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The Hope for Hysteresis in Foreign Aid

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ABSTRACT

We argue that a purpose of foreign aid is to whet the appetite of the recipient in order to bring about a long term commitment to what the donor perceives as a need, but which the recipient may rank lower down on his list of undertakings, or may be sufficiently resource constrained as to be unable to start the project. In other words, we explore the implications and conditions for success of a donor trying to affect long-term recipient policy by creating path dependence. Once the project is established, aid can be removed without reversing the process that has been set in motion. Quite simply, the donor wants its project to stick. We place a formal structure on this.

Keywords: foreign aid, governance, decentralization, rent seeking

JEL Classifications: O10, O19, F35, O11, C23, O47, E21, E22

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The Hope for Hysteresis in Foreign Aid

I. Introduction

The literature on foreign aid is replete with theories and empirical evidence on appropriate aid policies and strategies: the evaluation of the success or failure of aid, the implications of aid for donors and recipients, corruption, fungibility, equity and efficiency, intermediate short-term analysis and micro- and macro-economic outcomes, among others. Here we investigate how a donor can utilize the “stickiness” of aid policy to achieve its policy goals.

When a donor engages in a particular development/aid project, it may be argued – and casually is argued – that the purpose of the aid is to whet the appetite of the recipient in order to bring about a long term commitment to what the donor perceives as a need, but which the recipient may rank lower down on his list of undertakings or may be sufficiently resource constrained as to be unable to start the project. The question that the donor faces is what is needed to get the project implemented, how without making a permanent commitment.

We consider the situation in which a donor wishes to support a project in a certain country. The donor possesses a notion of his ideal (unconstrained) investment necessary to have the best outcome; however he also faces costs that must be taken into consideration when determining the optimal (constrained) investment in the project at hand. We develop a two-period model in which the donor invests in a project only during the first period and the recipient country invests only during the second period. Ideal total investment in the project may differ for the donor and the recipient. Knowing this, the donor calculates his optimal investment in the project for the first period.

Our argument borrows from the discussion of hysteresis in the economic history literature. Hysteresis, or path dependence, expresses the long term consequences of earlier, perhaps arbitrary, decisions. Under “policy hysteresis” a temporary policy can have permanent effects. Once the project is established, it is not readily reversible. Here we explore the behavior of donors and recipients when donors explicitly want to initiate a program that will continue after they stop funding it.

We rely on notions of foreign aid and its effects and implications developed in the fiscal federalism literature on aid. A major concern of this literature is the stickiness of foreign aid – whether or not aid effectively goes to where the donor intended it to go. A finding of this literature is that aid does “stick” in the sense that aid inflows cause increases in development expenditures – while aid may be fungible, it is not completely so (Heller, 1975; Gang and Khan, 1990, 1999; Khan and Hoshino, 1992; Pack and Pack, 1993; Iqbal, 1997; Feyzioglu et al., 1998; World Bank, 1998; Ahmed, 1998; McGillivray and Ahmed, 1999; McGillivray, 2000; McGillivray and Morrissey, 2001; Hagen, 2006).

We proceed by building the structure of the model, highlighting the insights it provides along the way.

2. The Model

The Donor

Consider a donor country (or NGO) that wishes to help a recipient country by supporting a certain project in the recipient. The donor possesses a notion of the ideal (unconstrained) investment necessary to have the best outcome for the recipient country and aims to provide the recipient the best possible project it can under its limitations and as close to the ideal level as possible. The ideal level, I , is assumed to be a continuous variable defined on the interval $(0, \bar{I})$. As the donor moves closer to the ideal point, I , the donor’s utility increases as the donor is more successful in attaining its goal. However, in reality the donor may not always be able to create a project at the ideal level, I , and may choose to create a project at level x which is lower than his ideal level. One could think of situations where the ideal level may be lower than the actual because of different restrictions. To simplify we assume that the actual level is always lower than the ideal level. Therefore, the utility of the donor depends on the difference between the ideal level, I , and the actual investment level x , $(I-x)$.

