Aid Dependence Reconsidered

Jean-Paul Azam*
Shantayanan Devarajan**
Stephen A. O'Connell***

March 2, 1999

WPS99-5

Abstract: If foreign aid undermines institutional development, aid recipients can exhibit the symptoms of "dependence"—a short-run benefit from aid, but increasing need for aid that is damaging in the long run. We show that this high-aid/weak-institutions state can be an equilibrium outcome even when donors and recipients fully anticipate the effect of aid on institutional development. However, a low-aid/strong-institutions outcome is also possible, so that the model encompasses the diverse foreign-aid experiences of countries like the Republic of Korea and Tanzania. When the development community ignores the effect of aid on institutions, the outcome depends strongly on initial conditions. Where institutions are already weak, institutional capacity collapses and foreign aid eventually finances the entire public budget. Where they are initially stronger, the result can be close to the institutions-sensitive equilibrium. The results suggest that foreign aid strategies, even for countries with similar per capita incomes, should be differentiated according to their institutional capacity; and that a short-run reduction in aid may increase a country's chances of graduating from aid.

This paper reflects the views of the authors and not necessarily those of the World Bank. We thank participants in the Tri-college lunch seminar and Mike Stevens for helpful comments. Please do not quote without permission.

* ARQADE and IDEI, University of Toulouse; and Centre for the Study of African Economies.
** The World Bank.
*** Swarthmore College and Centre for the Study of African Economies.

1. Introduction

Grants and concessional loans represent an important source of finance for low-income developing countries (Table 1). In the traditional macroeconomic view, these flows contribute to long-run development by releasing bottlenecks associated with low incomes. For example, rapid growth may require an investment rate that is too high to be financed by subsistence saving. Foreign aid provides the additional financing. Alternatively, given the narrow export and tax bases associated with low incomes, imports or government spending may be the binding constraint. By supplementing domestic resources, transfers from donors enable the achievement of short-run growth targets.

Under the plausible assumption that domestic resource mobilization improves with per capita income, such aid is self-limiting. The only requirement is that it raise current incomes. As GNP-shares of domestic saving, exports, and tax revenue rise with GNP per capita, the need for aid disappears (e.g., McKinnon [1964]). The story seems to fit well with the experience of Botswana and the Republic of Korea, where very high aid levels gave way determinedly to rapid growth and "graduation."[1]

For each example of graduation, however, there are cases in which aid flows have grown over several decades. In Sub-Saharan Africa,[2] median aid as a share of GNP more than doubled between the 1970s and the 1990s. While some countries such as Mozambique have come only recently to very high aid levels, others—such as Burkina Faso, Mali, and Tanzania—have been major aid recipients since independence and in some cases since the late 1940s (Figure 1). These experiences pose a clear challenge to the "self-limiting" view of foreign aid. One response is that three or four decades is too short a period for the major structural changes associated with economic "takeoff." The returns from aid are still over the horizon: they will emerge eventually provided that donors keep the aid flowing. But while short relative to the industrialization period in the West, forty years was more than adequate for the transformation of the newly industrialized developing countries.

A second response recalls the views of early aid critics and the recent debate over welfare reform in the United States. Authors like Bauer (1971) and Friedman (1958) predicted that foreign assistance would displace processes of institutional maturation that were essential to economic development. Aid would create dependence. The long-run result of high aid levels would be relative economic regress. A striking feature of these views is that many of their essentials were shared by the radical left. André Gunder Frank (1966), for example, argued that foreign assistance represented a side payment to elites in recipient countries, designed to buy their compliance in maintaining the economic and political dominance of the industrialized countries.

---

[1] American aid to postwar Europe under the Marshall Plan is sometimes considered the archetypical success of temporary, self-limiting aid. These flows were largely completed by the early 1950s, at the initial stage of what proved to be an extraordinary resumption of growth. But Marshall Plan aid was much smaller relative to the economies receiving it - between 2 and 3 percent of recipient GNP - than the flows received by low-income developing countries in the decades since 1960 (see the entries for Sub-Saharan Africa and South Asia in Table 1). De Long and Eichengreen (1991) argue convincingly that the Marshall Plan's contribution to domestic resources in Western Europe was far secondary in importance to its influence on the development of political and economic institutions there.

[2] For the 34 countries for which reasonably continuous data are available.

