

**Exogenous Inflows and Real Exchange Rates:  
Theoretical Quirk or Empirical Reality?**

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*There are 'known knowns'. These are things we know that we know. There are 'known unknowns'. That is to say, there are things that we know we don't know. But there are also 'unknown unknowns'. These are things we don't know we don't know.*

Donald Rumsfeld, US Secretary for Defence on the search for weapons of mass destruction in Iraq, February 2002.

## **1. Introduction**

Concerns that large aid inflows will induce an appreciation of the real exchange rate and discourage the expansion of exports, particularly non-traditional exports, thereby damaging growth prospects in the recipient economy are rarely far from the centre of contemporary debates on the macroeconomics of aid to low-income countries. These concerns have recently been pushed to the fore in well-managed low-income countries which have already participated in the HIPC debt relief initiative and are identified by the United Nations Millennium Project (2005) as potential 'fast-track' candidates for rapid scaling up of aid flows. As these countries face the prospect of significantly higher aid flows in the near future (and, arguably, increased pressure from donor nations to see these funds disbursed) they are concerned about whether such increases will generate sufficient returns in terms of sustained growth to outweigh the costs of absorbing the aid or whether higher aid flows will contribute to an unravelling of hard-won economic gains accumulated over recent years. In his overview paper for this seminar, Bevan (2005) summarizes the key elements underpinning this anxiety but argues that this conventional diagnosis may be pessimistic, even when aid levels are already high. Hence, while there are risks associated with rising aid inflows these can be managed.

While most economists would probably concur with this assessment they would also recognize that effective management requires evidence against which policy interventions can be calibrated. One problem currently facing policymakers, and the international community more generally, however, is that even though there

has been a large amount of research on the topic, the evidence on the short- and medium-run macroeconomic effects of aid – the ‘empirical reality’ referred to in the subtitle of this paper -- is still partial, often contradictory, generally ambiguous, and arguably of only limited relevance to the contemporary policy debate on aid management. This has quite serious implications both in situations when a view is required on how much aid flows to low-income countries could sensibly be increased, and also in thinking about how the supporting macroeconomic policy environment should be structured. Taking too sanguine a view, either on the limits of absorption, the rate at which aid flows can be scaled up, or on the degree of macroeconomic intervention required to manage a scale-up effectively runs obvious risks. But too conservative a stance is also costly.

This paper is fundamentally concerned with forms of evidence and is structured around two objectives. The first is to review the theoretical arguments concerning the macroeconomic transmission from aid inflows to the real exchange rate and export performance and to summarize the macroeconomic evidence on this link (this constitutes the ‘known knowns’ from the quotation at the beginning of the paper). The second objective is to discuss how simulation methods, based on a blend of theory and partial empirical evidence, may be used to highlight some critical but typically hard-to-quantify factors which are likely to determine the macroeconomic response to increased aid flows. These, then, are the ‘known unknowns’.

The structure of this paper is as follows. Section 2 lays out the key theoretical arguments in the relationship between exogenous aid flows, the real exchange rate, and the structure of production in the recipient economy. In doing so, three specific issues will be addressed: the role of dynamic growth effects from exporting; the problem of short-run real exchange rate overshooting; and the possibility that aid

flows can generate a so-called ‘transfer paradox’, a situation where a gift (e.g. an unrequited transfer of aid resources) may leave the recipient worse off than it was before the transfer. I argue that while the transfer paradox is, in some respects, a ‘theoretical quirk’ and unlikely to materialize in aggregate, there are elements of the paradox which are highly germane to certain distributional features of aid inflows. Section 3 then reviews some of the empirical evidence and offers an assessment of its relevance to the contemporary debate. Reflecting the rather pessimistic conclusions that emerge from this assessment, Section 4 then presents some simulation-based evidence on the aid and real exchange rate link which, I argue, helps sharpen the focus on the key factors shaping the macroeconomic response to aid inflows. Finally, Section 5 concludes with some brief remarks about implications for policy, anticipating later sessions in the seminar.

## **2. Aid flows, the real exchange rate and export performance**

### *The standard argument*

I start by reviewing the standard analysis of the macroeconomics of aid flows to small open economies. Foreign aid flows augment domestic resources, leaving the economy as a whole better off; how much so depends on how these increased resources are used. Two features of aid are important in considering the economy’s response. The first is that aid accrues initially to the government. In this respect it is similar to a resource windfall in state-owned natural resource sectors as opposed to commodity price windfalls or remittance booms which tend to accrue in the first instance to the private sector. It is for this reason that parallels are often drawn between issues of aid management and the so-called ‘resource curse’. The second feature is that while an aid inflow directly increases the economy’s capacity to import,

the expenditure it initially finances is often predominantly on domestic goods. The economic impact of aid flows therefore involves consideration of the inter-sectoral allocation of resources between the tradable (exportable and importable) goods and non-tradable (domestic) goods sectors of the economy and between the public and private sectors. The critical decision is, thus, what the authorities choose to do with the aid. The choices are straightforward. It could be saved, passed directly to the private sector through tax cuts or some direct transfer, used to substitute for domestic deficit financing, or be used to augment public expenditure (or, of course, some combination of all of the above).

If it is entirely saved, or if the ultimate recipient of the aid, either in the public or private sectors, spends the entire increase on imports the real exchange rate will be unaffected, at least initially.<sup>1</sup> It is much more likely that the aid inflow boosts total demand for both imports and domestically produced (i.e. non-tradable) goods and services including public services such as health and education. Hence the real exchange rate response will depend on the relative pattern of demand between the public and private sectors. Typically it is assumed that the public sector has a higher propensity to consume domestically produced goods and services so that this component of demand is likely to be stronger if aid is used to finance increased public expenditure than if it finances direct transfers to households or tax cuts, or is used to reduce domestic deficit financing. But in either case the mechanism is the same so that differences in outcomes are a matter of degree. For small economies, imports can be acquired directly from the world market at fixed world prices but non-tradables can, by definition, only be supplied by domestic producers. Unless there is considerable excess supply in the economy, this higher demand for domestic goods requires their prices to rise in order to induce the necessary supply response. In other

words the real exchange rate (i.e. the price of non-tradable relative to tradable goods) must appreciate to entice resources, including labour, to switch from the production of exportable and import-substituting goods to the production of non-tradable goods. In the process, then, as the real exchange rate appreciates the tradable goods sector shrinks relative to the non-tradable sector. This is what is often called the ‘Dutch Disease’ effect of aid.