The donor’s payoff is given as,

$$(1) \quad U_1 = \begin{cases} -\frac{(I-x)^2}{w} - a x & \text{for } I > x \\ -a I & \text{for } I = x \end{cases},$$

where I is the ideal project level that the donor thinks the recipient country needs, x is the actual level chosen by the donor, and a is the cost of one unit of the investment in the project – the marginal cost of production. w represents the recipient country's wealth. To simplify we assume constant marginal cost for the donor. This payoff function assumes that as the donor invests at a level closer to his ideal point, his utility increases. If the donor invests at a level that is equal to the ideal level, $I = x$, then the utility will equal to the costs of the project, aI . Of course the donor will not invest at a level which is higher than his ideal level. The main idea here is the wealthier the recipient, the less the donor cares about the project and thus loses less when there are deviations from his ideal project level.

The donor chooses the actual level of investment in the project, x , so as to maximize his payoff, U . The first order condition determining optimal investment is,

$$(2) \quad \frac{\partial U_1}{\partial x} = 2\frac{(I-x)}{w} - a \quad \text{for } I > x.$$

Solving the first order conditions¹ we obtain that the optimal level of investment by the donor equals,

$$(3) \quad x_1^* = I - \frac{a w}{2} > 0.$$

In order for $x > 0$, a or w cannot be too big. If w is high, the donor doesn't care too much about the recipient. Moreover, if a is high, the cost of investing is very high. Thus the benefit (which is a negative function of w) has to be higher than the cost (which is a direct function of a)!

¹ Second order conditions are ensured: $\frac{\partial^2 U_1}{\partial x^2} = -2\frac{1}{w} < 0 \quad \text{for } I > x.$

As we can see, the project's optimal level of donor investment has the following properties,

$$(4) \quad \frac{\partial x_1^*}{\partial I} > 0, \quad \frac{\partial x_1^*}{\partial a} < 0, \quad \frac{\partial x_1^*}{\partial w} < 0.$$

Namely,

1. *The higher the donor's ideal level, the more it will invest in the recipient country;*
2. *As the investment costs increase, the investment level decreases;*
3. *The donor invests fewer resources in wealthier than in less-wealthy countries.*

Given the optimal investment level, we calculate the optimal payoff of the donor investing x^* resources in the project by substituting into (1),

$$(5) \quad U_1^* = \frac{a^2 w}{4} - a I < 0.$$

As we can see, the optimal payoff of the donor has the following properties:

$$(6) \quad \frac{\partial U_1^*}{\partial I} < 0, \quad \frac{\partial U_1^*}{\partial a} = \frac{a w}{2} - I < 0, \quad \frac{\partial U_1^*}{\partial w} > 0,$$

$$\frac{\partial U_1^*}{\partial a} < 0 \text{ since } x^* = I - \frac{a w}{2} > 0.$$

In other words,

1. *As the ideal level of the donor increases, his payoff decreases,*
2. *As investment costs increase, the payoff decreases,*
3. *As the wealth of the recipient country increases, the payoff increases.*

The Recipient country

Let us now consider the recipient country. Assume that the recipient has a similar type of payoff function as the donor. The ideal project level for the recipient is given

by J and the actual level invested by the recipient is given by y . The recipient country faces marginal cost, b , in creating the project. Notice that investment by the recipient is to create the project; latter we will describe it as continuing the project that the donor started.

The payoff function of the recipient country is assumed to equal,

$$(7) \quad V = \begin{cases} -\frac{(J-y)^2}{w} - b y & \text{for } J > y \\ -b J & \text{for } J = y \end{cases}.$$

If the recipient country could choose its optimal investment in the project than it would choose a level that equals,²

$$(8) \quad y^* = J - \frac{b w}{2} > 0,$$

with an optimal payoff at a level,

$$(9) \quad V^* = \frac{b^2 w}{4} - a J < 0.$$

This, of course, is parallel to investment by the donor represented by equations (3) and (5) and has the same type of comparative statics conclusions as presented above.

