plausible.

Table 1: Optimal sensitivity to income per capita, calibrated recipients

| ABSORPTION FUNC: | V_A | V_B | V_A | V_B | V_A | V_B |
|------------------|----------------|---------|-------------------|---------|-----------------|---------|
| GENEROSITY | Low absorption | | Medium absorption | | High absorption | |
| | β | β | β | β | β | β |
| 4% | -0.31 | -1.00 | -1.83 | -1.66 | -2.05 | -2.38 |
| 8.60% | 0.9 | -0.20 | -0.16 | -0.67 | -0.92 | -1.06 |
| 13.40% | 1.56 | 0.01 | 0.55 | -0.33 | -0.08 | -0.61 |
| 18.70% | 1.78 | 0.11 | 1.14 | -0.15 | 0.45 | -0.35 |

Absorption Constraints.

Why do donors give aid to so many countries? Part of the reason is concern for extreme poverty, and extreme poverty is found in many countries. But if that was the sole reason, the distribution of aid would match the distribution of extreme poverty. Another reason to avoid concentrating aid in the very poorest countries could be the existence of limits to the quantity of aid that a country can use effectively, in other words if recipients face absorption constraints.

This paper takes prevalent assumptions about, and estimates of, absorption constraints, and works out the implications for optimal aid allocation. The existing consensus is that there are diminishing returns to aid intensity (the ratio of aid to recipient GDP) so that aid becomes less effective as countries receive more of it. So, all else equal, a larger economy (either because it is richer or more populous) is better able to absorb a dollar of aid, in

absolute terms, than a smaller one. The extent to which countries are able to absorb aid in relative terms, or the extent to which waste rises as the aid-to-GDP ratio rises, is a country-specific measure of absorptive capacity which, in this paper, corresponds to the policy index P used in the allocation rule. By placing a larger positive weight on P , the allocation rule directs more aid towards those countries better able to use it.

Little is known about absorption constraints and whilst there are estimates of waste from particular aid projects, at the macroeconomic level what little evidence we have comes from aid-and-growth regressions that tend to find diminishing returns to aid. The common assumption of a quadratic relationship between aid and outcomes has a nasty implication in this context: too much aid is harmful. To explore the implications of a less extreme assumption, the analysis also employs a logistic absorption constraint in which aid gradually becomes useless but does no harm.

There is a large evidence gap here: a non-linear relationship between aid and growth does not tell us much about the relationship between aid and other outcomes. A perfectly sensible response to the findings presented here could be that the current thinking on absorptive capacity, put to work in this paper, is flawed.

Methodology: how we arrived at these conclusions

The analysis is based on experiments in a theoretical laboratory populated by simulated aid recipients, which are modelled as neoclassical economies undergoing transition dynamics that face constraints on their ability to use aid effectively. This modelling approach involves all the things that critics of economics love to hate: an infinitely lived representative household solving a complicated inter-temporal optimization problem. What are the merits of this approach? Firstly, we get a laboratory in which aid recipients vary in both their level of income and prospects for growth. These traits are independent, so we may have some poor but stagnant economies and some richer but growing. And in these economies, the division of aid between investment and consumption responds to context and changes over time – in economies with higher returns to investment, more aid will be invested, resulting in more rapid growth. Secondly, we are able to define the optimal rule in terms of maximizing recipient welfare. Because utility functions embody diminishing returns to consumption, this objective is inherently ‘pro-poor’ and donors care most about raising the consumption of the poorest (where ‘consumption’ should be broadly interpreted to include everything that affects contemporaneous quality of life). We end up with a framework that promotes global income equalization, an idea that may find support in the development community.

This approach is a marked change from previous work, such as the well-known [Collier and Dollar rule](#), which allocates aid in order to maximize poverty reduction via economic growth, and has no role for transfers that simply alleviate poverty by allowing a higher level of consumption. In contrast, under the approach taken in this paper, aid recipients would not want to maximize growth, which raises consumption tomorrow, because they also care about consumption today. So we find that the lion’s share of aid is optimally consumed, not invested.

Growth Targeting

The dominant measure of aid effectiveness in the academic literature is its effect upon growth, and the objective of stimulating growth is emphasized in donor rhetoric. The history of ‘performance based allocation rules’ such as studied here can be traced to academic models in which donors have the objective of maximizing poverty reduction via growth. To what extent should donors weight aid towards recipients where it will cause growth?

Although one might think that recipients with higher quality institutions are more likely to use aid to accelerate growth, in the framework of this paper absorption constraints as measured by P apply to total aid, whether it is invested or consumed. Instead the impact of aid upon growth is determined by the prevailing marginal product of capital. Where returns to investment are higher, more aid is invested with a greater impact upon output growth. In principle a donor could augment the allocation rule to add a term that weights aid towards recipients where it will stimulate growth:

$$\textit{Aid per capita} = \kappa \cdot y^\beta \cdot P^\gamma \cdot R^\tau$$

Where R measures the prevailing marginal return to capital in the recipient and τ is weight placed upon it. A positive value for τ would create an allocation that targets growth.

