Official Versus Private Foreign Aid:
The Role of Crowding Out, Free Riding, and Political Economy

by

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Abstract

There exists ample evidence that the provision of official (governmental) aid relative to private aid to developing countries varies considerably between donor countries. A multi-household model of official and private aid provision is put forward to explain the said differences. The latter are explained in terms of different political economy equilibria, differences in the distribution of income in the donor country as well as differences in the extent of the coordination of private aid provision. The relative political power of the government and pressure groups in the donor country is modelled in a two stage game theoretic framework with one of the parties having a first mover advantage.

1   Introduction

The effects of international income transfers have been studied for more than seventy years in a huge and still growing literature. Some of the early literature is reviewed by Bhagwati, Brecher and Hatta (1984). Recent surveys are provided by Kemp (1992) and Brakman and van Marrewijk (1998).[1] One of the most cited results of this literature is the so-called transfer paradox; i.e. donor enrichment and recipient impoverishment as a result of the transfer.[2] Recent contributions to this literature have focussed on the tying of aid,[3] and the allocation of aid to several recipient countries.[4]

One of the striking facts about foreign aid provision is that the ratio of official to private aid provision varies enormously between aid providing countries (see Appendix A for details).[5] Consider, for example, the cases of two of the major donor countries, Japan and the United States. In Japan the magnitude of official aid is 40 to 50 times higher than that of private aid. In sharp contrast, the ratio of official to private aid in the United States is about 3. As can be seen from the table in Appendix A, there are not only big differences in the relative importance of official aid between the aid providing countries but private aid provision plays an important part in several donor countries apart from the United States which has already been mentioned (Germany and the United Kingdom, for example). Given this fascinating diversity, it is therefore interesting to see if economic theory can explain the stylised facts, and in this respect one of the key shortcomings of the received literature is its failure to distinguish between official and private aid.

Our main purpose is to develop a multi-household model which can explain the differences in the relative importance of official aid in terms of different political economy equilibria,

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[1]There is also a parallel and substantial empirical literature on the effectiveness and allocation of foreign aid. See, for example, Boone (1996) and Burnside and Dollar (2000).

[2]The seminal article is by Samuelson (1954). Paradoxes in distortion-free and distorted economies were also demonstrated by, for example, Gale (1974), Ohyama (1974), Brecher and Bhagwati (1982), Bhagwati, Brecher and Hatta (1983 & 1985), Dixit (1983), Jones (1985), Turunen-Red and Woodland (1988), Kemp and Wong (1993) and very recently Yano and Nugent (1999).

[3]On the implications of the tying of aid, see, for example, Kemp and Kojima (1985), Schweinberger (1990), Lahiri and Raimondos (1995), Lahiri and Raimondos-Møller (1997) and very recently, Lahiri et al (2001).

[4]A very recent contribution which focuses on the allocation of aid determined, *inter alia*, by lobbying by ethnic groups is Lahiri and Raimondos-Møller (2000).

[5]Official aid is taken to be all governmental aid to developing countries including those channeled via NGO's (non-governmental organisations). Private aid is the aid provided by NGO's net of government subsidies.

differences in the distribution of income among the donor households as well as different degrees of coordination of private aid provision. The decisions by the households to provide private aid, and that by the government to provide official aid, are modelled as a non-cooperative game. The government finances official aid by means of an income tax which is levied on all the household types.

The importance of political factors in the shaping of economic policies is now well recognised. Rodrik (1995) surveys various approaches of modelling political economic interactions between the government and private agents.[6] In particular, he distinguishes between demand and supply determined political economy equilibria. We follow his suggestion and model various political economy equilibria in terms of a first mover advantage of one of the players (the government or a donor pressure group) in the context of a two stage non-cooperative game. The well known concept of political markets then corresponds to the simultaneous game equilibrium, which forms the benchmark case in our analysis.

Last, but not least, it should be emphasized that our overall approach is related to the literature on the provision of public goods by the government and from voluntary contributions of private agents. The public good in our case is the utility of the recipient country which appears as an argument in the utility functions of the donor households.[7] However, there are key differences between our paper and this literature in terms of the focus of analysis and in terms of model formulation. To be more specific, the main focus of analysis in this paper is to explain the nature of the equilibrium in terms of a number of factors outline above, and not to examine the welfare effects of policy reforms as is the case in the above-mentioned literature on public goods. As for the modelling, our approach here is to consider political economy equilibria in a two stage game. In doing so, we assume the existence of a political support function *a la* Long and Vousden (1991). There is another strand in the literature on foreign aid that also treats foreign aid as a public good (see, for example, Olson and Zeckhauser (1966) and Dudley (1979)) as we do here.

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[6]Various approaches to political-economic analysis include the tariff-formation function approach of Findlay and Wellisz (1982), the political support function approach of Hillman (1989) and Long and Vousden (1991), the median-voter approach of Mayer (1984), the campaign contributions approach of Magee et al (1989), and the political contributions approach of Grossman and Helpman (1994) and Dixit et al (1997).

[7]Recent contributions to this interesting literature include Itaya et al (1997) and Boadway and Hayashi (1999).

Olson and Zeckhauser (1966) proposed a theory of alliances to explain the allocation of defense expenditures among Western nations in NATO. In particular their concern was to find reasons why small countries tend to be free riders in international organisations. Dudley (1979) extended this framework and applied it to multilateral foreign aid. There are a number of differences between our approach and the above mentioned articles. Most importantly, neither Olson and Zeckhauser (1966) nor Dudley (1979) focus on the interaction between the government and private agents as we do. Also, we consider many types of political economy equilibria which play no role in the said articles.

The paper consists of six sections. In section 2 we consider our benchmark model in which there are no pressure groups and private and public donors play a simultaneous game. We compare this equilibrium with another one in which the donor country has a strong government in the sense that the government has as a first mover advantage. We also analyse how exogenous changes in official aid (with the help of income tax levied by the government) affect the private aid provision as well as the amount of total aid (private and official).

Section 3 focuses on the distribution of income among the household types in the donor country and how this affects the official/private aid mix in the context of our benchmark model. The properties of the political economy equilibrium with a strong government are analysed in section 4.