Dutch Disease effects alter the balance between the tradable and non-tradable sectors. Producers of tradables – both those currently in operation and potential producers -- stand to lose: the purchasing power of their export income declines and their profit margins are squeezed as prices of domestic inputs, including labour, rise. On the other hand, producers of non-tradable goods stand to gain as their income now purchases more imports and domestic tradables (i.e. import-substituting goods) than before. If the production of non-tradable goods and services is relatively labour-intensive – as is often the case – then in aggregate wage earners will also gain (either as a result of higher labour demand or higher wages if there is close to full employment).

The magnitude of these short-run effects will depend on a number of factors. As noted, they will be stronger the greater the share of non-tradable goods in consumption which is likely to be closely related to the proportion of the aid inflow directly spent by the public sector. They will be weaker the greater the capacity of consumers – in either the public or private sectors – to substitute between domestic and imported goods in response to changes in relative prices. They will also be weaker if there is substantial spare capacity in the economy; the larger the pool of unemployed labour the easier it is to increase the supply of labour-intensive domestic goods without driving up prices, including the price of labour. Nkusu (2004) suggests

that a failure to account for idle capacity may create a systematic expectation that Dutch disease risks are higher than they truly are. How much genuine spare capacity really exists, however, is often unclear. Unemployed capital and labour are only relevant as excess capacity if they can be brought into productive use in response to increased demand. Hence, if critical inputs in short-supply such as specialist labour cannot be substituted by abundant factors, regardless of how far their price falls, ‘full capacity’ can co-exist with generalized unemployment of factors.

In the short run, the impact of aid on the economy is felt predominantly on the demand-side. Over the medium term, however, the evolution of the economy depends equally on the nature of the supply side response to the aid inflow, in other words how, if at all, the productive capacity of the economy is augmented by aid inflows. This in turn will be determined by how aid is used and how the supply side of the economy responds to these different uses. As we shall shortly discuss, once appropriate consideration is taken of the supply-side there is no presumption as to whether, over the medium term, aid inflows will be associated with an appreciation or depreciation of the real exchange rate or, indeed, with an expansion or contraction in the tradable goods (exportables) sector of the economy. Before doing so, we consider three extensions to this basic argument.

#### *The costs of temporary exclusion from world markets*

Most economists believe that there are important growth-enhancing productivity gains to be obtained from producing for world markets. This belief appears to be borne out in empirical evidence, including for African manufacturing firms.<sup>2</sup> Hence, if the appreciation of the real exchange rate induces a protracted shift of resources away from the export sector and towards non-tradable production, where latent productivity

effects are typically assumed to be lower, this jeopardises an important engine of growth for the economy.<sup>3</sup> Although the evidence on the scale of these growth effects is contested, this argument is a serious one, particularly since because of past policy errors the exportable sector in many low-income countries is already too small. The policy challenge it thus to ensure that poor management of aid inflows does not leave the exportable sector *permanently* smaller than its growth maximizing level. If, however, productivity gains from aid-financed public investment can be secured, so that the exportable sector's share of total output expands in the medium term, the issue is simply an inter-temporal one, at least in aggregate; the temporary growth-retarding effects of a short-run real exchange rate appreciation are compensated for by future growth in the export sector, allowing higher export-led productivity gains to be accessed in the future.

#### *Permanent costs of temporary real exchange rate overshooting*

The interaction of demand and supply side effects of aid mean that the real exchange rate may 'overshoot' its long-run value and may, in fact, move in the opposite direction so that a short-run appreciation is followed by medium-term depreciation. Temporary movements of this kind are often much more costly than conventional models suggest, even if they are anticipated. These costs are likely to be especially high when firms face high adjustment costs and when the domestic financial sector is relatively under-developed. If firms falsely believe temporary real exchange rate movements to be permanent, they incur costs as they first move into (what they think is) the booming sector and then out again when the temporary effects pass. These are one-off costs. More problematic, though, is the case where real exchange movements are known to be temporary, so that firms are not induced to reallocate resources in



response to the short-run relative price movements, but they are unable to access sufficient credit from under-developed financial markets to finance the short-run losses brought about by unfavourable temporary real exchange rate movements which, in the case of export firms would be an appreciation. In these circumstances firms may run-down their capital, lay off skilled workers, or at worst close down completely even though the long-run prospects for the tradable sector may be strongly favourable. Hence short-run movements in real exchange rates may again have *permanent* effects on the structure of production and growth. Given their lesser ability to access credit from the formal financial sector, small firms are likely to be disproportionately vulnerable to this kind of market imperfection.

It is important to distinguish here between the volatility of aid flows and the volatility of the real exchange rate itself. It is the latter which matters for inter-sectoral resource allocation decisions. Whether the former mitigates or exacerbates the latter depends on whether aid is pro- or counter-cyclical. Pro-cyclical aid (i.e. flows that increase in ‘good’ times as the real exchange rate is otherwise appreciating) may exacerbate the problem, while counter-cyclical aid (which offsets other adverse shocks such as terms of trade shocks) may directly serve to smooth both the current account and fiscal balances and the real exchange rate.

### *The Transfer Paradox*

The original idea of a ‘transfer paradox’ -- which has been a feature of the international economics literature for some time -- is that, as a result of distortions in the structure of trade, an aid transfer may move the terms of trade sufficiently far against the interests of the recipient country that it is left worse off following the transfer. More recently, the possibility of a transfer paradox has been examined in the

context of small-country aid recipients (where the terms of trade are independent of transfers), with attention switching to the role of the non-tradable goods sector. In this case the risk to the recipient emerges not from the conventional Dutch disease diagnosis (which is concerned with the switching of resources away from the dynamic tradable goods sector) but rather from its reverse. Specifically, when the transfer induces an expansion of the supply of non-tradables that is strong enough relative to the growth in domestic demand the relative price of non-tradable goods may fall sufficiently far that real income falls too.<sup>4</sup> While the models employed are highly specific (some might suggest they are contrived) and the empirical evidence marshalled in their support is relatively weak, this analysis does highlight an important aspect of aid transfers not normally addressed in conventional macroeconomic analyses, namely that the effects of potentially large relative price changes induced by responses to aid flows may be highly concentrated and therefore distributionally non-neutral. A particularly relevant example is in the market for basic food crops whose prices are determined by domestic market conditions. We frequently think of such goods as having a relatively low income elasticity of demand (i.e. above some subsistence level, the demand for food rises less than proportionally with income). In these circumstances shifts in supply arising, for example, from aid-funded public investment, and which are exogenous to the actions of producers themselves, can produce a sharp decline in prices and hence a sharp decline in incomes for net sellers of basic foods, typically poor rural households. In reality, of course, matters do not stop here, since households faced with this adverse movement in their terms of trade will tend to make some form of adjustment, either in their crop choice, their labour supply decision, and so on. However, the scope for adjustment

may be very limited or take some time to effect, so that the adverse distributional effects may be protracted.