In the framework employed in this paper, it turns out that donors should not target growth. This is because the economic model used in the analysis embodies something known as “Bauer’s paradox”: aid is most effective where it is least needed. In the neoclassical growth model aid only accelerates growth in countries that are beneath their balanced growth paths and are experiencing transition dynamics. Think of a country like China, which is rapidly catching up with the West via a process of fixed capital accumulation. But Bauer’s paradox applies more broadly than the simple neoclassical growth model used here. Suppose the model included a government that could invest aid in productive public capital in such a way as to raise the long-run level of output. Now consider two countries with identical income per capita, one of which has a more efficient government (or better institutions more generally) and is hence able to invest aid more productively. This country would likely face a brighter future in the absence of aid and is hence in less need of aid. In the presence of Bauer’s paradox a donor wanting to maximize recipient welfare would target aid towards the stagnant recipient, where aid could be used to raise the level of consumption of households that would otherwise face a future of prolonged poverty.

Although the model employed to reach this conclusion is highly stylized, it draws attention to a very real dilemma, and suggest that more emphasis should be place on raising standards of living in countries even if there is no accompanying impact upon the rate of growth. By analogy, aid can be used to treat the symptoms of poverty or to cure poverty. In the analysis used here, recipients decide how much aid to spend on alleviating suffering today and how much to invest in growing out of poverty, and they choose to spend the majority on consumption today. Forcing aid to be used for investment would, from the recipient’s point of view, be sub-optimal. Using aid to directly alleviate suffering would become even more important once we incorporate the fact that aid donors do not know how to cure poverty with any reliability, so should not ask the poor to suffer unaided whilst they search for the cure.

Conclusion

This paper has approached the question of how aid should be allocated across countries by studying an allocation rule of the form that multilateral agencies, such as the World Bank, actually use. The analysis highlights the crucial role of absorption constraints, and shows that the often stated view that the poorest countries receive too little aid relies on the unstated assumption that they would be able to make effective use of it.

If there are diminishing returns to aid, as is widely believed, and absorption constraints are calibrated to be consistent with current estimates, then donors may need to be less responsive to poverty, particularly if donors were to make progress towards existing aid targets, 0.7 per cent of GNI. But that result occurs most frequently under the assumption that aid starts to do harm when the ratio of aid to recipient GDP (aid intensity) gets too high. If we assume that the marginal impact of aid merely tends towards zero at high levels of aid intensity, then we only find that donors should use weights that direct aid away from poorer recipients when aid generosity is higher than current levels, or when absorption constraints start to bite at low levels of aid intensity. When aid budgets are lower or when absorption constraints are less binding, we find support for the conclusion that poor countries currently receive too little aid.

Because of the uncertainty surrounding the form and extent of absorption constraints, we cannot reach firm conclusions suitable for direct use in aid allocations decisions. **The main lesson from the analysis may be the need for a much better understanding of absorption constraints.** It could be that the widespread assumption of diminishing returns to aid per se is unwarranted, based as it is upon nonlinearities in aid-and-growth regressions. However, the analysis demonstrates that quite small changes to how soon absorption constraints start to bite could imply quite large changes in the optimal responsiveness of aid to recipient need. It is impossible to say whether poor countries are receiving too little aid without having some idea about absorption constraints, yet analysis of aid allocation sometimes ignores this issue.

The paper also looks at the case for allocating more aid towards countries where it will stimulate economic growth. **In this setting, donors who have the objective of raising recipient welfare should not target growth, because aid can have a greater impact upon welfare by raising consumption in stagnant economies.** This conclusion rests on the assumption of “Bauer’s paradox” that aid can only stimulate growth in countries that would be growing

in the absence of aid. This finding challenges the traditional rationale for “performance based allocation rules”, which is based the estimated impact aid has upon growth.

Formal economic analysis based on welfare maximization draws attention to the importance of aid-funded consumption (in the broadest sense of everything that raises the quality of life), even when recipient economies are undergoing transition dynamics and marginal returns to capital are high. Much of the rhetoric around aid is focussed on investment and growth, but formal economic analysis suggests that a relatively small proportion of aid should be spent on efforts to accelerate growth, because the opportunity cost is meeting the consumption needs of people today. **This suggests that social protection programs and other interventions that directly alleviate poverty should play a prominent role alongside aid designed to accelerate growth and structural transformation.**

The paper Aid Allocation Rules, published in the European Economic Review, can be found at: <http://dx.doi.org/10.1016/j.euroecorev.2014.07.004>

References

Dabla-Norris, Era and Brumby, Jim and Kyobe, Annette and Mills, Zac and Papageorgiou, Chris (2012) "Investing in public investment: an index of public investment efficiency" *Journal of Economic Growth* Volume 17, Issue 3, pp 235-266



ODI is the UK's leading independent think tank on international development and humanitarian issues.

Our mission is to inspire and inform policy and practice which lead to the reduction of poverty, the alleviation of suffering and the achievement of sustainable livelihoods.

We do this by locking together high-quality applied research, practical policy advice and policy-focused dissemination and debate.

We work with partners in the public and private sectors, in both developing and developed countries.

Readers are encouraged to reproduce material from ODI Reports for their own publications, as long as they are not being sold commercially. As copyright holder, ODI requests due acknowledgement and a copy of the publication. For online use, we ask readers to link to the original resource on the ODI website. The views presented in this paper are those of the author(s) and do not necessarily represent the views of ODI.

© Overseas Development Institute 2014. This work is licensed under a Creative Commons Attribution-NonCommercial Licence (CC BY-NC 3.0).

ISSN: 2052-7209

Overseas Development Institute
203 Blackfriars Road
London SE1 8NJ
Tel +44 (0)20 7922 0300
Fax +44 (0)20 7922 0399