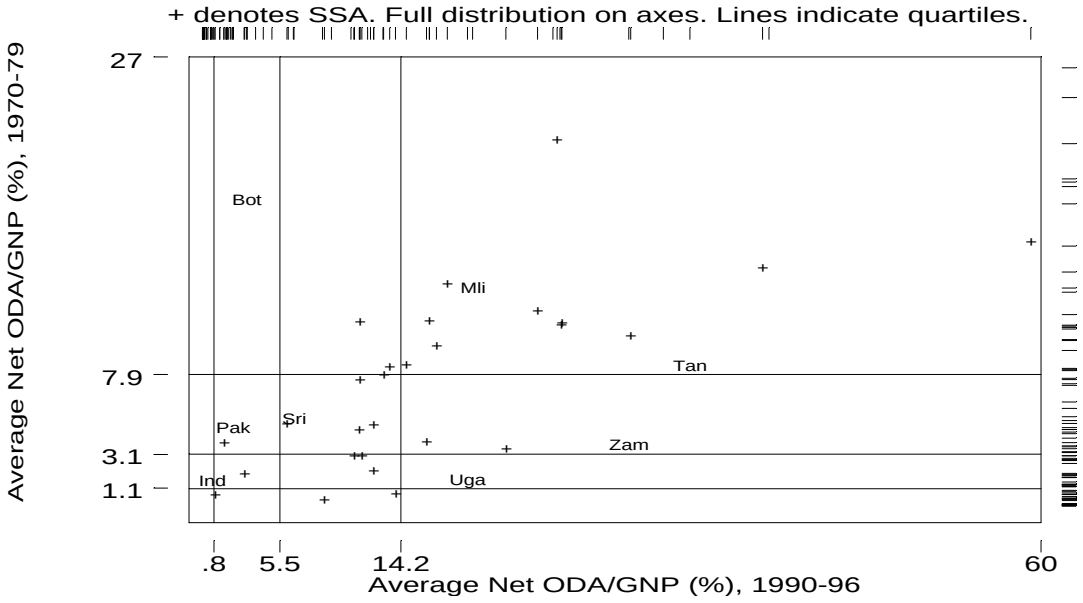
Table 1. Net ODA and Technical Cooperation as shares of GNP by Region and Decade

	Median of decadal country averages by region			
Region and decade	*(1) Net ODA/GNP*	*(2) Net ODA (excluding TC/GNP)*	*(3) TC/GNP*	*(4) TC/Gross ODA*
Latin America (22)				
1960s	1.29	1.07	0.26	15.24
1970s	1.31	0.92	0.37	27.06
1980s	1.38	0.87	0.39	30.58
1990s	1.58	0.81	0.64	38.04
High-Performing Asian Economies (7)				
1960s	1.14	0.80	0.12	13.30
1970s	0.74	0.46	0.19	39.34
1980s	0.15	0.03	0.13	33.95
1990s	0.02	–0.00	0.05	42.65
South Asia (5)				
1960s	1.96	1.59	0.11	7.27
1970s	3.84	2.41	0.72	14.20
1980s	8.53	7.04	1.14	16.52
1990s	6.52	5.41	1.11	16.24
Pacific (5)				
1960s	7.23	5.84	1.11	24.99
1970s	19.49	13.41	1.98	19.53
1980s	8.10	4.11	0.78	32.15
1990s	9.21	7.49	1.72	24.94
Other developing countries (14)				
1960s	2.54	2.42	0.26	11.20
1970s	3.00	2.60	0.22	22.77
1980s	2.93	2.21	0.13	20.39
1990s	1.86	0.99	0.32	24.85
Sub-Saharan Africa (34)				
1960s	3.00	2.08	0.72	26.64
1970s	7.53	4.31	2.33	34.59
1980s	11.24	7.38	3.30	27.68
1990s	15.30	11.39	3.44	22.72
All 87 developing countries				
1960s	2.09	1.83	0.35	18.00
1970s	3.03	2.03	0.72	30.49
1980s	5.04	4.11	0.92	27.76
1990s	6.02	4.19	1.47	25.17

***Note*:** The number in parentheses represents the number of countries in the data. The table includes all developing countries with 1990 populations exceeding 800,000 and for which more than one-half the observations are available for all four decades ("1990s" refers to 1990–96). The latter criterion eliminates the economies in transition.

***Source and definitions*:** *Net ODA* is the sum of development assistance grants and net disbursements of concessional development assistance loans. TC is technical cooperation grants, a sub-category of development assistance grants. The data are from the DAC98 CD-ROM (OECD Development Assistance Committee, *Geographical Distribution of Financial Flows to Developing Countries, 1960–96*). Development assistance loans are classified by the DAC as concessional if their grant element exceeds 25 percent; see DAC98 for details. *GNP* in US dollars is from the World Bank as reported on DAC98.

Figure 1. Aid Intensity Over Time For 88 Developing Countries



The diversity of actual experience indicates that neither the gap-filling view nor the dependency view provides an adequate account of the dynamics of aid and development. In this paper, we present a model that captures some of the features of both viewpoints, but permits a multiplicity of outcomes—including the very different aid profiles of, say, Korea and Tanzania. To do so we begin with a standard public-finance problem, to which we add a specific process of institutional maturation. Foreign aid is explicitly government-to-government in this model, and in an accounting sense it fills a "fiscal gap." At the same time, it retards the development of institutional competence in the recipient's public sector. For concreteness we locate institutional development in the recipient's revenue-collecting ministry. The foundational question becomes the one asked by Kaldor (1963): "Will developing countries learn how to tax?" The answer depends on initial conditions, on how much aid is received, and most importantly, on the degree to which donor and recipient internalize learning-by-doing externalities in the recipient's public sector. The model exhibits two steady states, one involving high aid and low institutional development, the other low aid and strong institutions. Whether a country ends up in the second, preferred equilibrium depends on the extent to which donors and recipients recognize the adverse effects of aid on learning-by-doing.