In section 5 the effects of coordination in the provision of private aid on private and official aid are considered. We compare the simultaneous game equilibrium with perfect coordination within each donor type and between the donor types with the simultaneous game equilibrium without coordination

Finally, section 6 analyses the effects on private and official aid of moving from a simultaneous game equilibrium with a perfectly coordinated donor group to an equilibrium in which the latter group has a first mover advantage.

The results of the paper are summarised in section 7, which also provides a tentative interpretation of the stylised facts as outlined above in the light of the theoretical analysis,

and points out a number of possible extensions.

2 Crowding Out and Political Economy

As explained in the introduction, the focus of this paper is on the relationship between official and private aid, a topic which in spite of its obvious importance has not received any attention in the literature on foreign aid.

To this end we now put forward a simple model of a multi-household donor economy.[8] There are four types of households: three domestic and one foreign. One of the domestic household types – labeled household of type 1 – does not donate at all; but the other two domestic household types – labeled type 2 and 3 – do. The three domestic household types differ in terms of preferences and incomes. The government may or may not provide official aid. If it does, it levies a proportionate income tax on all domestic households. The utility functions of the three domestic household types are assumed to take the following forms:

$$V_1 = V_1[(1-\alpha)\overline{Y}_1], \tag{1}$$

$$W_2 = V_2[(1-\alpha)\overline{Y}_2 - F_2] + \lambda_2 U[\alpha\overline{Y} + F_2 + F_2^-], \tag{2}$$

$$W_3 = V_3[(1-\alpha)\overline{Y}_3 - F_3] + \lambda_3 U[\alpha\overline{Y} + F_3 + F_3^-], \tag{3}$$

$\overline{Y}_i$ stands for the before-tax income of each household of type i, $i = 1, 2, 3$. The aggregate before-tax income in the donor country is therefore given by, $\overline{Y} = N_1\overline{Y}_1 + N_2\overline{Y}_2 + N_3\overline{Y}_3$. N_i ($i = 1, 2, 3$) stands for the number of households of type i. F_i denotes the amount of private aid given by each household of type i, $i = 2, 3$. The utility function of the recipient household is $U[\alpha\overline{Y} + F_2 + F_2^-]$ (or, equivalently, $U[\alpha\overline{Y} + F_3 + F_3^-]$),[9] where $F_2^- = (N_2 - 1)F_2 + N_3F_3$ and $F_3^- = (N_3 - 1)F_3 + N_2F_2$. Finally note that λ_2 and λ_3 can be interpreted as 'altruism parameters', and that α stands for the rate of the proportionate income tax employed to pay for official foreign aid.

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[8]Possible extensions of our model are pointed out in the last section of the paper.

[9]In order to avoid unnecessary variables, without any loss of generality we assume that the recipient household has no income other than that received from the donor households.

We assume that all the utility functions exhibit positive and diminishing marginal utilities, i.e.

$$V_1' > 0, \ V_2' > 0, \ V_3' > 0, \ U' > 0 \quad \text{and}$$

$$V_1'' < 0, \ V_2'' < 0, \ V_3'' < 0, \ U'' < 0.$$

We also assume that the product and factor markets are perfectly competitive, the economies are small open economies so that the commodity prices are exogenous, and the factor endowments are inelastically supplied. Because of these assumptions, all the income levels, $\overline{Y}$ and $\overline{Y}_i$ $(i = 1, 2, 3)$ are exogenous variables in our model.

Initially treating α exogenously, each donor household decides upon an optimal level of private aid treating all the other aid parametrically. Therefore, we readily obtain the following first order conditions:

$$\frac{\partial W_2}{\partial F_2} = -V_2' + \lambda_2 U' = 0 \quad \text{and} \tag{4}$$

$$\frac{\partial W_3}{\partial F_3} = -V_3' + \lambda_3 U' = 0 \tag{5}$$

Equations (4) and (5) yield the reaction curves of a household belonging to type 2 and 3 respectively, treating the income tax rate parametrically. It can be easily shown that both reactions functions are downward sloping, implying that the two types of donor households are strategic substitutes in aid giving. It is also to be noted that in this equilibrium, each household free rides on other households, whether they belong to the same type or not. There is therefore an underprovision of private aid (from the point of view of the donor households). As we shall note later on, in the presence of official aid, there is also free riding on the non-donor households, i.e. households of type 1.

Before proceeding to comparative static and other exercises, let us analyse the properties of the equilibrium given by (4) and (5). If V_2 and V_3 have the same functional form, it follows at once that, $\lambda_3 \geq \lambda_2$ implies $V_3' \geq V_2'$ and given the concavity of the function we have:

$$\lambda_3 \geq \lambda_2 \quad \Longrightarrow \quad (1 - \alpha)(\overline{Y}_3 - \overline{Y}_2) \leq (F_3 - F_2).$$

From the second inequality, we find that $\overline{Y}_3 > \overline{Y}_2$ implies $F_3 > F_2$. Therefore, we can conclude that if the more altruistic household types are also richer, then each member of this household type will also give more private aid.

We now want to address the following two fundamental questions:

1. Does official aid crowd out private aid?

2. If the government raises α, and thus official aid, how does this affect total aid (official and private) and therefore the welfare of the aid receiving country?

To this end, we first totally differentiate (4) and (5) to obtain:

$$(V_2'' + \lambda_2 U'' N_2) dF_2 + \lambda_2 U'' N_3 dF_3 = -(\overline{Y}_2 V_2'' + \lambda_2 U'' \overline{Y}) d\alpha \tag{6}$$

$$\lambda_3 U'' N_2 dF_2 + (V_3'' + \lambda_3 U'' N_3) dF_3 = -(\overline{Y}_3 V_3'' + \lambda_3 U'' \overline{Y}) d\alpha \tag{7}$$

From the above two equations, we derive:

$$\frac{dF_2}{d\alpha} = \frac{-\lambda_2 V_3'' U'' (\overline{Y} - N_3 \overline{Y}_3) - V_2'' V_3'' \overline{Y}_2 - \lambda_3 V_2'' U'' N_3 \overline{Y}_2}{D}, \tag{7a}$$

$$\frac{dF_3}{d\alpha} = \frac{-\lambda_3 V_2'' U'' (\overline{Y} - N_2 \overline{Y}_2) - V_2'' V_3'' \overline{Y}_3 - \lambda_2 V_3'' U'' N_2 \overline{Y}_3}{D}, \tag{7b}$$

$$\text{where} \qquad D = V_2'' V_3'' + \lambda_2 V_3'' U'' N_2 + \lambda_3 V_2'' U'' N_3 > 0. \tag{7c}$$

It can be easily verified that the numerators of (7a) and (7b) are both negative, and therefore it follows that

$$\frac{dF_2}{d\alpha} < 0 \quad \text{and} \quad \frac{dF_3}{d\alpha} < 0.$$

The fact that $dF_2/d\alpha$ and $dF_3/d\alpha$ are both negative confirms the intuition that an increase in α, *ceteris paribus*, reduces disposable income of the donor households and therefore crowds out private aid. Therefore an increase in α leads to an even greater underprovision of private aid, i.e. it increases the efficiency loss (relative to the equilibrium without official aid).