Two-period Model

We assume a two-period model where in the first period the donor invests in the project and in the second period the recipient country continues the investment by itself. Assume that the recipient country will be continuing the project after the donor finishes its investment. The recipient country will, of course, start from the point where the donor finished. When deciding on its optimal investment the donor takes into account the fact that the recipient will continue this project. We assume that the

² The first order conditions, $\frac{\partial V}{\partial y} = 0$ and the second order conditions are ensured.

donor knows both the recipient's behavior with respect to the continuation of investment in this project and its ideal investment, J . Of course, it may well be the case that the ideal level of the project for the donor, I , is not identical to the ideal level of the recipient country, J . However, the donor knows how the recipient country will react to each level of investment by the donor. This is a Stackelberg type of game where the donor takes into account how his investment will affect the recipient, while the recipient only takes as given what the donor has invested and thus determines its optimal investment level in the project in the second period.

The donor may or may not care about what happens after it leaves the project, i.e., whether or not the recipient continues to invest. To simplify, assume that the level of investment by the donor is strictly lower than the ideal level, $x < I$. We assume that the payoff of the donor is given as,

$$(10) \quad U_2 = \alpha \left(-\frac{(I-x)^2}{w} - a x \right) + (1-\alpha) \left(-\frac{(I-x-y)^2}{w} - b y \right) \text{ for } I > x,$$

where $0 \leq \alpha \leq 1$ is the weight the donor puts on the utility from the first period. If $\alpha = 1$ then the donor only values the benefits from the investment in the project at the time that he is involved in its investment and after he leaves the project he does not care anymore about it. If $\alpha = 0$, the donor cares only about the long run affects of the project. If $\alpha = \frac{1}{2}$, the donor put identical weights on both periods and have an equal benefit from the time he invests and the time that the recipient country continues to invest in the project. As α ($0 \leq \alpha \leq 1$) increases, the weight the donor puts on the first period (during which he invests in the project) increases at the cost of a decrease in the weight placed on the second period (when the donor is no longer connected to the project).

We also assume that the donor, when taking into consideration the second period, calculates the payoff around its own ideal level, I . This is the level the donor thinks the project should be and is not necessarily the ideal level, J , of the recipient. Of course, he will also take into consideration the ideal level of the recipient country in terms of the recipient country's reactions to his investment. Moreover, the donor takes into consideration that in the second period, an investment of x has already been

carried out; thus the distance to achieve the ideal level is $J - x$. This is in comparison to the case of the first period when they are starting from scratch.

The donor knows that the recipient country will choose an optimal level as given by (8) that maximizes the recipient's payoff in the second period. However, the donor also knows that the starting point for the recipient is not J , but the investment level of the donor x^* . Moreover, we assume that the cost of investing in the project by the recipient is a function of the fact that the donor has already invested in the first period. In other words, if the recipient country believes its ideal level is J and the donor has already invested x , then the gap is now $J - x$, since the recipient country is receiving an already started project. The payoff function of the recipient will no longer be the one described in (7) and will instead equal,

$$(7') \quad V = \begin{cases} -\frac{((J-x)-y)^2}{w} - b y & \text{for } J-x > y \\ -b(J-x) & \text{for } J-x = y \end{cases}.$$

We assume that the marginal cost of investing in the project by the recipient country equals b and is also a function of the investment level of the donor. It may well be that the marginal cost in the second period is lower than the marginal cost in the first period, $b < a$. In this case the investment by the donor decreases the marginal costs of the recipient country. The reason for this is that the donor has started the work and has undertaken the high cost elements of the project and what is left for the recipient are the lower cost investment items. If $b > a$, the donor has invested in the lower costs elements of the project – the easier part of the project – leaving the harder part for the recipient to complete. If $b=a$, then the donor has no effect on the costs of production for the recipient in the second period.

Therefore, the optimal investment of the recipient country in the second period, y , equals,

$$(11) \quad y^* = (J-x) - \frac{bw}{2}.$$

In light of (11) let us now rewrite the payoff of the donor taking into account (7') and the two-periods of investment,

$$(12) \quad U_2 = \alpha \left(-\frac{(I-x)^2}{w} - a x \right) + (1-\alpha) \left(-\frac{(I-y^*(x))^2}{w} - b y^*(x) \right).$$