While we have emphasized tax efficiency, the argument can be applied in other areas. For example, suppose that learning-by-doing spillovers are concentrated in the recipient's nascent manufacturing sector, and that manufactured goods are traded internationally (Bruton [1998]). In the absence of other forms of financing, a rise in aid will produce a rise in expenditure and a fall in production (the mediating variable being the real exchange rate). If learning-by-doing spillovers are associated with accumulated production experience in the manufacturing sector, aid will again

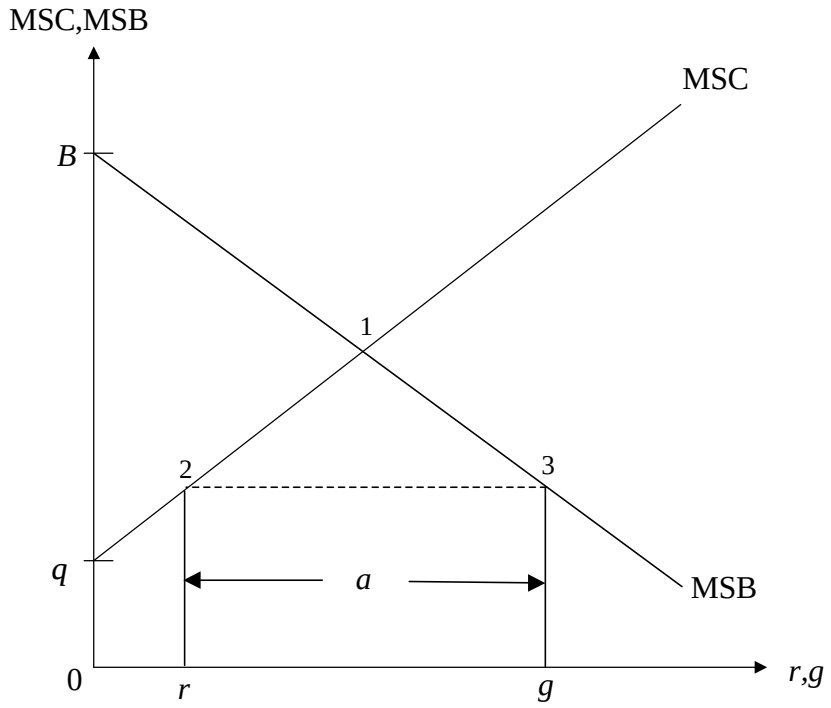
be too large when these spillovers are ignored. Manufacturing output will in turn be too small and the rate of learning-by-doing correspondingly sub-optimal. As in our case, graduation will be postponed or prevented altogether.

In section 2, we describe and solve the model, and then use it in section 3 to develop a precise interpretation of aid dependence. In a concluding section we investigate the implications of the analysis for aid policy and discuss some extensions.

2. The Model

In the absence of foreign aid, governments optimize by equating the marginal social benefit of public spending to the marginal social cost of public funds. Equivalently, the government implements all spending projects that pass the social cost-benefit test given the existing set of tax instruments and financing sources. In Figure 2, the "autarky" optimum is at point 1, with net social benefit given by the triangle *B1q*.

Figure 2



Now suppose that foreign aid is available in amount *a* to fill the gap between desired spending *g* and domestic revenue *r*. The net social benefit, or surplus, enjoyed by the recipient, gross of any cost of the aid, is now the difference between the areas *0B3g* and *0è2r*. Note that this area is always greater than *B1è*. Using slopes of 1 and –1 for simplicity, we can define the surplus as

(1) $$S(r,g;B,q) = (Bg - \frac{g^2}{2}) - (qr + \frac{r^2}{2}).$$

With this setup it is straightforward to study the recipient's optimal response to foreign aid, whether provided as a grant or as concessional financing (e.g., Kimbrough [1987]). Missing from such accounts, however, is a characterization of institutional development in the recipient's public sector. Yet, several observers have pointed to the pernicious effects of foreign aid on the recipient's ability to develop an effective public revenue and expenditure system (Botchwey and Brautigam [1998], World Bank [1998]). In a widely quoted speech in 1993, Kim Jaycox, the World Bank's then vice president for Africa, said "…donors and African governments together have in effect undermined capacity in Africa: they are undermining it faster than they are building it…"

We capture this feature by introducing learning-by-doing of the type studied by Arrow (1962) and others. More specifically, we assume that the marginal cost of taxation, represented by the parameter *è*, is a decreasing function of accumulated revenue-collecting experience *R*, where the latter is measured as

$$R_t = \int_{-\infty}^{t} r_s e^{-a(t-s)} ds. \tag{2}$$

The parameter *á* is nonnegative: a lower value corresponds to greater institutional memory. In the limit (*á = 0*), revenue experience does not decay at all. For simplicity we use the form

$$q = \frac{1}{R_t}, \tag{3}$$

which places a lower bound of zero on the tax inefficiency parameter.

With these items in place we now take the position of a global central planner. The planner's problem is to maximize the discounted surplus accruing to the recipient country, net of the opportunity cost of aid funds to the donor (time subscripts are suppressed unless absolutely necessary):

$$Max \int_{t}^{\infty} [bS(r_s, g_s, q) - a] e^{-d(s-t)} ds \tag{4}$$

subject to

$$\dot{q} = aq - q^2 r \tag{4.1}$$

$$g = r + a\,. \tag{4.2}$$

The parameter *â* is the relative weight the planner attaches to recipient-country welfare. Constraint (4.1) describes the evolution of tax (in)efficiency over time, and comes directly from (2) and (3). Constraint (4.2) is the public sector's current budget constraint; it reflects our assumption that aid and tax revenues are the only available sources of financing for government spending.