The next question which arises is how the sum of official and private aid is affected by an increase in α. This is important because a government may be willing to incur efficiency losses if the latter imply an increase in the welfare of the recipient household.

Let T stand for the total aid and F the total private aid. That is,

$$F = N_2 F_2 + N_3 F_3 \quad \text{and} \quad T = \alpha \overline{Y} + F.$$

Then differentiating (4) and using (7a) we have:

$$\lambda_2 \frac{U''}{V_2''} \frac{dT}{d\alpha} = \frac{\lambda_2 N_1 \overline{Y}_1 V_3'' U''}{D}. \tag{8}$$

Since D is positive ((7c)), it follows at once that $dT/d\alpha$ is positive. The preceding analysis is now formalised in Proposition I.

PROPOSITION I: *Consider a simple multi-household economy described by (1) to (5). Suppose that the government decides to increase α, the proportionate income tax rate. This implies a crowding out (reduction) of private aid but an increase in total (official + private) aid and therefore an increase in the welfare of the recipient household.*

We now take a closer look at (8) which highlights the crucial role played by the income of household type 1 in the analysis and results. The model described by (1) to (5), as mentioned before, features two different kinds of free riding. It is well known that in any Cournot-Nash equilibrium with voluntary provision of public goods the households free ride on each other (if all of them contribute to the provision of the public good). What is special about the model represented by (1) to (5) is that the donor households (types 2 and 3) free ride on the non-donor household (type 1) if official aid is undertaken. It is this fact which explains why an increase in official aid (induced by an increase in the tax rate) outweighs the resultant decrease in private aid.

To obtain further insights we now examine the effects of an increase in α on the welfare levels of the donor households. Differentiating (2) and (3), we get:

$$\frac{dW_2}{d\alpha} = \lambda_2 U' \left[(\overline{Y} - \overline{Y}_2) + (N_2 - 1)\frac{dF_2}{d\alpha} + N_3 \frac{dF_3}{d\alpha} \right] \tag{9}$$

$$\frac{dW_3}{d\alpha} = \lambda_3 U' \left[(\overline{Y} - \overline{Y}_3) + (N_3 - 1)\frac{dF_3}{d\alpha} + N_2 \frac{dF_2}{d\alpha} \right] \tag{10}$$

As can be seen from (9) and (10), an increase in α is equivalent to a transfer from household 1 and 3 to household 2 (see the first term in the square brackets of (9)) or from households

1 and 2 to household 3 (see the first term in the square brackets of (10)) . However, since this transfer reduces private aid it is not obvious that W_2 and W_3 would increase.

We now proceed to show that the transfer effect dominates the crowding out effect and therefore W_2 and W_3 do indeed increase. To this end, we substitute $dF_2/d\alpha$ and $dF_3/d\alpha$ from (7a) and (7b) into (9) and (10) to yield:

$$\frac{dW_2}{d\alpha} = [U'\lambda_2 N_1 \overline{Y}_1] \left(\frac{V_2'' V_3'' + \lambda_2 V_3'' U''}{D} \right) > 0, \tag{11}$$

$$\frac{dW_3}{d\alpha} = [U'\lambda_3 N_1 \overline{Y}_1] \left(\frac{V_2'' V_3'' + \lambda_3 V_2'' U''}{D} \right) > 0. \tag{12}$$

Expressions (11) and (12) prove that the transfer effect (in the sense of one donor free riding on the other donor and the non-donors) must dominate the utility-reducing effect of an increase in the underprovision of private aid.

Furthermore, (11) and (12) offer an interesting insight into the efficiency reducing effect of an increase in α. The utility gains of the two donor households types arising from increased tax contributions, are given by the terms inside the square brackets on the right hand sides of the two equations. Note from the definition of D ((7c)) that the second terms lie between zero and one, and therefore these can be interpreted as 'multipliers' measuring the efficiency loss due to the crowding out of private aid by official aid.

Before considering endogenous determination of α, we would like to note that there is some *prima facie* empirical support for the crowding out result in Proposition I. Of course, the level and composition of aid would depend on a very large number of factors. However, if we consider the two largest donors, viz. Japan and the United States, we find that whereas Japan allocates 0.28% of its GNP for official development assistance, the figure for the United States is only 0.10%. Interestingly, official to private aid ratio for Japan and the United States are 52.41 and 3.29 respectively (see table A in the appendix). Therefore, it seems that official aid in Japan has to some extent crowded out private aid, at least in relation to the United States.

Our main remaining task in this section is to extend our analysis to the case when α is also endogenous. In particular, we want to specify a simultaneous game equilibrium in which

there are three players: the government and the donor households of types 2 and 3. Then our task is to analyse the effects on private and official aid of a move to an equilibrium with a strong government. By a strong government we mean a government with a first mover advantage.

The behaviour of the government is modeled by means of the following political support function:

$$\begin{aligned} \text{PS} &= \overline{N}_1 V_1 [(1-\alpha)\overline{Y}_1] + \overline{N}_2 \{V_2[1-\alpha)\overline{Y}_2 - F_2] + \lambda_2 U(\cdot)\} \\ &\quad + \overline{N}_3 \{V_3[1-\alpha)\overline{Y}_3 - F_3] + \lambda_3 U(\cdot)\}, \end{aligned} \tag{13}$$

where $\overline{N}_i = N_i/N$ $(i = 1, 2, 3)$, and $N = N_1 + N_2 + N_3$.

This political support function is closely related to the function used by Long and Vousden (1999). The main advantage of this function is that it highlights and makes transparent two sources of political support, namely redistribution on the one hand and efficiency on the other.