### **3. The absence of reliable macro-econometric evidence**

In principle, it should be a simple matter to answer the question: how do aid flows impact the real exchange rate and the structure of domestic production, and how large are these effects? Attempts to measure this relationship date back to the early 1980s when parallels were first drawn with the natural resource curse and hence the possibility of ‘Dutch Disease’-like effects accompanying aid flows.<sup>5</sup> While a number of subsequent empirical studies have also found a tendency for aid inflows to be associated with an appreciation of the real exchange rate,<sup>6</sup> this evidence is not overwhelmingly significant. Econometric estimates of the impact of aid on the real exchange rate often show this effect to be small and statistically insignificant – what Bulíř and Lane (2002) have referred to as ‘traces’ of aid-induced real exchange rate appreciation. This tendency is echoed in more recent work by Prati, Sahay and Tresselt (2003) who, on the basis of a rather more sophisticated dynamic panel data model, suggest that for countries with net ODA flows in excess of 2% of GDP per annum, a doubling of aid would only appreciate the real exchange rate by at most approximately 4% in the short-run rising to around 18% over a five year period and 30% over the decade. Time-series models describing the evolution of the real exchange rate also tend to find that its response much less to variations in aid flows than it does to other exogenous foreign exchange flows, most notably commodity price or terms of trade variations.<sup>7</sup> Moreover, a number of studies on African economies find that aid inflows appear to be associated with a *depreciation* rather than an appreciation of the real exchange rate.<sup>8</sup>

Evidence on whether there has been an aid-financed contraction of the exportable sector is equally mixed. Bulfř and Lane (2002) present some striking evidence that suggests the tradable sector as a whole has declined by an average of 8 percent per annum in a sample of aid-dependent economies. Dramatic though this association is, it does not indicate causality running from aid to the contraction of the tradable sector. It is equally consistent with the reverse, namely that aid dependent economies may be in receipt of high aid flows precisely because the tradable sector is declining. Yano and Nugent (1999), in their paper on the transfer paradox, also find rather mixed econometric evidence on the relationship between aid flows, real exchange rates and the structure of production amongst a set of 44 aid-dependent economies over the two decades from 1970-1990. Aid dependence here means that a country receives in excess of 5 percent per annum in aid. In 21 of these 44 countries, aid was associated with an appreciation in the real exchange rate, although in only two cases was the effect statistically significant, while in 23 cases the relationship was reversed (and was significant in four countries). In only six of the countries (Burkina Faso, Congo, Lesotho, Liberia, Senegal and Yemen) were aid flows statistically and negatively associated with the symptoms of a transfer paradox (an expansion of the non-tradable sector, contraction of the tradable sector and a decline in real GDP), and only in the case of Liberia was there any evidence that the decline in real income was statistically significant.

Where there is an arguably stronger empirical consensus is on the costs of short-run temporary movements in the real exchange rates. The generalized costs of real exchange rate volatility are extremely well documented and there is an increasing body of firm-level evidence suggesting that it is exactly this form of temporary misalignment, rather than anticipated medium-term movements in the equilibrium real

exchange rate, that is particularly costly to sustained export growth in low-income countries.<sup>9</sup>

### *Making sense of the evidence*

A first reading of this macro-econometric evidence would appear to suggest that while short-run real exchange rate volatility is costly, the case for strong Dutch disease-like effects of aid is, at best, 'not proven'. At one level this is consistent with the fact that it is impossible to think of any example in which surges in aid inflows have led to the kind of collapse in the tradable goods sector associated with conventional Dutch disease episodes, such as, for example, the collapse of export agriculture in Nigeria following the oil shocks of the 1970s. But equally it does not imply that these effects could not materialize, nor that aid inflows have not choked off an incipient export-led growth. Moreover the evidence jars with well-articulated concerns about aid-induced real exchange rate movements emerging from policy makers in a number of African countries in recent years.<sup>10</sup> The problem would appear to lie with the evidence, particularly the aggregate macroeconomic evidence. There are at least three reasons why we might be cautious about accepting this evidence at face value.

The first is that much of the empirical evidence cited above draws on periods in the recent past where underlying macroeconomic circumstances, and particularly those relating to the management of foreign aid inflows, were radically different from those prevailing at present. In some cases, aid transfers were driven by, and responded to, non-economic factors (which might explain some of the high variation in the cross-country data such as that used by Yano and Nugent), while in others, and especially throughout the 1980s and 1990s aid was highly conditional on (or at least was associated with) large macroeconomic reforms, particularly in the areas of

exchange rate liberalization and unification and the removal of quantitative restrictions on trade. In these circumstances it becomes difficult to disentangle conventional aid and Dutch disease effects, where aid inflows appreciate the real exchange rate, other things equal, from the associated (or at least contemporaneous) tendency for the real exchange rate to depreciate as a result of policy reforms aimed at removing macroeconomic distortions. While huge amounts of effort have been expended to address these issues, there is little doubt that conventionally estimated effects of aid on the real exchange rate are highly likely to be biased downwards so that, at best, only weak Dutch disease effects are identified.

Similarly, over much of the period spanned by the econometric evidence, and especially when foreign exchange regimes were highly controlled, aid flows played a crucial role in financing critical imported inputs with the effect that short-run supply responses (across the economy as a whole) were sufficiently strong and sufficiently rapid to shift the balance in favour of a depreciation in the real exchange rate as otherwise idle capacity was brought into use.

A second problem with most analyses of real exchange rate responses to aid is that the results are dominated by the average, either over time or across countries. One consequence of this is that such models rarely allow for the possibility that real exchange rates may first appreciate and then depreciate in response to aid (and equally that the exportable sector may contract and then expand). In principle, time-series analyses can go some way to allowing for these effects but given the previous observations about relying too heavily on historical data, it is questionable how much weight can be put on this evidence.