The Hamiltonian for this problem, substituting (4.2) into the maximand, is

$$H(r, g, q, l) = e^{-dt}[bS(r, g, q) - (g - r) + l(aq - q^2 r)]. \tag{5}$$

The first-order conditions are

$$bS_g = 1, \;\; or \;\; g = B - b^{-1} \tag{6.1}$$

$$bS_r = lq^2 - 1, \;\; or \;\; r = b^{-1} - q - b^{-1} lq^2 \tag{6.2}$$

(6.3) $$\dot{l} = (d-a)\,l - bS_q + 2\,lqr = (d-a)\,l + (b+2\,lq)r,$$

along with (4.1), (4.2), and the transversality condition.

From equation (6.1), government spending is constant along any optimal path. An alternate way of writing this condition is $b * MSB = 1$: the planner equates the distributionally weighted marginal social benefit of expenditure with the opportunity cost of funds. Equation (6.2) has a similar interpretation save for the additional term lq^2, which reflects the learning-by-doing externality associated with revenue collection.

Differentiating (6.2) with respect to time and using (4.1) and (6.3) to replace dq/dt and dl/dt, the evolution of revenue over time is given by

(7) $$\dot{r} = (a+d)[r - b^{-1}] + dq.$$

Equations (7) and (4.1) form a second-order dynamic system in *r* and *è*. With *g* fixed at its optimal level by (6.1), we use the public sector's budget constraint (4.2) to substitute for dr/dt and *r* in these equations to get:

(8) $$\dot{a} = (a+d)[a - B + 2b^{-1}] - dq.$$

and

(9) $$\dot{q} = aq + q^2(a - B + b^{-1}).$$

Together with the transversality condition, equations (8) and (9) describe the evolution of aid and tax efficiency along an optimal path.

Figure 3 shows the phase diagram. The dq/dt locus has two segments, the first of which is the *a*-axis ($q = 0$). The second ($a = B - b^{-1} - (a/q)$) is the rectangular hyperbola labeled hh'. As *á* goes to zero, institutional memory increases and this locus approaches the axes $q = 0$ and $a = g^* = B - b^{-1}$. Above the hyperbola, current revenues are high enough that the accumulation of new experience outweighs depreciation, and tax inefficiency falls. Between the two loci, depreciation dominates and inefficiency rises.

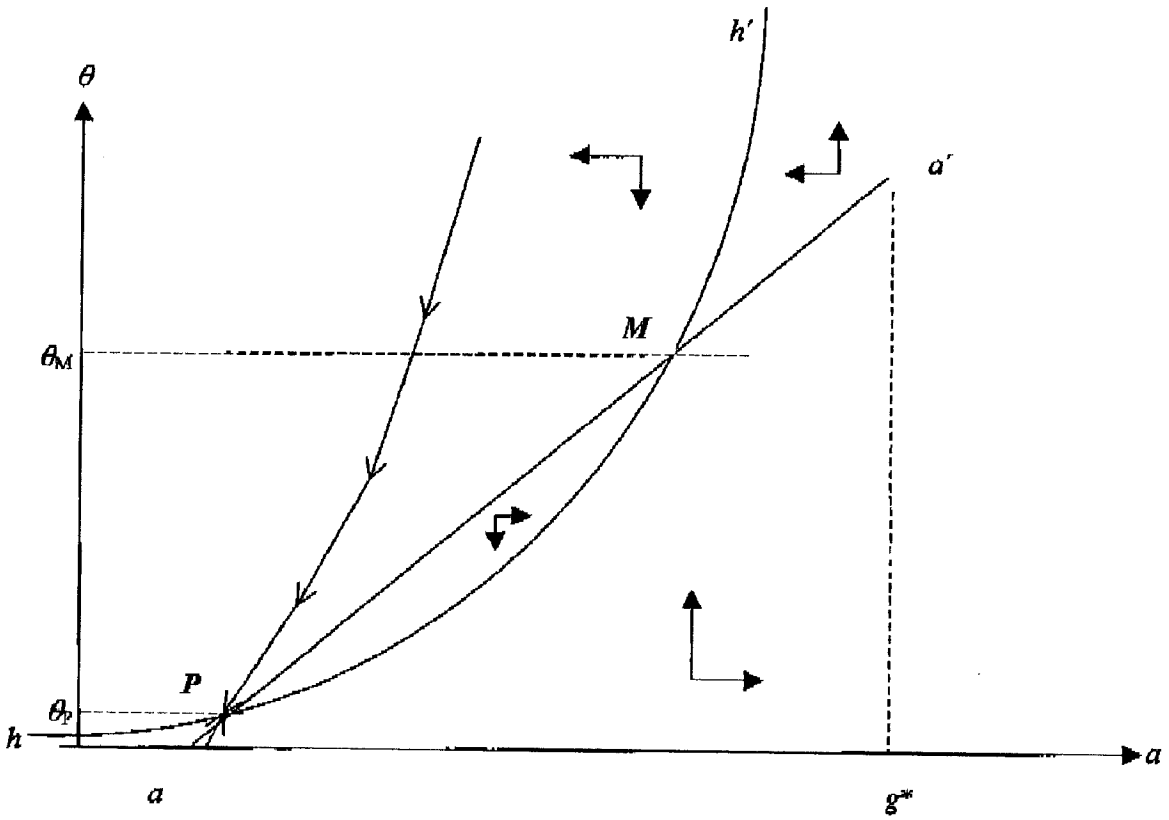
The $da/dt = 0$ locus is linear and is labeled aa' in Figure 3. From equation (8), it takes the form