Plugging into (12) the ideal level of investment of the recipient (11) which is a function of the investment of the donor from the first period, we obtain that the payoff function of the donor over the two time periods for $I > x$ and $y^* \geq 0$ equals,

$$(12') \quad U_2 = \alpha \left(-\frac{(I-x)^2}{w} - a x \right) + (1-\alpha) \left(-\frac{\left((I-x) - \left((J-x) - \frac{bw}{2} \right) \right)^2}{w} - b \left((J-x) - \frac{bw}{2} \right) \right).$$

The donor maximizes his payoff as stated in (12') by determining his optimal investment in the project, x . The first order conditions satisfy,

$$(13) \quad \frac{\partial U_2}{\partial x} = b(1-\alpha) - \frac{\alpha(-2I + a w + 2x)}{w}.$$

Solving the first order condition, $\frac{\partial U_2}{\partial x} = 0$, we obtain.³

$$(14) \quad x_2^* = \frac{1}{2} \left(2I + \left(-a + \left(-1 + \frac{1}{\alpha} \right) b \right) w \right).$$

As we discuss below, we are assuming that the investment level of the recipient country is positive, $y^* > 0$. This optimal investment by the donor may generate a negative investment by the recipient country. For the case where the investment is

³ Second order condition holds: $\frac{\partial^2 U_2}{\partial x^2} = -\frac{2\alpha}{w} < 0$.

"negative" we will have to rewrite the donor's payoff function. For now we assume that the investment in the second period is positive.

Let us now consider the effects of changes in the different variables on the level of investment in this case. It can be verified that,

$$(15) \quad \frac{\partial x_2^*}{\partial a} < 0; \quad \frac{\partial x_2^*}{\partial \alpha} < 0; \quad \frac{\partial x_2^*}{\partial b} = -\frac{1}{2} \left(\frac{\alpha - 1}{\alpha} \right) w \geq 0,$$

and,

$$\frac{\partial x_2^*}{\partial w} = \frac{1}{2} \left(-a + \frac{(1 - \alpha)}{\alpha} b \right).$$

In other words,

1. *An increase in donor's investment cost decreases investment in the first period;*
2. *Increasing the weight the donor sets on the first period, the period in which it invests in the recipient country (a decrease in the effect of future benefits from the investment for the donor), decreases the donor's investment in the first period;*
3. *An increase in the cost of investment for the recipient (in the second period) increases the donor's investment;*
4. *An increase in the wealth of the recipient, w , has an ambiguous affect on donor's investment. The main reason for this result is that the wealth affects utility via the cost structure. The ambiguity is a function of three parameters: the weight the donor places on the present time, α , and the costs of production in the first period, a , and the second period, b . The sign of $\frac{\partial x_2^*}{\partial w}$ rests on the sign of $((1 - \alpha)b - \alpha a)$. Namely if the donor sets the same weight on both periods, $\alpha = (1 - \alpha) = \frac{1}{2}$, then if the costs in the second period are higher than the first period, $b > a$, the donor increases his investment. And if the costs in the first period are higher, $b < a$, the donor decreases his investment. If the costs are identical, a change in wealth has no effect. In general, not only do costs matter, but also the weight the donor assigns to each period. Therefore,*

the weighted cost (the cost times the weight assigned to the period) determines whether the donor increases or decreases investment.

The recipient country's investment

In the light of the donor's optimal investment let us now consider the recipient's optimal investment. The optimal investment by the recipient country is given by (11),

$y^* = (J - x) - \frac{bw}{2}$, where this is a function of the donor's optimal investment.

Given the donor's optimal investment level as shown in equation (14), we may calculate the optimal level invested by the recipient,

$$(16) \quad y^* = J - I + \frac{(a\alpha - b)w}{2\alpha}.$$

As we can see from (16), the recipient's optimal investment level depends on several parameters: the ideal level of the recipient country, J , the ideal level of investment of the donor, I , and the difference in the ideal levels of the donor and the recipient country, $J - I$. It also depends on the weight the donor sets on the effect investment has on the present (and future) period, as well as on the cost of investment during both periods, a and b , and on the wealth of the recipient country, w .

Let us first discuss the ideal levels of the different groups. We examine three cases:

1. the ideal levels of the donor and the recipient are identical ($J = I$);
2. the ideal level of the recipient country is higher than that of the donor, $J > I$;
3. the ideal level of the recipient country is lower than that of the donor, $J < I$.