Assuming that all the parties act simultaneously, the first order condition for the government is obtained by partial differentiation of the political support function with respect to α and setting the latter equal to zero.[10] That is,

$$\frac{\partial \text{PS}}{\partial \alpha} = -\overline{N}_1 V_1' \overline{Y}_1 + U'[\lambda_2 \overline{N}_2 (\overline{Y} - \overline{Y}_2) + \lambda_3 \overline{N}_3 (\overline{Y} - Y_3)] = 0. \tag{14}$$

The equilibrium of the simultaneous game is represented by (4), (5) and (14). This is the initial equilibrium. Let us denote by α^* the equilibrium value of α in this game. Consider now a second game in which the government is stronger than in the first game. To be specific, we assume that the government has a first mover advantage. In this case the government will maximise its objective ((13)) subject to the reaction curves of the donor households given by (4) and (5). The following equation represents the change in political support due to a small change in α.

$$\frac{d\text{PS}}{d\alpha} = \frac{\partial \text{PS}}{\partial \alpha} + \frac{\partial \text{PS}}{\partial F_2}\frac{dF_2}{d\alpha} + \frac{\partial \text{PS}}{\partial F_3}\frac{dF_3}{d\alpha}, \tag{15}$$

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[10]The political support function is concave in α (see footnote 11).

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where $dF_2/d\alpha$ and $dF_3/d\alpha$ are as in (7a) and (7b), and

$$\frac{\partial \text{PS}}{\partial F_2} = U'[\overline{N}_2\lambda_2(N_2 - 1) + \overline{N}_3\lambda_3 N_2] > 0, \tag{15a}$$

$$\frac{\partial \text{PS}}{\partial F_3} = U'[\overline{N}_3\lambda_3(N_3 - 1) + \overline{N}_2\lambda_2 N_3] > 0. \tag{15b}$$

From (7a), (7b) and (15a)-(15b), it follows that if we evaluate (15) at the simultaneous game equilibrium where $\partial \text{PS}/\partial\alpha = 0$, we have

$$\left. \frac{d\text{PS}}{d\alpha} \right|_{\alpha=\alpha^*} = \frac{\partial \text{PS}}{\partial F_2}\frac{dF_2}{d\alpha} + \frac{\partial \text{PS}}{\partial F_3}\frac{dF_3}{d\alpha} < 0. \tag{16}$$

From the concavity of the political support function and (16), it can be inferred that the optimal value of α is lower in the second game, i.e. the game with the strong government, than in the simultaneous game. This result is stated formally in Proposition II below.

PROPOSITION II: *Compare two countries in two different political equilibria. In one country the equilibrium is described by (4), (5) and (14). In the other country there exists a strong government which maximizes the political support function, (13), subject to the reaction curves of the donor households given by (4) and (5). The two countries are the same in every other respect.*

Then the income tax rate α is lower in the country with the strong government than in the other country. The aid receiving country receives less aid from the country with the strong government.

Proposition II tells us that, contrary to what one might expect, official aid is less rather than more in a country with a strong government. This apparently paradoxical result is relatively easy to explain. Since efficiency plays an important part in the political support function, the government, in deciding on the optimal value for α, takes into account the fact that an increase in α reduces efficiency because it exacerbates the underprovision of private aid (which is due to a lack of coordination of donor households).

3 Income Distribution and the Structure of Foreign Aid

In this section we examine how differences in the distribution of income between the households affect private and official aid provision. In order to focus on the effect of income distribution, we consider an equilibrium in which the private donor households and the government act simultaneously. We consider two specific exercises. In the first, it is assumed that the non-donor household's income remains unchanged, but income is redistributed among the donor households. In the second exercise, we assume that income is taken away from the non-donor household and given to the donor households. Formally, the two exercises are:

Exercise 1: $dY_1 = 0,\ N_2 dY_2 + N_3 dY_3 = 0,$

Exercise 2: $dY_1 < 0,\ dY_2 > 0,\ dY_3 > 0,\ N_1 dY_1 + N_2 dY_2 + N_3 dY_3 = 0.$

Assuming, *pro tempore*, that α is fixed, we totally differentiate the reaction functions of the two donor households, (4) and (5), to solve for dF_2 and dF_3 as:

$$DN_2 dF_2 = V_2''(1-\alpha)(V_3'' + \lambda_3 U'' N_3)N_2 d\overline{Y}_2 - \lambda_2 U'' N_2 V_3''(1-\alpha)N_3 d\overline{Y}_3,$$

$$DN_3 dF_3 = V_3''(1-\alpha)(V_2'' + \lambda_2 U'' N_2)N_3 d\overline{Y}_3 - \lambda_3 U'' N_3 V_2''(1-\alpha)N_2 d\overline{Y}_2,$$

where D is given in (7c).

Adding the above two equations it is easy to show that:

$$(N_2 dF_2 + N_3 dF_3)_{\alpha \text{ const.}} = \frac{(1-\alpha)V_2'' V_3''(N_2 d\overline{Y}_2 + N_3 d\overline{Y}_3)}{D}. \tag{17}$$

From (17) we can derive two intermediate results. First, it is evident that exercise 1 will not affect the total provision of private aid, for a given level of official aid. That is, the neutrality theorem familiar from the theory of public goods (see, for example, Warr (1983)) also applies in our model if the redistribution affects only the two donor households. As we shall see later, the total private provision will be affected via induced changes in α.

Second, it follows that exercise 2 will result in a higher provision of private aid, for a given level of official aid. That is, *ceteris paribus*, if the distribution of income favours the donor households at the expense of the non-donors in one donor country as compared to another, then there will be more private aid from the former country. Furthermore, since

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$(1-\alpha)V_2^{''}V_3^{''}/D$ is less than one, the difference in private aid is less than the differences in the aggregate income of the donors.

It is interesting to compare the second result with the results stated in Proposition I. As explained before, in some sense an increase in α amounts to a transfer from the non-donor household to the donor household. However, whereas in that case the 'transfer' crowds out private aid, in the present case it increases private aid for a given level of α. Note that the amount of official aid does not change in the present exercise since α is taken as given.

Having derived two intermediate results, we now endogenise α. To this end we introduce the concept of net marginal political support (NMPS) for official aid, which is the right hand side of (14).[11] That is,

$$\text{NMPS} = U^{'}\Theta - \overline{N}_1 V_1^{'}\overline{Y}_1, \tag{18}$$

where $\Theta = \lambda_2 \overline{N}_2(\overline{Y} - \overline{Y}_2) + \lambda_3 \overline{N}_3(\overline{Y} - \overline{Y}_3)$.