(10) $$\dot{a} = 0 \quad \Rightarrow \quad q = \left(\frac{a+d}{d}\right)[a - (B - 2b^{-1})].$$

For fixed *è*, the dynamics for *a* are unstable around this locus: *a* is falling to the left of the locus and rising to the right. Stationary points occur where hh' and aa' cross. There are two such points if memory is sufficiently long; otherwise there are none. We assume in what follows that there are two stationary points. A sufficient condition for this, when $b \le 1$, is $a \le 1/4$ (the exact condition, $a < (a+d/4b\,2d)$, is derived in the Appendix).

Of the two stationary points in Figure 3, the low-aid, high-tax-efficiency equilibrium *P* is a saddle point while the high-aid, low-tax-efficiency equilibrium *M* is locally stable. The transversality condition is satisfied at both points, implying that *any* path converging to either equilibrium satisfies the full set of necessary conditions for an optimum. We show in the Appendix, however, that the planner's discounted welfare is higher at point *P* than at point M, by the amount $(r_P - r_M)/2d$, where

Figure 3



$r_i (i = M, P)$ is the revenue corresponding to steady state i. It follows that from any initial value of tax efficiency, the saddle path converging to P is the planner's optimum *for sufficiently low values of the discount rate*. In what follows we assume that this condition is satisfied.

If tax inefficiency is initially above the planner's steady-state θ_P, the optimum involves declining levels of aid and a gradual accumulation of tax experience. Assuming that aid cannot be negative, the steady-state value of aid is

$$a_P = Max\left[0, B - \frac{\beta^{-1}}{2}(3 + \sqrt{1 - 4\alpha\beta^2\gamma})\right], \tag{11}$$

where $\gamma = \delta/(2\alpha + \delta)$. For interior steady states we have $da_P/dB = 1$, $da_P/d\beta > 0$, and $da_P/d\alpha > 0$. The first two of these results are intuitive: aid is higher in steady state if public spending is more productive or if a higher weight is given to recipient-country welfare. The finding that faster institutional decay (weaker institutional memory) increases steady-state aid is less obvious. The dynamics of institutional experience would suggest the opposite, since by equation (4.1) the level of revenue

collection required to keep a given level of accumulated experience intact ($\dot{q} = 0$) is an increasing function of *á*. With *g* fixed at its optimal level, greater current revenue implies lower aid, so a rise in *á* shifts the *hh* schedule to the left. Since the *aa′* locus has a positive slope, this increases *steady-state* aid. The *aa′* schedule also rotates to the left, but does so by a sufficiently smaller amount, that the *P* intersection takes place at a higher aid level. Finally, equation (11) implies that $da_P / dd \geq 0$, with strict inequality if *á* > 0. A higher social discount rate therefore means greater aid in the steady state. This result comes from the lower weight placed on the future payoffs associated with learning-by-doing.

Steady-state tax efficiency is given by $q_P = a / r_P = a / (B - b^{-1} - a_P)$. A rise in *B* therefore leaves q_P unchanged: the increase in public spending is paid for entirely by aid in the steady state. A rise in *â* reduces tax efficiency (raises q_P): the greater weight on recipient-country welfare leads to higher aid in the steady state, and this increase is spent partly on public services and partly on reducing distortionary taxation. A rise in á also reduces tax efficiency, as the decreased return to revenue-collecting experience is reinforced by an increase in aid. As a final comparative statics result, a higher discount rate also reduces tax efficiency, by substituting aid for domestic revenue—and thus institutional development—in steady state.

While the equilibrium at *P* is clearly preferred to that at *M*, it is important to note that the recipient is actually better off at *M*. Hence all the benefits in going from *M* to *P* accrue to the donor. This is intuitive when we recognize that the level of expenditure, g^*, is fixed and the same in *M* and *P*. Nevertheless, the notion that Korea's graduation benefited the donors and not Korea may be a bit difficult to swallow. Recall, however, that in our model the recipient attaches no cost to aid. If he did, and it was sufficiently large, then the recipient would be better off at *P* than *M*. Finally, if the recipient faced a possible cutoff in aid, he would rather be in a high-institutional-development state, *P*.

3. Aid Dependence

The planner's optimum involves a steady improvement in institutional performance as the recipient graduates from high aid levels. At each instant the recipient is "dependent" on aid in the sense that a reduction would lower the current net benefit associated with government spending and taxation. *But dependence in this sense represents a Pareto optimum*. Furthermore, recipient and donor fully anticipate the consequences of their actions for institutional development. We now explore how this concept of dependence changes if agents behave in a non-optimal manner.