Third, as was stressed above, aid flows do not occur in isolation and their impact is intimately linked not just with the fiscal response to the aid (i.e. how

revenue mobilization, public expenditure and the overall fiscal stance respond to aid flows), but also with the monetary and exchange rate policy response. Although there have been some attempts to develop sophisticated econometric ‘fiscal response’ models,<sup>11</sup> it is highly debatable whether such models can ever successfully identify the underlying structural linkages of interest, especially given the severe data limitations they face.

#### **4. Using simulation approaches to get behind the aggregate data.**

In recent years, a second tradition has emerged to assess the quantitative significance of the macroeconomic effects of aid flows in circumstances where other direct forms of empirical evidence cannot be relied upon. This involves building simulation models which are informed by theory and calibrated by data and case study evidence where these exist, but which do not rely exclusively on actual history to provide quantitative insights on possible responses to aid. Simulation models differ greatly in terms of scale and structure, depending on the kinds of questions they seek to address.<sup>12</sup> Recently, however, a number of models have been constructed to focus specifically on the question of aid and public investment. These include work by the World Bank (2004), by researchers at IFPRI, Lofgren and Robinson (2004), and Adam and Bevan (2004). It is far beyond the scope of this paper to do justice to this research, but it is appropriate to illustrate how this approach can be used to understand the possible dynamic responses to aid inflows. Simulation models on their own are generally unable to ‘predict’ the specific macroeconomic consequences of aid inflows, but they can, in the spirit of the quotation at the beginning of this paper, focus attention on the key ‘known unknowns’, those factors whose quantitative

importance we know we need to know in order to gauge how a particular economy may respond to a scaling up of aid.

To give a sense of how this approach might contribute to the debate, this section reports some simulations from a model built specifically to analyse possible short- and medium-term responses to alternative aid-financed public expenditure programs in low-income countries. The model, which is described in detail in Adam and Bevan (2004), is designed to capture the salient features of a typical 'post-stabilization' African country. Thus it assumes that the economy produces basic food crops, export cash crops, manufactured goods (including non-traditional exports) and services. This particular model does not assume any significant natural resource dependency. It embodies a standard characterization of consumption and saving behaviour for a range of representative household groups, including rural households whose livelihoods depend overwhelmingly on the production and sale of cash- and food-crops. The government in the model undertakes the standard array of functions, taxing households' income and consumption, providing conventional government services but also providing public infrastructure which has the capacity to boost the productivity in the private sector. The recent work by the World Bank (2004) on Ethiopia follows a similar strategy, but places more emphasis on the potential for productivity gains from investment in human capital, specifically through public expenditure on health and education.

The simulations reported here are designed to examine the sensitivity of possible macroeconomic responses to aid-funded public expenditure programmes to assumptions about: (i) the productivity of different forms of public expenditure; (ii) how this impacts the private sector (on average and, for example, whether different forms of public infrastructure favours the production of the export sector over the



domestic non-tradable sector); (iii) how quickly public investment can be brought on line; (iv) the initial degree of capital scarcity in the economy; and (v) the extent to which there are dynamic growth effects from non-traditional exporting. The simulations reported here represent only a fraction of the more extensive analysis carried out in the full paper.

Figures 1 to 4 plot a set of simulated 10-year trajectories for the real exchange rate (Figure 1), export volumes (Figure 2), real GDP (Figure 3), and total income (Figure 4), in response to a scale-up of grant aid equivalent to just under 2 percent of GDP in an economy which is already operating with a relatively high aid to GDP ratio of 11 percent.<sup>13</sup> Since the aim is to focus exclusively on alternative public expenditure packages, other external factors such as terms of trade changes and other aspects of the potential fiscal response are assumed to be constant, although there is no requirement that this needs be the case.<sup>14</sup> The plots, which give a sense of the potential range of responses, are generated for only a small subset of the possible trajectories generated by the model.

Experiment 1 provides a reference benchmark. In this case public investment has no effect on private sector productivity: the economy's total capital stock is increased but the increased public capital does not sustain higher private output. This allows us to isolate the pure demand-side effects of the aid flow. Experiment 2 examines the case where aid-financed public investment does enhance private sector productivity, but disproportionately in the non-traditional export sector (for example by improving international market access), while Experiments 3 and 4 consider the case where the productivity gains accrue overwhelmingly to producers of domestic non-tradable goods (for example subsistence food). In Experiment 3, we assume this public investment has a rapid impact on productivity and occurs against a background

or relative public and private capital scarcity so that the marginal returns to both sorts of capital are high. By contrast, Experiment 4 assumes a less favourable environment: the gestation lag for public investment is longer (it takes three years for investment to impact on private productivity instead of one as assumed in Experiment 3); the economy is already working with somewhat higher levels of public and private capital (although the economy is still ‘capital scarce’); while the consequences of a temporary contraction of non-traditional export growth are more severe.

Experiment 1 highlights the classic Dutch Disease anxiety and reflects many of the features underpinning some of the econometric evidence discussed earlier. The aid flow obviously augments aggregate real income (Figure 4) but has little initial impact on GDP (Figure 3). It does, however, lead to an appreciation of the export real exchange rate of around 3%, suggesting an elasticity somewhat larger than that estimated by Prati *et al* (2003), and a sizeable contraction in exports (in favour of higher production of domestic goods). Moreover, the experiment suggests a progressive deterioration in overall economic performance which is, in fact, sufficiently large to reduce real disposable income below its initial level, despite the continued aid flow. This collapse reflects a decline in real private investment which, in turn, is underpinned by two features of the model. The first is the growth slow-down brought about by a squeeze on the non-traditional export sector, but this is compounded by the fact that the real exchange rate appreciation raises the cost of capital goods (since the model assumes, rather reasonably, that capital formation is intensive in non-tradable services). This means that although the real exchange rate appreciation moderates over time, the deterioration of the capital stock ensures that the decline in export performance does not reverse and hence the initial welfare gains

weaken over time. Over the medium term, therefore, aid which delivers no supply-side benefit does indeed act as a brake on economic growth.<sup>15</sup>

By contrast, in experiments 2 to 4 public infrastructure investment is assumed to raise the productivity of private factors of production. In experiment 2, the gains from this infrastructure are biased in favour of the non-traditional export sector. In this case, once the effects of the public investment begin to be felt, the now higher returns to producing non-traditional exports draw resources away from other sectors, including the non-tradable sector, thereby inducing a further appreciation of the real exchange rate (Figure 1). This real exchange rate appreciation has a deleterious effect on traditional exports (e.g. cash crops) in the short-run, but as the supply side effects feed in, non-traditional exports grow rapidly and this stimulates a fairly substantial cumulative growth in GDP and national income over the ten year simulation horizon (Figures 3 and 4).