We proceed as follows. First, note that the equilibrium value of α is obtained by setting NMPS $= 0$. From the monotonicity of the NMPS function with respect to α (see footnote 11), it then follows that as a result of the assumed changes in the distribution of income the equilibrium value of α will increase (decrease) if we are able to show that NMPS increases (decreases) for every value of α (for the assumed changes in the distribution of income).

Differentiating NMPS, for a given value of α, we obtain:

$$
\begin{aligned}
d\text{NMPS}|_{\alpha \text{ const.}} = \ & U^{''}\Theta(N_2 dF_2 + N_3 dF_3)_{\alpha \text{ const.}} \\
& -U^{'}(\lambda_2 \overline{N}_2 d\overline{Y}_2 + \lambda_3 \overline{N}_3 d\overline{Y}_3) - V_1^{'}\overline{N}_1 d\overline{Y}_1.
\end{aligned}
\tag{19}
$$

Using $\overline{N}_1 d\overline{Y}_1 = -\overline{N}_2 d\overline{Y}_2 - \overline{N}_3 d\overline{Y}_3$, equation (19) may be rewritten as:

$$
\begin{aligned}
d\text{NMPS}|_{\alpha \text{ const.}} = \ & U^{''}\Theta(N_2 dF_2 + N_3 dF_3)_{\alpha \text{ const.}} \\
& -(\lambda_2 U^{'} - V_1^{'})\overline{N}_2 d\overline{Y}_2 - (\lambda_3 U^{'} - V_1^{'})\overline{N}_3 d\overline{Y}_3,
\end{aligned}
\tag{20}
$$

where $(N_2 dF_2 + N_3 dF_3)_{\alpha \text{ const.}}$ is given by (17).

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[11]It is straightforward to show that NMPS is a declining function of α.

$$\frac{\partial \text{NMPS}}{\partial \alpha} = U^{''}\Theta[N_2 \frac{\partial F_2}{\partial \alpha} + N_3 \frac{\partial F_3}{\partial \alpha} + \overline{Y}] + \overline{N}_1 V_1^{''}\overline{Y}_1^2 < 0.$$

Note that, in view of Proposition I, the term in the square brackets is positive.

From (19) and (20) we derive the effects of exercises 1 and 2 on both private and official foreign aid. First, under exercise 1, $N_1 dY_1 + N_2 dY_2 = 0$ and $(N_2 dF_2 + N_3 dF_3)_{\alpha \text{ const.}} = 0$ (from (17)). Therefore, we get from (20)

$$d\text{NMPS}|_{\alpha \text{ const.}} = (\lambda_2 - \lambda_3) U' \overline{N}_3 d\overline{Y}_3,$$

whence it follows that the official aid will fall if and only if $(\lambda_2 - \lambda_3) d\overline{Y}_3 < 0$. From Proposition I, we also know that a fall in α unambiguously increases private aid but reduces total foreign aid. Formally,

PROPOSITION IIIa: *Let the political economy equilibrium be a simultaneous game equilibrium described by (4), (5) and (14). A redistribution of income between the two donor households will reduce official aid, increase private aid, and reduce the level of total (private plus official) aid if and only if the redistribution is in favour of the more altruistic household.*

It follows from Proposition IIIa that if the two donor countries are identical in all respects except in relation to distribution of income between the donor households, the country where the distribution of income favours the more altruistic donor household will give less total aid and will have a higher private to official aid ratio.

Turning now to exercise 2, note that the first term on the right hand side of (20) is positive and therefore we have:

PROPOSITION IIIb: *Let the political economy equilibrium be a simultaneous game equilibrium described by (4), (5) and (14). If income is redistributed from the non-donor household to the donor households, there will be less official aid, more private aid and less total aid if $\lambda_2 > V_1'/U'$ and $\lambda_3 > V_1'/U'$.*

As can be seen from (20) a change in the distribution of income in favour of the donor households has a direct and an indirect effect on the net marginal support for official aid. Changes in the distribution of income entail changes in the provision of private aid, for a given α (see (17)). This is the indirect effect. A change in favour of the donor households

brings about an increase in private aid and this, *ceteris paribus*, lowers the net marginal political support for official aid (again for a given α) (see (20)). The direct effect on NMPS is equal to:

$$-[(\lambda_2 U^{'} - V_1^{'})\overline{N}_2 d\overline{Y}_2 + (\lambda_3 U^{'} - V_1^{'})\overline{N}_3 d\overline{Y}_3],$$

which reinforces the indirect effect if $\lambda_2 > V_1^{'}/U^{'}$ and $\lambda_3 > V_1^{'}/U^{'}$.

An additional insight into the meaning of the effect of the redistribution on NMPS can be obtained by rewriting the direct effect as follows:

$$-[(V_2^{'} - V_1^{'})\overline{N}_2 d\overline{Y}_2 + (V_3^{'} - V_1^{'})\overline{N}_3 d\overline{Y}_3].$$

If V_1, V_2 and V_3 have the same functional form, it can be seen that exercise 2 entails a crowding out of official aid by private aid if the disposable income of the two donor households is below that of the non-donor. If, as one may presume, the consumption expenditure of the two donor households is higher than the expenditure of the non-donor household, the country with a distribution of income favouring the donor households may well have a higher level of official aid. The latter effect could crowd out private aid provision but not to such an extent that total aid is lower.

To conclude section 3 we only point out that distributional policies may be considered as alternatives to changes in the income tax rate α to augment the political support for the government. However, it should be noted that, it may be much more difficult to implement targeted and personalised changes in the distribution of income than impersonal changes in income tax rates.

4   Political Equilibrium with a Strong Government

We have already seen in section 2 (Proposition II) that differences in the structure of foreign aid between donor countries can be explained in terms of the two countries being in different political economy equilibria. A country with a strong government provides less official aid and more private aid than a country where the power of the government and the donor households is evenly balanced. Our purpose in this section is to characterize the political

equilibrium where all the donor countries are in a political economy equilibrium with a strong government. In this framework, we shall examine how the size of a country can affect the structure of foreign aid.