What if the planner ignored institutions and institutional development altogether? This could be characterized as the extremely myopic or naïve view, but is not inconsistent with the optimal public finance view of budget policy (see Dreze and Stern [1987]). In this case, the planner solves the "static" public finance problem to obtain

$$g_s = B - b^{-1}$$
$$r_s = b^{-1} - q$$

so that

$$a_s = g^* - b^{-1} + q$$

which is different from the condition for $\dot{a} = 0$, $a = g^* - B^{-1} + (d/(a+d))q$, except when $a = 0$.

In terms of Figure 3, this static solution amounts to a rotation of the aa' line to the right. This leads to two equilibria, one of which is stable. The stable equilibrium is one which involves less aid and more institutional development than even the planner's optimum, *P*. The unstable equilibrium is one with high aid and low institutional development.

Which equilibrium the economy converges to depends on initial conditions (Figure 4). If the country's institutional capacity was weak to start with ($q > q_1$), the economy will require increasing amounts of aid. Institutions will deteriorate until domestic revenue mobilization is driven to zero and aid finances all of public spending. This occurs at point a'. The process does not stop here, however, since taxation capacity now gradually disappears as cumulative tax experience is driven to zero. By contrast, if the country had relatively strong institutions ($q < q_1$), the economy converges to M_1, which is a low-aid, high-institutional-quality state. In either situation, the myopic planner (along with aid donors and recipients) is continuously "surprised" by the evolution of institutions over time.

The above discussion points to a possible dichotomy between aid-receiving countries that have strong and weak institutions. For instance, many African countries have similar per capita incomes to India and Pakistan, but arguably different levels of institutional development. In Africa, ignoring the effect of aid on institutional development can be very costly (to donor and recipient alike), with a strong possibility that the economy becomes trapped in a high-aid, low-institutional-development equilibrium. In India and Pakistan, the effect of ignoring institutional development may be relatively benign. The historical experience supports this hypothesis. Aid to India and Pakistan has declined significantly when comparing the 1970s with the 1990s (Figure 1). Interestingly, so has aid to Botswana. But aid to many African countries, including Mali and Tanzania, has increased substantially between the two decades.

Instead of being myopic throughout, what if the planner realized at some point that aid was undermining domestic institutions? Note that the myopic solution involves too much aid at each point on the dynamic path. Once the institutional dimension is recognized, the optimal strategy is to reduce aid "up front," making a horizontal jump in Figure 5 from the aa' schedule to the saddle path. This adjustment brings out two very different aspects of the recipient's aid dependence. The first is always present: reducing aid hurts the recipient. The reduction in aid requires an immediate increase in domestic revenue, which in turn produces an immediate fall in the recipient's surplus *(S)*. Moreover, since there is no immediate payoff to greater learning-by-doing, this loss is greater than the reduction in aid and the planner's payoff falls in the short run as well. But the present value of this move, from the planner's perspective, is positive. This is precisely because of the second aspect of aid dependence: excessive aid levels hold back the recipient's institutional development.