When the productivity gain is biased towards the production of the domestic good, however, as is shown in experiments 3 and 4, outcomes are markedly different again. Here the productivity bias works to ease pressures in the non-tradable sector and in this case is sufficiently strong to rapidly reverse the initial demand-side effects of the increased aid flows. The real exchange rate reverts to its initial value quite rapidly despite the continued higher aid inflows and in fact shows a depreciation in the medium term. As we shall see shortly, this has important distributional implications.

As shown in this set of simulations, the domestic-biased supply response in Experiment 3 (when the external environment is relatively benign and identical to that assumed in Experiment 2), has a stronger impact on overall export performance and output growth than when infrastructure is specifically export-biased. This occurs

because of the beneficial effects of the weaker real exchange rate appreciation in the short-run which helps to suppress the overall cost structure for the export sector. This relative ranking is not guaranteed, however. In the case shown here as Experiment 4, where there are longer gestation lags associated with public investment, and where marginal returns to investment (both public and private) are somewhat lower, the export-biased case generates higher output growth in the medium term.

Finally Figure 5 shows how aid inflows can adversely affect the income distribution, even when total national income is rising (as is shown in Figure 4 for experiments 2 to 4). In this model, rural households are net producers on non-tradable food crops, and urban households net consumers. In the case where there is a strong export bias in the productivity gain induced by infrastructure expenditure, rural households enjoy a modest increase in real incomes (not shown here) although this rise is proportionally less than the rise in overall income, mainly because most of the positive demand side effects of higher public investment expenditure are felt by the suppliers of goods and services to governments who tend to be found amongst urban households. Hence the rural income share declines slightly. By contrast, when there is a strong domestic-goods bias in the supply response (which, as can be seen from Figures 3 and 4, generates higher aggregate income and output growth), this distributional effect is compounded by the fall in the relative price of food crops. This confers a direct benefit to net consumers of food (urban households) and a direct loss of real income to net producers. When the demand effects arising from the rise in overall national income are relatively weak (which may be the case if we consider basic foods), this disadvantageous shift in rural households' terms of trade may be sufficient to generate an absolute as well as relative loss of income and hence produce

a variant of the ‘transfer paradox’ noted above. This is the case here in simulations 3 and 4.

## **5. Caveats, summary and policy implications**

Although they only scratch the surface, and are certainly not meant as predictions for any specific country,<sup>16</sup> these simulations provide an interesting and informative perspective on what may lie behind the econometric evidence on the effect of aid flows presented earlier. But simulations are only as good as the models generating them, and the model underpinning those presented in Figures 1 through 5 embodies a host of limitations. To name just a few: the initial calibration assumes there is no usable excess capacity in the economy; it assumes the evolution of the real exchange rate is not influenced by the *nominal* exchange rate regime (since domestic prices are assumed to be fully flexible), nor is there any role for distortions arising from inflation; the model does not allow for migration from rural to urban sectors in response to the shift in relative incomes; nor does it provide for any form of human capital accumulation.

Listing the limitations is not really the point, though. The relevant issue here is that this analysis has moved beyond the econometric averages and has shifted attention onto some of the elements that determine the macroeconomic response to aid inflows and, in doing so, has helped identify some of the key “known unknowns”.

For example, four central messages emerge from the simulations presented above. First, when public infrastructure augments the productivity of private factors, and especially when there is an initial scarcity of public infrastructure, there are potentially large medium-term welfare gains from aid-funded increases in public investment, despite the presence of some short-run Dutch disease effects, and that

these are compatible with growth in the export sector of the economy. Second, however, when supply side responses to aid are important, real exchange rate overshooting may be an important feature of the economy's response to aid inflows. Third, and rather obviously, the actual evolution of the economy will depend crucially on the form of public investment, how powerfully (and how quickly) it feeds back onto private production capabilities, and the costs of any short-run contraction of the export sector. Importantly, though, export promotion and growth may be benefited as much, if not more, by public investment geared towards improving the productivity of domestic non-tradable goods production rather than directly towards improving productivity in the export sector itself. Finally, if aid flows do stimulate significant shifts in non-tradable goods supply, this may exacerbate underlying distributional tensions. In the case examined here net suppliers of domestic goods will not share proportionately in the aggregate income gains to the economy, raising the possibility of a potential worsening in the income distribution.<sup>17</sup>

The final step at this stage is to ask how this long discussion on forms of evidence contributes to the better management of aid. I think two key implications emerge. The first is general, rather obvious, and does not necessarily imply specific macroeconomic policy actions. Just as the late Speaker of the US House of Representatives, Tip O'Neil once famously claimed that all politics is local, any serious analysis of the impact of aid relies on the dictum that "all macroeconomics is micro". More precisely, which of the wide range of simulated macroeconomic trajectories is relevant for a particular country and setting, depends intimately on the microeconomics underpinning public expenditure and its impact including: (i) the demand side characteristics of different forms of public investment, particularly their call on the non-tradable goods sector, and the time taken for the effects of such

investment to be realized; (ii) the extent of usable capacity and relevant unemployed (but employable) labour; (iii) the extent to which public expenditure alters private production capacities and how this varies across sectors; and (iv) how these constraints may vary with the rate at which public expenditure is scaled up. It is clear that an understanding of these micro-structural features will not emerge from macroeconomic data, but there is a burgeoning body of microeconomic and case-study evidence that is increasingly able to provide some insight into the quantitative magnitudes of these features.