To this end we assume that the government maximizes by its choice of α the political support function given by (13), subject to the reaction curves of the two donor households given by (4) and (5). Differentiating (13) we get:

$$\frac{d\text{PS}}{d\alpha} = \overline{N}_1 \frac{dV_1}{d\alpha} + \overline{N}_2 \frac{dW_2}{d\alpha} + \overline{N}_3 \frac{dW_3}{d\alpha}. \tag{21}$$

Equations (11) and (12) are now substituted into (21) to yield:

$$\frac{d\text{PS}}{d\alpha} = -\overline{N}_1 \overline{Y}_1 V_1' + N_1 \overline{Y}_1 (\overline{N}_2 \lambda_2 \beta_2 + \overline{N}_3 \lambda_3 \beta_3) U' = 0 \tag{22}$$

$$\text{where} \qquad \beta_2 \;\; = \;\; \frac{V_3''(V_2'' + \lambda_2 U'')}{D},$$

$$\beta_3 \;\; = \;\; \frac{V_2''(V_3'' + \lambda_3 U'')}{D},$$

and D is defined in (7c).

Equation (21) can be rewritten as follows:

$$NU'(\overline{N}_2 \lambda_2 \beta_2 + \overline{N}_3 \lambda_3 \beta_3) = V_1'. \tag{23}$$

The interpretation of (23) is straightforward. The left hand side of (23) stands for the marginal political support for official aid by the donor households arising from more official aid. The right hand side represents the marginal utility loss of the non-donor (resulting from more official aid). This result enables us to relate directly the differences in the marginal political support by donor households between donor countries to the level of disposable income of the non-donor households. Assume that two donor countries differ only in terms of country size and before-tax incomes of the various households as well as number of households belonging to each type. It then follows directly from (23) that the country in which the marginal political support by the donor households for more official aid is higher, the disposable income of the non-donor must be lower. The lower level of disposable incomes

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of the non-donor households may be due to a lower before-tax income than in the other country or a higher level of α, the 'equilibrium' income tax rate.

In order to explore (23) further, we consider, *pro tempore*, specific forms of the indirect utility functions. Specifically, let us assume them to be of the constant average risk aversion type. That is,

$$\rho = -\frac{U''}{U'}, \quad \text{and} \quad \rho_i = -\frac{V_i''}{V_i'}, \quad i = 1, 2, 3, \tag{24}$$

where ρ, ρ_1, ρ_2 and ρ_3 are positive constants.

Using (4), (5) and (24), we can rewrite β_2 and β_3 as

$$\beta_2 \;=\; \frac{\rho_2\rho_3 + \rho_3\rho}{\rho_2\rho_3 + \rho_3\rho N_2 + \rho_2\rho N_3} \tag{25}$$

$$\beta_3 \;=\; \frac{\rho_2\rho_3 + \rho_2\rho}{\rho_2\rho_3 + \rho_3\rho N_2 + \rho_2\rho N_3}. \tag{26}$$

From the concavity of the utility functions, using (25) and (26), it follows from (23) that an increase in the size of the population in the three household types such that the share of each group does not change will increase the equilibrium value of α and therefore (from Proposition I) crowd out private aid, but increase total aid. This result is formally stated below.

PROPOSITION IV: *Suppose that a donor country is characterised by a strong government and that the utility functions are of the constant average risk aversion type. Then, an increase in the size of population in each of the three household types such that the share of each group in the population remains the same will reduce private aid and increase official and total aid.*

The intuition for this result has been alluded to earlier in the section.

5   The Effect of Donor Pressure Groups

In this section we assume that a donor pressure group exists, i.e. households coordinate their decisions on private aid provision. In the present context donor households face two

types of coordination problems. There is a coordination problem within each donor type and there is a coordination problem between donor types. We therefore assume that the private donors perfectly coordinate their decisions both within each group and also between the two groups. That is they maximise the total welfare of the two groups, given by:

$$W = N_2 W_2 + N_3 W_3, \tag{27}$$

where
$$W_2 = V_2 \left[(1 - \alpha)\overline{Y}_2 - F_2 \right] + \lambda_2 U \left[\alpha \overline{Y} + N_2 F_2 + N_3 F_3 \right],$$
$$W_3 = V_3 \left[(1 - \alpha)\overline{Y}_3 - F_3 \right] + \lambda_3 U \left[\alpha \overline{Y} + N_2 F_2 + N_3 F_3 \right],$$

with respect to F_2 and F_3 in a fully coordinated way, i.e. each does not take the amount donated by others as given.

Assuming, to start with, that the private agents and the government act simultaneously, the first order condition for the private agents are given by:

$$\frac{\partial W}{\partial F_2} = -V_2' + (\lambda_2 N_2 + \lambda_3 N_3)U' = 0, \tag{28}$$

$$\frac{\partial W}{\partial F_3} = -V_3' + (\lambda_2 N_2 + \lambda_3 N_3)U' = 0. \tag{29}$$

The coordination equilibrium is described by (28), (29) and the condition $\partial \mathrm{PS}/\partial \alpha = 0$ ((14)). We shall now compare this equilibrium with the original equilibrium described by (4), (5) and (14). For this purpose, we shall follow our approach in section 3 and consider the concept of net marginal political support (NMPS) defined in (18). However, first of all, by comparing (4) and (5) on the one hand with (28) and (29) on the other, we shall show that total private aid is larger under the coordination equilibrium, *for a given value of alpha (say, $\bar{\alpha}$)*. Formally,

LEMMA I: $(N_2 F_2^c + N_3 F_3^c)_{\alpha=\bar{\alpha}} \geq (N_2 F_2^u + N_3 F_3^u)_{\alpha=\bar{\alpha}}$, *where the superscripts u and c stand for uncoordinated and coordinated equilibrium respectively.*

Proof: First, we write (4), (5), (28) and (29) fully as:

$$V_2' \left[(1 - \bar{\alpha})\bar{Y}_2) - F_2^u \right] = \lambda_2 U' \left[\bar{\alpha} Y + N_2 F_2^u + N_3 F_3^u \right], \tag{30}$$

$$V_3' \left[(1-\bar{\alpha})\bar{Y}_3) - F_3^u\right] = \lambda_3 U' \left[\bar{\alpha}\bar{Y} + N_2 F_2^u + N_3 F_3^u\right], \tag{31}$$

$$V_2' \left[(1-\bar{\alpha})\bar{Y}_2) - F_2^c\right] = (\lambda_2 N_2 + \lambda_3 N_3)U' \left[\bar{\alpha}\bar{Y} + N_2 F_2^c + N_3 F_3^c\right], \tag{32}$$

$$V_3' \left[(1-\bar{\alpha})\bar{Y}_3) - F_3^c\right] = (\lambda_2 N_2 + \lambda_3 N_3)U' \left[\bar{\alpha}\bar{Y} + N_2 F_2^c + N_3 F_3^c\right]. \tag{33}$$