Figure 4

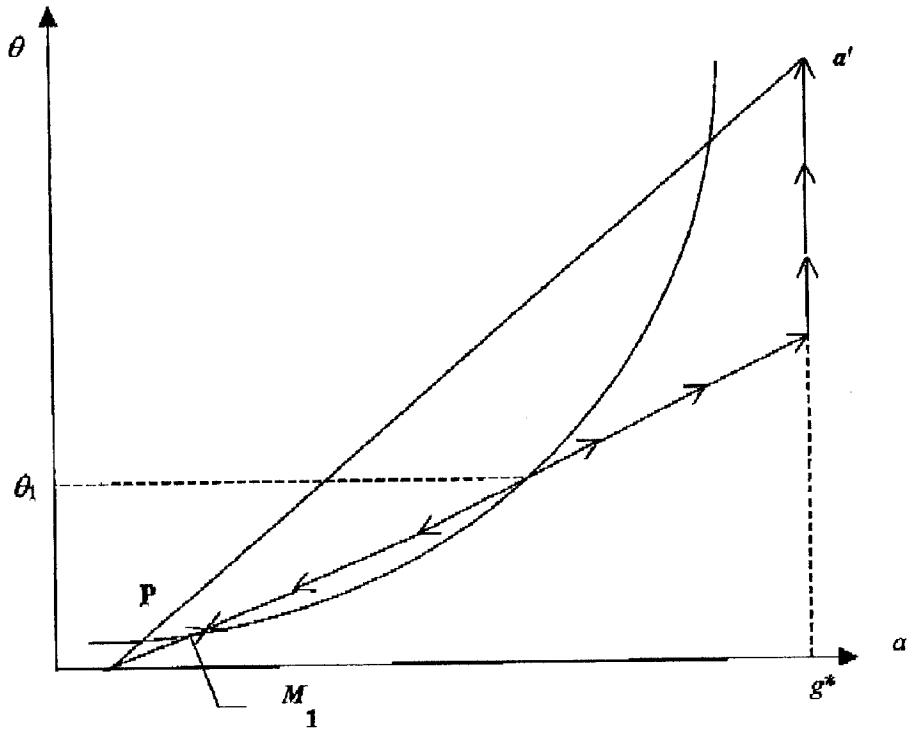


Figure 5

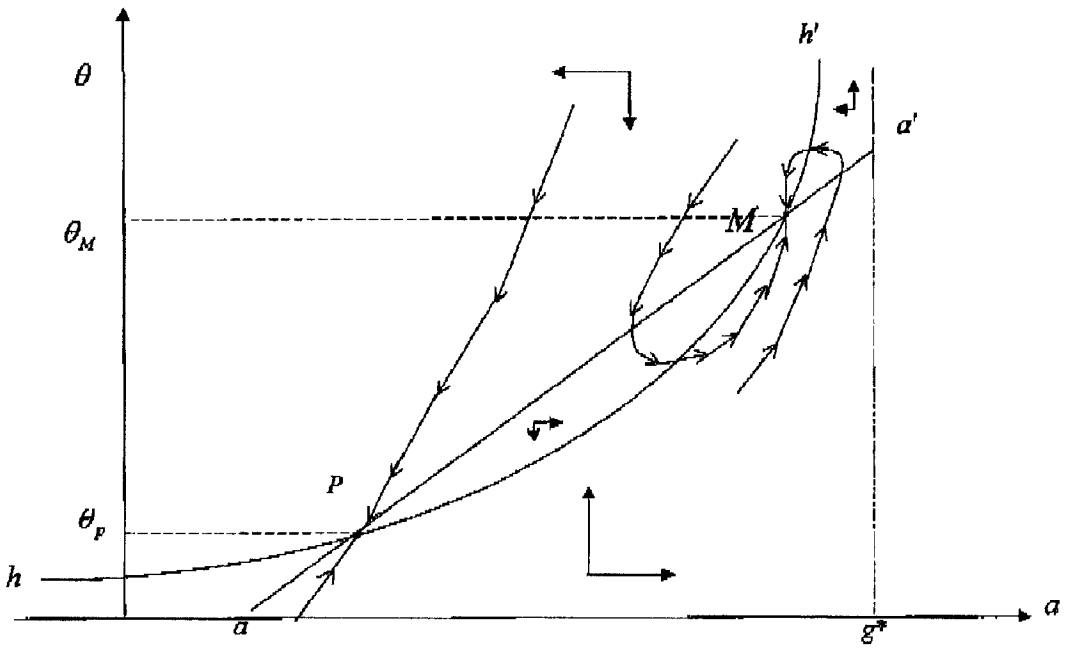
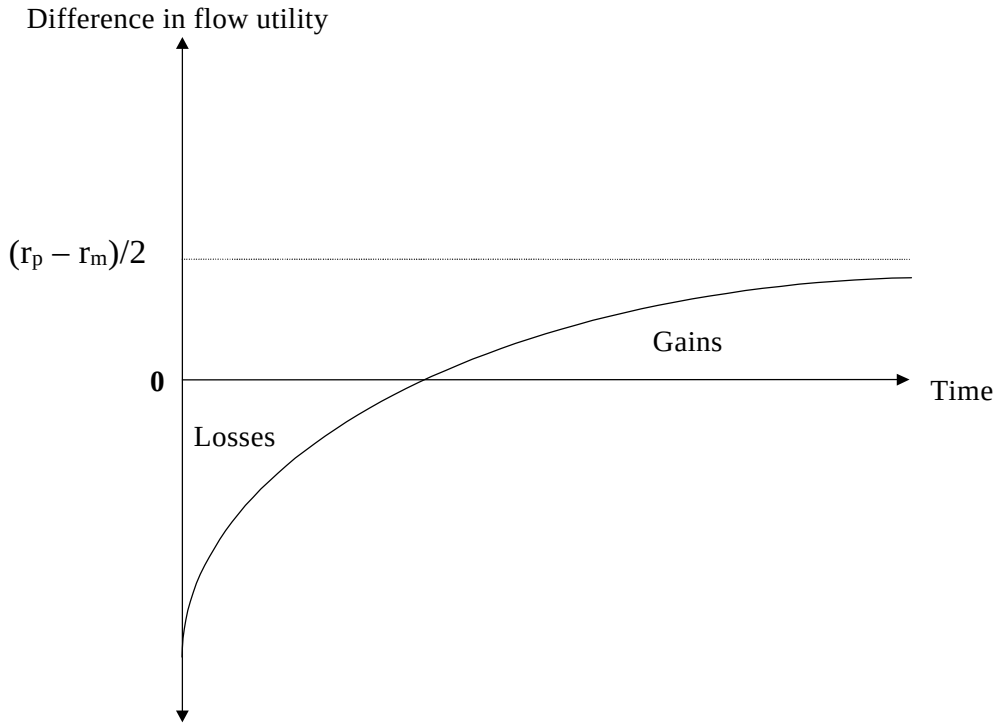


Figure 6 shows the increase in flow utility $bS - a$ associated with a move from the myopic path to the optimal path, assuming an initial institutional capacity between q_P and q_M. Initial losses persist for some period but are more than offset in present value terms by gains due to faster institutional development.