Case I: Ideal levels equal, $I = J$

In this case the donor and the recipient see eye-to-eye with regard to the ideal level of investment in the project. Both think the ideal level should be the same. From (16) it is clear that the recipient's investment equals $y^* = \frac{(a\alpha - b)w}{2\alpha}$. Therefore, the

recipient country invests in the project in the second period only if y^* as presented above is positive. Namely, $\frac{(a\alpha - b)w}{2\alpha} > 0$. Therefore, the sign of the investment of the recipient in the second period rests on the sign of $a\alpha - b$. If $a\alpha > b$, then either the cost of investment in the second period is sufficiently larger than that of the first period, or the weight assigned for the first period is sufficiently large. If the cost of investment is identical, $a=b$, then the recipient country will not invest in the second period. Moreover, in order for the recipient country to invest in the second period the difference between the costs of investment in both periods has to be sufficiently large. In other words, it must hold that $\alpha > \frac{b}{a}$. Thus, the ratio of the costs of investment in the second period relative to the first period, $\frac{b}{a}$, has to be lower than the time preference of the donor, α . Thus,

In the case where the donor's and recipient's ideal investment levels are identical

1. *and the cost of investment in both periods are the same, then the recipient country will not invest in the second period;*
2. *in order for the recipient country to be willing to invest in the second period it must be the case that the cost of investment in the second period is sufficiently lower than that of the first period.*

Case II: Donor's ideal levels are smaller than of the recipient country, $I < J$

In this case the ideal level of the donor is lower than the ideal level that of the recipient. In other words the recipient thinks that the importance of the project is greater than what the donor thinks. In this case, the recipient wants the project much more than the donor is willing to give. Since $I < J$, the investment of the recipient country may well be positive even if the cost of production (investment) in the second period is high, $\alpha < \frac{b}{a}$. Even so, if the costs of the investment in the two-periods are not identical, it may be that the recipient country will not invest in the second period. However, the difference between the costs of investment so that the recipient country

will invest in the second period depends on the difference between the ideal levels of investment.

In the case where the recipient country has a higher ideal level than the donor, the recipient wants a higher level project than the donor thinks it needs and, thus, there is a higher chance of continuing the investment in the second period after the donor finishes its funding.

Case III: Donor's ideal level is higher than that of the recipient, $J < I$

This is the case where the donor values the project more than the recipient country. In other words, the donor thinks that the project is more important than the recipient and therefore the donor believes that this project should have a higher investment level, while the recipient is not so enthusiastic. This may well be because the recipient has other projects in which it wishes to invest. It is clear that in this case the cost of production will mainly fall on the donor rather than on the recipient. From (16) we see that in order for the investment level of the recipient to be positive, it must be that $\frac{(a\alpha - b)w}{2\alpha}$ is "sufficiently" positive. Namely, the costs of production in the second

period must be sufficiently low so that the donor will not invest too much in the first period, as a result of high investment costs, and thus it will be worthwhile for the recipient to invest in the second period (see analysis above for the case of differences in investment costs). The main reason why the recipient will invest even though the donor invested with a higher ideal level is that when the donor makes its investment, it takes into account what its own ideal level is even during the second period (I) and not the recipient's ideal level (J). Thus,

In the case that the ideal level of investment in the project is higher for the donor than the recipient country, in order for the recipient country to invest in the second period, the cost of production must be sufficiently lower in the second period than in the first period.

Donor's investment and recipient country's investments cost

As we have seen above, a major element in our discussion is the cost of investment in the second period. As a result of an investment by the donor in the first period the cost of production may decrease in the second period. This has an effect on the willingness of the recipient to invest in the project in the second period. In this setup the cost of investment may decrease as a result of the investment during the first period. It may well be that $b < a$, the investment by the donor decreases the marginal costs of the recipient country. The reason for this is that the donor has started the work and has made high cost investments, so what is left for the recipient is lower cost investments. If $b > a$, the donor invests in the lower cost elements – the easier part of the project – and the recipient now has the harder part of the project to complete. If $b = a$ then the donor has no affect on the costs of production of the recipient country.