The second implication derives from the robust finding that there is a reasonable expectation that in the short-run the real exchange rate will overshoot its medium-run value, particularly if aid inflows support productivity enhancing public investment and that this effect is likely to be larger and more protracted the more intensive is public investment in non-tradables, the more attenuated the public investment process and the stronger the productivity bias in favour of the export sector. Thus while the medium term profile for the economy is clearly dependent on the aid being spent, there may be a case for aid inflows to be accompanied by measures geared towards smoothing the path of the real exchange rate in the short-run. How this might be most efficiently achieved, given that the management of aid flows is only one of the issues competing for policymakers' attention, has been a major concern to central banks in a number of low-income countries in Africa confronting surges in aid flows. While firm conclusions have yet to emerge, this is now an area of very active debate.<sup>18</sup>

## FIGURES

### SIMULATED RESPONSES TO AN AID-FINANCED INCREASE IN PUBLIC INVESTMENT EQUIVALENT TO 2% OF INITIAL GDP.

- Experiment 1:** Baseline: 'non productive' public investment
- Experiment 2:** 'Productive' public investment – export biased
- Experiment 3:** 'Productive' public investment – domestic goods biased
- Experiment 4:** 'Productive' public investment – domestic biased but low returns.

**Source:** Adam and Bevan (2004)

**Figure 1**  
Trade Weighted Real Exchange Rate

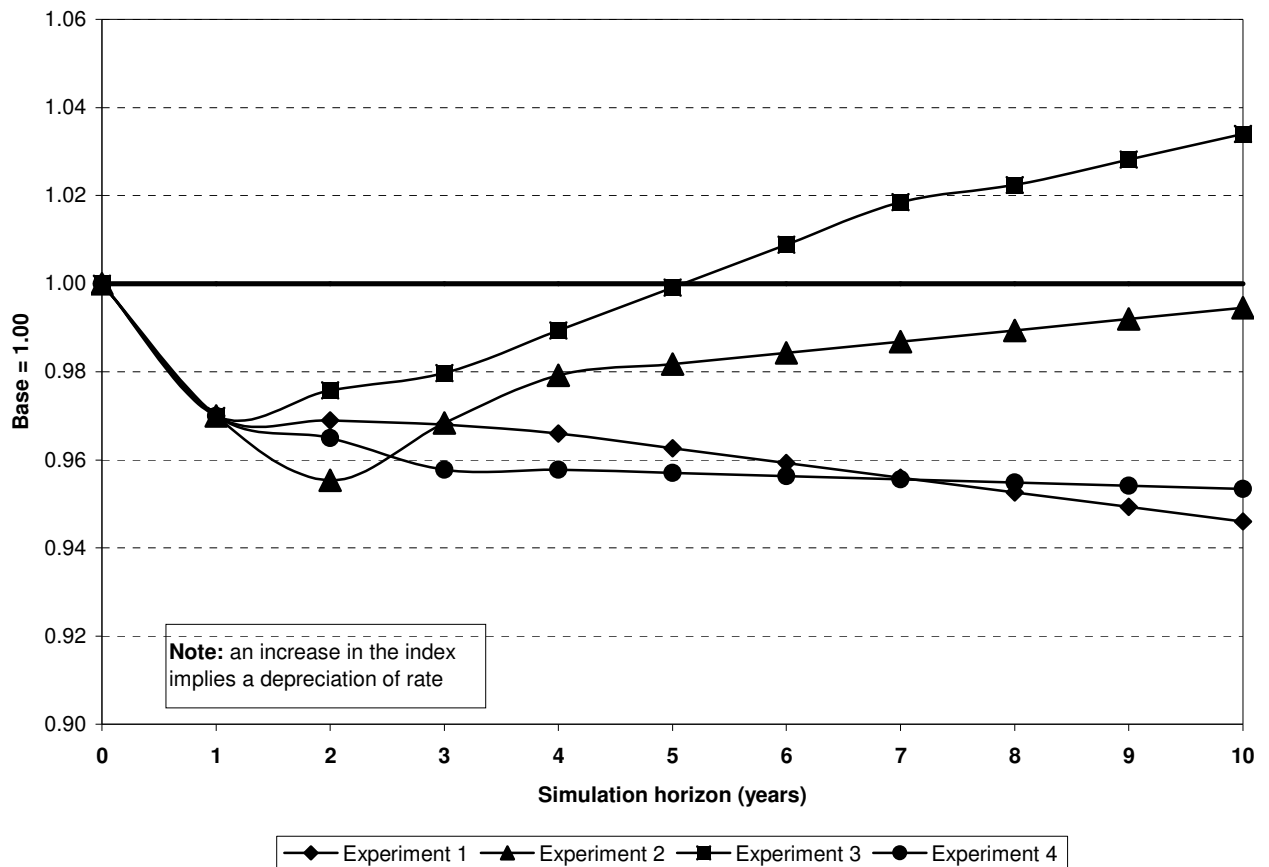




Figure 2  
Total exports

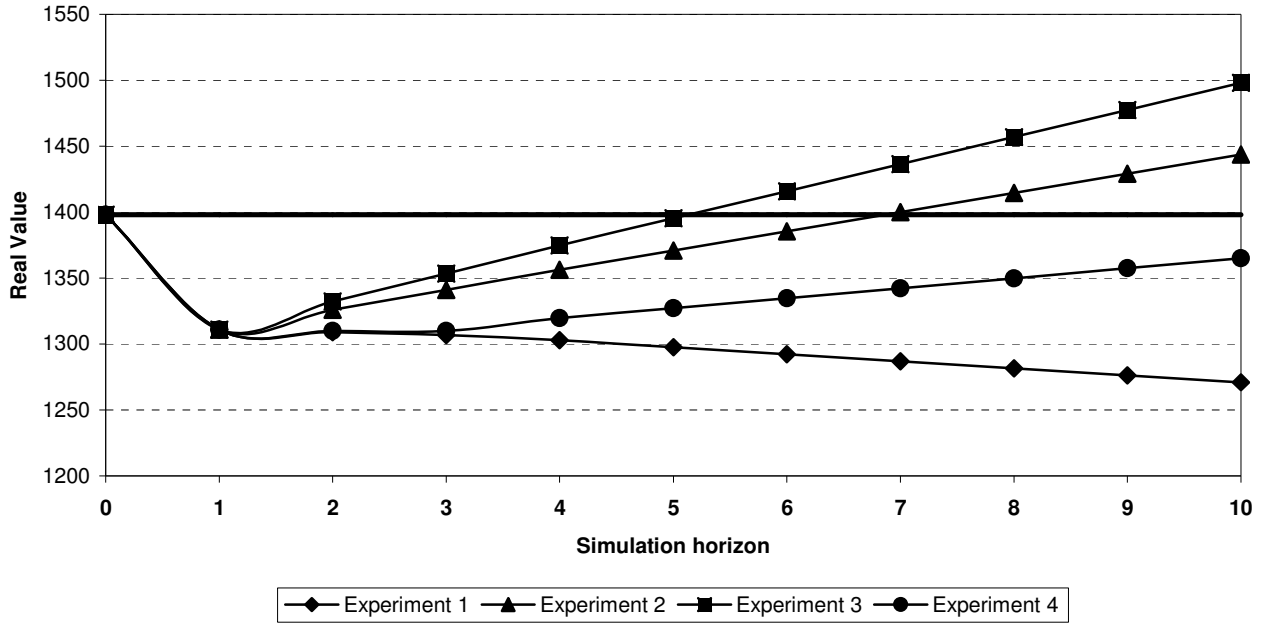


Figure 3  
Real GDP

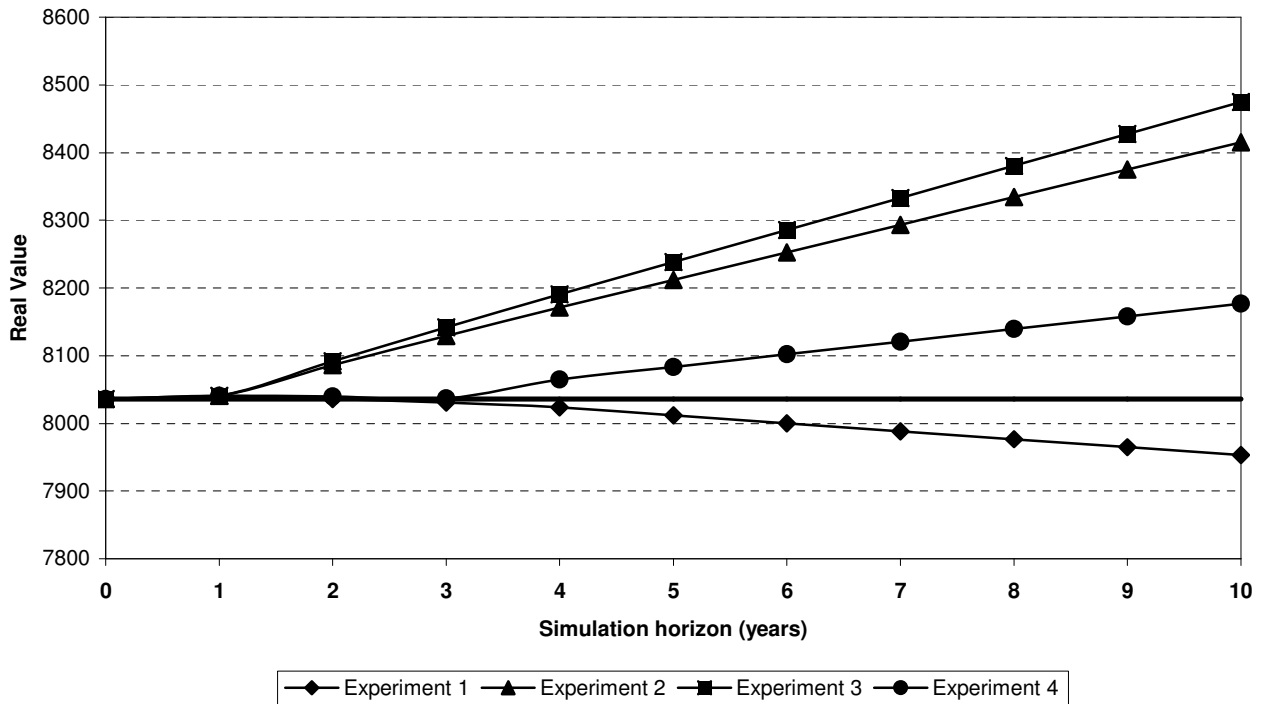


Figure 4  
Total Real Disposable Income

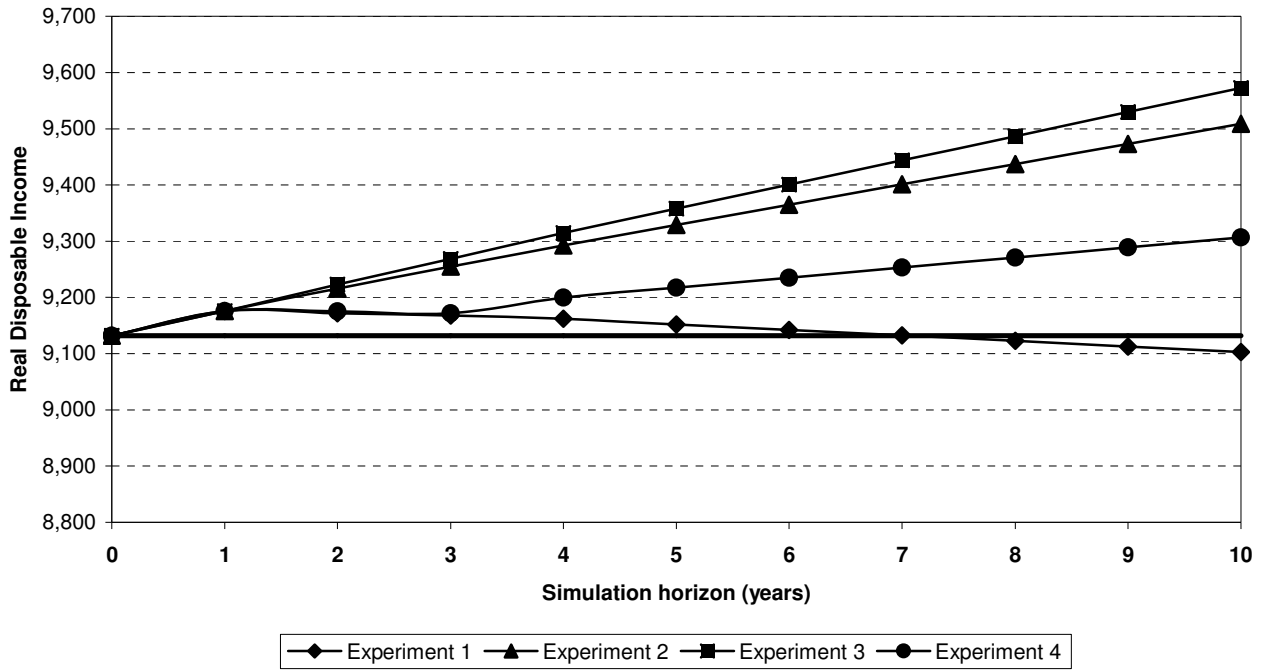
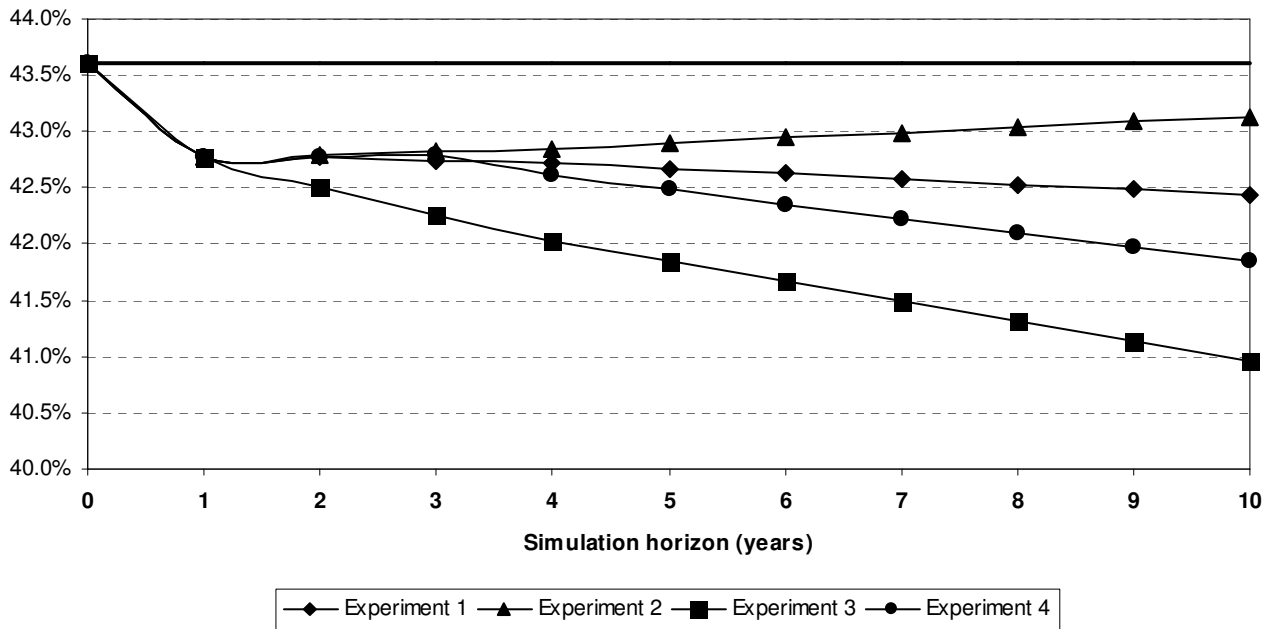


Figure 5  
Rural share of total income



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## NOTES