Figure 6



As long as institutional capacity is strong enough to justify some domestic revenue mobilization initially, institutions will improve or deteriorate over time. Participants are therefore likely to infer, eventually, the true relationship between revenue collection and efficiency. A more subtle form of myopia exists when this relationship is incorporated but the eventual superiority of the equilibrium at *P* is given insufficient weight. There is an infinity of such paths, converging to the equilibrium at *M* (two of these are shown in Figure 5). Expectations are fully rational on such paths. The planner realizes that aid slows down institutional development, and at each instant taxation capacity evolves exactly as expected. Moreover, these paths satisfy the transversality condition for the planner's optimum. But the planner fails to realize how much è-cutting could be achieved in the long run; and this failure of ambition limits the recipient's accumulation of experience in the short run. Graduation does not occur, for the simple reason that institutional development is too

slow. Eventually donor and recipient are stuck at *M*, with high aid levels and low institutional capacity.

4. Conclusions

Our aim in this paper has been to give precise analytical content to the widely used concept of aid dependence. All aid recipients are dependent in the sense that a substantial reduction in aid will hurt in the short run. Our focus has instead been on the interaction of aid with institutional capacity. If aid displaces domestic institutional development at the margin, an aid relationship that ignores this link will at best slow down eventual graduation. Where institutional capacity is initially weak, as in many Sub-Saharan African countries at independence, the attraction of gap-filling aid to both parties will be strong enough to displace the recipient's existing institutional capacity, locking donor and recipient into a permanent situation of high aid and low institutional capacity. Furthermore, even when donors and recipients recognize the importance of institutional development, they may not take the drastic steps needed to put the country on the path to graduation.

A final question concerns policy strategy. The problem as laid out here has the feature that efficiency and distribution cannot be easily separated. Moving to the optimal path is efficient but the recipient's discounted surplus falls (government spending is unchanged, so the benefits of learning-by-doing on the revenue side accrue to the donor in the form of lower aid). A Pareto improvement can be achieved only if prospective gains can be redistributed towards the recipient without overly compromising institutional development.

References

Arrow, K. 1962. "The economic implications of learning by doing." *Review of Economic Studies* 9: 155–73.

Bauer, P. T. 1971. "Foreign aid forever?" *Encounter* (March).

Botchwey, K., and D. Brautigam. 1998. "The impact of aid dependence on governance and institutions in Africa." Paper prepared for AERC/OCD Collaborative Research Project on Managing the Transition from Aid Dependency in Sub-Saharan Africa, May 21–22, 1998.

Bruton, H. 1998. "A reconsideration of import substitution." *Journal of Economic Literature* 36: 903–36.

de Long, J. B., and B. Eichengreen. 1991. "The Marshall Plan: History's Most Successful Structural Adjustment Program." Paper prepared for the Centre for Economic Performance and Landeszentralbank Hamburg conference on Post–World War II European Reconstruction, Hamburg, September 5–7, 1991.

Frank, A. G. 1966. "The underdevelopment of development." *Monthly Review* 18(4).

Friedman, M. 1958. "Foreign aid." *Yale Review* 47(4): 500–16.

Kaldor, N. 1963. "Will underdeveloped countries learn to tax?" *Foreign Affairs* (January).

Kimbrough, K.P. 1986. "Foreign aid and optimal fiscal policy." *Canadian Journal of Economics* 19(1, February): 35–61.

McKinnon, R. 1964. “Foreign exchange constraints in economic development and efficient aid allocation.” *Economic Journal* (June).
United Nations Industrial Development Organization. 1972. Guidelines for project appraisal. New York: UNIDO.
World Bank. 1998. “Addressing the challenge of reforming public institutions.” Public Sector Board, PREM Network. Draft.

Appendix

Deriving the condition for two stationary points:
For simplicity we work with the system in *r* and *è* rather than *a* and *è*. Our dynamic equations are (4.1) and (7). From (4.1), $dq/dt = 0$ when $q = a/r$. From (7), $dr/dt = 0$ when $q = g^{-1}(b^{-1} - r)$, where $g = d/(a+d)$. Eliminating *è*, we have the quadratic equation $r^2 - b^{-1}r + ag = 0$, with roots $r = b^{-1} \pm b^{-1}(1 - 4ab^2g)^{1/2}$. These roots are real provided that $4ab^2 < g^{-1}$, which is the condition given in the text.

Proof that the planner prefers P to M and the recipient prefers M to P:
The discounted value of the planner’s welfare at any stationary point is $W = (bS - a)/d$. Since government spending is identical at both stationary points, the difference in the planner’s welfare at the *P* and *M* points is

$$d(W_P - W_M) = b[q_M r_M + (r_{M^2}/2)] + a_M - b[q_P r_P + (r_{P^2}/2)] - a_P.$$

But $qr = a$ at both points (because $dq/dt = 0$); and from the quadratic equation derived above we can replace r^2 in each equilibrium with $b^{-1}r + ag$. We therefore have $d(W_P - W_M) = (r_M - r_P)/2 + a_M - a_P$. With g identical across stationary points, $a_M - a_P = r_P - r_M$ and $W_P - W_M = (r_P - r_M)/2d$.

The discounted value of the recipient’s welfare (using the same discount rate and applying a zero shadow price to aid) is bS/d at any stationary point. Since $b(S_P - S_M) = (r_M - r_P)/2d$, the recipient is better off at the *M* equilibrium.