We prove the lemma by the logic of contradiction. Suppose, contrary to the statement of the lemma, that

$$(N_2 F_2^c + N_3 F_3^c)_{\alpha=\bar{\alpha}} < (N_2 F_2^u + N_3 F_3^u)_{\alpha=\bar{\alpha}}.$$

It then follows that, at the minimum, private aid by one of the groups has to be lower under coordination. Without loss of generality, assume that

$$F_2^c < F_2^u.$$

Since $N_2 \geq 1$, it then follows from the concavity of the utility functions and the above two inequalities that whereas the left hand side of (30) is larger than that of (32), the right hand side of (30) is smaller than that of (32). Thus, both (30) and (32) cannot hold at the same time. This is a contradiction. Therefore,

$$(N_2 F_2^c + N_3 F_3^c)_{\alpha=\bar{\alpha}} \geq (N_2 F_2^u + N_3 F_3^u)_{\alpha=\bar{\alpha}}. \qquad \textbf{Q.E.D.}$$

Since the above lemma is valid for all values of $\bar{\alpha}$ such that $0 \leq \bar{\alpha} \leq 1$, it follows from (18) that for every value of $\bar{\alpha}$ the value of NMPS is smaller in the coordinated than in the uncoordinated equilibrium. Since NMPS $= 0$ determines the equilibrium value of α, it then follows at once that $\alpha^c \leq \alpha^u$. Moreover, since NMPS $= 0$ under both equilibria, we have:

$$\Theta \left(U' \left[\alpha^c \bar{Y} + N_2 F_2^c + N_3 F_3^c\right] - U' \left[\alpha^u \bar{Y} + N_2 F_2^u + N_3 F_3^u\right]\right)$$
$$= \bar{N}_1 \bar{Y}_1 \left(V_1' \left[(1-\alpha^c)\bar{Y}\right] - V_1' \left[(1-\alpha^u)\bar{Y}\right]\right).$$

Since $\alpha^c \leq \alpha^u$, from the concavity of the utility function V_1 it follows that the right hand side of the above equation is negative and thence from the concavity of the utility function U and the right hand side of the equation that $\alpha^c \bar{Y} + N_2 F_2^c + N_3 F_3^c \geq \alpha^u \bar{Y} + N_2 F_2^u + N_3 F_3^u$ and therefore that $N_2 F_2^c + N_3 F_3^c \geq N_2 F_2^u + N_3 F_3^u$. The above results are formally stated as:

PROPOSITION V: *Assume that the private donors and the government act simultaneously. Consider then the following two equilibria. First, the private agents do not coordinate their actions at all, i.e. the equilibrium is given by (4), (5) and (14). Second, the private donors coordinate their actions fully both within and between groups, i.e. the equilibrium is given by (14), (28) and (29).*

Private and total (private plus official) aid is larger, and official aid smaller, under the second (coordinated) equilibrium than the first (uncoordinated) one.

Coordination by members of one type of households increases the amount of aid given by each household of that type, as coordination reduces intra-group free riding. However, this, *ceteris paribus*, increases inter-group free riding and therefore the net effect on total private aid is ambiguous. However, since we consider both inter-group and intra-group coordination total private aid increases unambiguously as a result of coordination and this in turn crowds out official aid.

6 Political Equilibrium with a Strong Pressure Group

As in section 5, we assume the existence of a pressure group. However, in contrast to the analysis in section 5 where the pressure group and the government act simultaneously, in this section we consider the pressure group to be strong in the sense that it has a first mover advantage. That is, it maximises the function $W = N_2 W_2 + N_3 W_3$ with respect the amounts of private aid subject to the reaction function of the government given by (14). To ease the analysis, we shall assume that households from the two donor types give the same amount of aid, i.e. $F_2 = F_3 = F$ (say).

First, from the reaction function of the government given by (14), we obtain:

$$[N_1 V_1''(\overline{Y}_1)^2 + N_2 V_2''(\overline{Y}_2)^2 + N_3 V_3''(\overline{Y}_3)^2 + (\lambda_2 N_2 + \lambda_3 N_3) U''(\overline{Y})^2] d\alpha$$

$$= -[N_2 V_2'' \overline{Y}_2 + N_3 V_3'' \overline{Y}_3 + U'' \overline{Y}(N_2 + N_3)(\lambda_2 N_2 + \lambda_3 N_3)] dF. \tag{34}$$

That is, private and official aid are negatively related. As we shall see later on, this relationship provides the strong pressure group to induce a higher level of official aid by lowering

the volume of private aid.

Turning now to the donor pressure group, its objective function ((27)) can be written as $W(F, \alpha(F))$ where the slope of the reaction function $\alpha(F)$ is given by (34). Differentiating this welfare function with respect to F, we obtain the first order condition for the donor pressure group's optimisation problem as:

$$\frac{dW}{dF} = \frac{\partial W}{\partial F} + \frac{\partial W}{\partial \alpha} \cdot \frac{d\alpha}{dF}, \tag{35}$$

where
$$\frac{\partial W}{\partial F} = -V_2' - V_3' + 2U'(\lambda_2 N_2 + \lambda_3 N_3),$$

$$\frac{\partial W}{\partial \alpha} = (-V_2' \overline{Y}_2 + \lambda_2 U' \overline{Y})N_2 + (-V_3' \overline{Y}_3 + \lambda_3 U' \overline{Y})N_3,$$

and $d\alpha/dF$ is given in (34).

Having derived the equilibrium conditions under a strong pressure group, we shall now compare the property of this equilibrium with that of the equilibrium when the pressure group does not have a first mover advantage, i. e. when the equilibrium is given by (14), (28) and (29).