<sup>1</sup> Even if donors were comfortable with the idea, this option is unlikely to be optimal for the recipient, particularly if the aid increase is permanent, or at least not expected to be reversed in the near future. Some reserve accumulation might be optimal if reserves are sufficiently far below the level required for sound macroeconomic management. In this case, however, the accumulation of reserves is best thought of as a temporary rather than permanent response.

<sup>2</sup> For example, Ghei and Pritchett (1999) for a general discussion on this topic, Westphal (1990) and Kraay (1999) on evidence for East Asia and China, and Gautier (2002) and Bigsten *et al* (2004) for African exporting firms.

<sup>3</sup> See for example, Adam and O'Connell (2004).

<sup>4</sup> The small country 'aid transfer paradox' problem was first introduced by Chichilinsky (1980) but the idea has recently been revived by Yano and Nugent (1999).

<sup>5</sup> For example, van Wijnbergen (1985).

<sup>6</sup> These include country specific studies, for example by Younger (1992) for Ghana, Atingi-Ego and Sebudde (2001) for Uganda, as well as cross-country analysis by Adenauer and Vagassky (1998) for a number of Franc Zone countries, and Prati *et al* (2003) for a range of low-income aid-dependent economies.

<sup>7</sup> For example Elbadawi (1994) for Ghana; Baffes *et al* (1999) for Cote d'Ivoire and Burkina Faso; Atingi-Ego and Sebudde (2001) for Uganda, and Cashin *et al* (2002).

<sup>8</sup> For example, Nyoni (1998), Adam, Bevan and Chambas (2001).

<sup>9</sup> See, for example, Servin (2003) and Bleaney and Greenaway (2001) on the general evidence, Elbadawi (1999) on country-level evidence for sub-Saharan Africa, and Bigsten *et al* (1999) and Sekkat and Vavoudakis (2000) on firm-level evidence.

<sup>10</sup> For example, the discussion in Buffie *et al* (2004).

<sup>11</sup> For example, Mavrotas (2002).