In a more general model we could have that the marginal cost of investment in the second period is a continuous function of investment by the donor in the first period. This may well cause the donor to increase its investment in the first period to create the circumstance for the recipient country to invest in the second period.

Comparing the levels of investment, x_1^* and x_2^* .

The recipient country's investment is positive

Let us first concentrate on the case where the optimal level of investment by the recipient country is positive, $y^* > 0$. The difference between the two levels of investment, the first that does not take into consideration the investment in the second period and the second that takes into consideration of the investment of the recipient country in the second period. Comparing (3) and (14) we obtain that,

$$(17) \quad x_1^* - x_2^* = \frac{(\alpha - 1)}{2\alpha} b w$$

In other words,

1. *as the weight assigned to the first period, α , increases, the difference between the two investment decreases;*

2. *as the cost of investment by the recipient country is higher, the difference between the investments increases;*
3. *as the recipient country is wealthier, the difference between the two investments increases.*

The cost of investment in the second period and investment in the first period

The effect of the cost of investment in the second period is a very important component in the decision making.

As this cost decreases then the differences between the investments is smaller since the investment in the first itself has created a decrease in cost which enables the recipient country to invest. In the case where the costs do not decrease, then the donor takes a bigger proportion of investment on itself.

No investment by the recipient country, $y^*=0$

Let us now look at the case where from the calculations above we find that the "optimal" investment level by the recipient country is negative. Note than in the second period there will be no investment by the recipient country and the utility generated in the second period will only be a function of the ideal level of the donor and its investment in the first period. In such a case the recipient country will not invest in the second period and thus the payoff of the donor will no longer be as presented (12). Of course, for the first period nothing will change. The main change is the benefit from the second period. Here the donor will obtain a benefit only from his own investment in the first period as there will be no investments in the second period by the recipient. Therefore, the payoff function of the donor over the two-periods will equal

$$(18) \quad U_2 = \alpha \left(-\frac{(I-x)^2}{w} - a x \right) + (1-\alpha) \left(-\frac{(I-x)^2}{w} \right),$$

which equals

$$(18') \quad U_2 = -\frac{(I-x)^2}{w} - a\alpha x .$$

The donor will maximize U_2 with respect to x and calculate its optimal investment level. It is clear that if $\alpha < 1$ then this is the same type of problem when the donor does not take into consideration the second period, however, with lower investment costs, $a\alpha < a$.

The optimal investment thus equals,

$$(19) \quad x_2^* = I - \frac{a\alpha w}{2} > x_1^*$$

Therefore, we obtain the same type of results as before with regard to the relationship between the different variables determining the optimal investment level. The difference between the two investment levels will thus equal

$$(20) \quad x_1^* - x_2^* = \frac{(\alpha - 1)}{2} a w .$$

The results here are very similar to the case where y^* is positive. The difference between the investments will decrease with the weight assigned to the first period, α . The difference will now be a function of the costs of the first period, a , and not those of the second period, b , since the investment in the first period does not have an affect on the cost of investment in the second period.

3. Conclusion

In the last few years it has become popular to discuss economic development in terms of developing the proper set of institutions – including the legal framework and social conventions (for example, Epstein and Gang, 2006a, 2006b). International aid was brought into this discussion in terms of its influence on institutional development and its impact on growth and other indicators of development. While not universally

embraced, a stylized fact of development policy became that good governance is a necessary pre-requisite for aid to be effective in terms of raising a nation's rate of growth.

We suggest another yardstick for measuring the success of aid policy, one that is unfortunately more difficult to measure than growth and whose impact may be more difficult to pin down. Yet it may be as important. In Case 3, in a quite straightforward way the donor wants to direct the course of development. For example, aid may be given to a country to develop the oil extraction industry, conditional on most of the revenue from that industry going to the poor. The donor wants things for the recipient country and without the donor the recipient would not have invested so much since they have other priorities.

What we are arguing is that an important aspect of donor activity is its desire to influence recipient policy over the long haul. It tries to do this by creating path dependence; providing a desirable role for hysteresis in its foreign aid policy. Once the project is established, aid can be removed without reversing the process that has been set in motion. Quite simply, the donor wants its project to stick. We place a formal structure on this; highlighting the major considerations in implementing and evaluating this type of policy.

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