It can be easily shown that the first term on the right hand side of (35) is zero when it is evaluated at the simultaneous game equilibrium with pressure group. At the equilibrium, we also have

$$\frac{\partial W}{\partial \alpha} = N_1 \overline{Y}_1 (\lambda_2 N_2 + \lambda_3 N_3)U' > 0.$$

From these facts together with an earlier result that $d\alpha/dF < 0$ ((34)), it follows that dW/dF (given in (35)), evaluated at the simultaneous game equilibrium with a donor pressure group, is negative. It then follows from the concavity of the objective function that the equilibrium value of private aid is lower when the pressure group is strong (i.e. it has a first mover advantage) compared to the case when it acts simultaneously with the government. From (34) we then also derive that the level of official aid is higher in the former equilibrium than in the latter. These results are summarised in the following proposition.

PROPOSITION VI: *Assume that a donor pressure group exists and it coordinates aid-giving by all its members. Total private aid is smaller and official aid larger when the*

pressure group has a first mover advantage compared to the case when the pressure group and the government act simultaneously.

The economic rationale of Proposition VI is clear. The formation of a donor pressure group creates incentives to raise private contributions F_2 and F_3 to overcome the underproduction of private aid from the point of view of both donor type households. If a pressure group exists already such welfare improvements are impossible. The welfare of the group can then only be raised by engineering an increase in official aid which is equivalent to an income transfer from the non-donor to the donor households. In order to achieve this, given the constraint of the reaction function of the government, the pressure group has to decide upon a reduction of private contributions.

Before concluding this section, it is worth noting that the present framework is somewhat unusual as in economics normally a government is assumed to have a first-mover advantage. However, in the context of foreign aid, it is not clear that such a scenario is always the most realistic one. There are instances where the present scenario would make more sense. For example, highly organised, powerful and popular movements such as Jubilee 2000 (led by, among others, pop and rock stars) have been extremely effective in many countries such as the United Kingdom to coordinate the actions of internationally altruistic individuals and 'forcing' significant increase in the amount of official aid.

7 Concluding Remarks

As mentioned in the introduction, the relative importance of official aid in the provision of total (private and official) aid varies considerably between donor countries. To shed light on this we have developed a model where the decisions to provide official and private aid are explained by means of a series of political economic equilibria in which the players are the government and two types of donor households, with the possibility that the latter form a pressure group.[12]

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[12]We have ignored political variables which may also affect patterns of official and private aid provision. There exists an interesting literature on the importance of political variables in determining the effectiveness of aid, see, for example, Boone (1996).

The main benchmark of our political economy analysis is a simultaneous game equilibrium without or with the existence of a donor pressure group. The simultaneous game equilibrium corresponds to the concept of supply and demand determined economic policies (see Rodrik (1995)). Proposition I proves the basic crowding out result: an increase in official aid crowds out private aid but raises total (private and official) aid and is therefore in the interest of the recipient country. If the government has a first mover advantage (i.e. economic policies are supply side determined) there is less official aid and more private aid relative to the simultaneous game equilibrium (Proposition II). Overall the total amount of aid is lower. The differences in the mix between official and private aid between countries like Denmark, Finland or Japan on the one hand and the USA, Ireland or Germany on the other may therefore be explained in terms of the former countries being in a simultaneous game equilibrium and the latter in an equilibrium where the government has a first mover advantage.

When the donor households are organised as a pressure group , the latter may (section 6) or may not (section 5) have a first mover advantage. Taking again the simultaneous game equilibrium as a benchmark we have shown (Proposition VI) that official aid will be higher and private aid lower in the equilibrium with a first mover advantage of the donor pressure group. This result yields another explanation of the differences in the mix of official and private aid in the two groups of countries mentioned above.

If countries differ only in terms of the extent of the coordination of private aid provision it is shown in proposition V that the existence of coordination crowds out official aid. In this case, the level of private and total aid is larger and that of official aid is lower when a donor pressure group exists.

Finally differences in the mix of official and private aid can be explained in terms of differences in the distribution of income either only between donor households or between donor and non-donor households (Proposition III). If the differences only concern donor households it is straightforward to show that if the distribution of income favours in one country the more altruistic household (at the expense of the less altruistic household) the level of official aid is lower in this country.

Admittedly, our framework of analysis is very stylised and ignores many features of the real world. However, our results are suggestive and we make significant inroads into an understanding of how private and official aid interact under various political-economic scenarios. Nevertheless, many extensions are worth pursuing. For example, (a) a disincentive effect of an increase in income tax can be introduced, (b) the altruism parameter can be made to depend upon disposable income and (c) official and private aid may not be treated as perfect substitutes in the utility function of the recipient country. There are many reasons for the last, one of these being the degree of corruption which may have a key influence on the effectiveness of aid.

Appendix

A   Table: Official and private foreign aid

Donor	Official to Private Aid Ratio[a,b] 1997	Official to Private Aid Ratio 1998	Official Aid ($ millions) 1998	Private Aid ($ millions) 1998	Official Aid to GNP Ratio 1998
Australia	7.03	8.67	960	111	0.27
Austria	15.97	9.91	456	46	0.22
Belgium	19.70	24.53	883	36	0.35
Canada	11.69	10.91	1691	155	0.30
Denmark	54.57	48.69	1704	35	0.99
Finland	37.9	79.2	396	5	0.32
France	_ [c]	_ [c]	5742	_ [c]	0.40
Germany	6.17	5.74	5581	972	0.26
Ireland	3.34	4.42	199	45	0.30
Italy	30.88	56.95	2278	40	0.20
Japan	41.96	52.41	10640	203	0.28
Luxemburg	15.83	18.66	112	6	0.65
Netherlands	_ [d]	19.25	3042	158	0.8
New Zealand	10.27	10.83	130	12	0.27
Norway	10.79	10.48	1321	126	0.91
Portugal	62.75	37.00	259	7	0.24
Spain	10.23	10.34	1376	133	0.24
Sweden	64.11	39.33	1573	40	0.72
Switzerland	15.18	5.92	989	167	0.32
United Kingdom	10.93	9.47	3864	408	0.27
United States	2.73	3.29	8786	2671	0.10

Notes:

[a] Official aid is defined to be total official development assistance given to List I countries, i.e the developing countries that are not reasonably advanced in the development process.

[b] Private aid is grants by NGOs, net of subsidies from government.

[c] Net private aid from France is almost non-existent

[d] Net private aid from the Netherlands in 1997 is negative.

Source: www.worldbank.org/data/wdi2000/pdfs/tab6_8.pdf

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