<sup>12</sup> For example, there is a long tradition of using simulation models to analyse the likely impact of trade policy reforms. More recently these models have been promoted as a means of analyzing possible distributional effects of policy reforms.

<sup>13</sup> This is similar to the top end of the scale of HIPC debt relief but somewhat smaller than some of the aid flows anticipated under the UNMP.

<sup>14</sup> In practice, of course, the government may decide to take all the adjustment on the side of expenditure, by increasing current expenditure or infrastructure investment, or to offset part of it by altering the rate of revenue mobilization. Some combination of both is likely to be optimal in many circumstances, especially if current tax structures are highly distortionary at the margin and there are limitations to the public sector's absorptive capacity.

<sup>15</sup> These simulations are reported as deviations from a static baseline, represented by the horizontal line in each figure. In reality, of course, the no-aid increase baseline may

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reasonably exhibit some growth so that the contraction illustrated here represents a slow-down in the growth of output rather than an outright contraction.

<sup>16</sup> Simulation models certainly can be used for country-specific predictions but to be effective in this role, much closer attention would need to be paid to the calibration of exogenous developments (and not just the aid shock) and the characterization of anticipated policy reactions to such changes.

<sup>17</sup> How this effect is likely to translate into overall income distribution and poverty incidence will depend on the detailed structure of household activities (e.g. whether households are able to switch their production between subsistence and cash-crop production), patterns of off-farm employment, migration and remittances etc.

<sup>18</sup> See for example Buffie *et al* (2004) for a discussion of alternative monetary and exchange rate rules in the face of persistent aid shocks (for example arising from debt relief).