

DEPARTMENT FOR INTERNATIONAL DEVELOPMENT
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THE MACROECONOMICS OF INCREASED AID

TECHNICAL APPENDIX

1. Introduction

1. Aid flows to a number of well-managed low-income countries have increased sharply in recent years.¹ For such countries, these higher levels of aid flows can reasonably be expected to persist over the medium term, and this pattern is likely to be repeated elsewhere as the HIPC debt-relief initiative runs its course. Hand in hand with donors' increased willingness to support such countries, however, has come a renewed concern amongst some that increased aid flows themselves may jeopardize good economic management. This concern typically centres on three potential problems. The first is that aid inflows appreciate the real exchange rate and thereby undercut the competitiveness of the export sector of the economy, an effect often referred to as the 'Dutch Disease'. The second is that high and volatile aid inflows compromise effective domestic economic management, particularly in the area of monetary policy, and the third is that aid flows place excess pressure on the government's capacity to deliver its public expenditure programme, the so-called 'absorptive sustainability' issue. There is a range of other concerns about the effects of aid in low-income countries, including the effect of aid dependency on institutional development, the political costs of excessive reliance on non-tax revenue, and the distortionary effects of aid on political competition. These latter concerns are all highly germane to donors' engagement with low-income countries but are not dealt with in this paper, which concentrates exclusively on the first two issues.

2. DFID's position on the macroeconomic effects of increased aid flows can be summarised as follows. Increased aid flows confront recipients and donors with a number of macroeconomic and other challenges. Although not without cost, these challenges must be set against the gains from aid -- in terms of their contribution both to current poverty reduction and to future growth -- and the costs of not increasing aid. Aid flows are subject to diminishing returns but available evidence suggests that most low-income countries are some way short of the point where the marginal product of aid becomes negative. Moreover, good aid management is likely to *increase* the returns to current and future aid. Although increased inflows can certainly be mis-managed, this is not inevitable; if supported by appropriate economic policies in the recipient country, the net gains to increased aid flows remain strongly positive and donors should continue to make these resources available to recipient countries pursuing sound macroeconomic policies.

¹ For example, Uganda, Tanzania, Mozambique and Rwanda.

3. This appendix explains the basic macroeconomics of increased aid inflows and outlines the range of policy responses that recipient governments and donors should adopt in order to manage the macroeconomics of increased aid flows effectively. Part 2 examines the effects of increased aid flows on the real economy in the short- and medium-term and Part 3 discusses the monetary and exchange rate management of these inflows.

4. The arguments laid out here are concerned with the macroeconomics of aid in general. They are, however, most directly applicable to those countries where a measure of macroeconomic stability has been established – often with significant donor support – where substantial trade and exchange rate reforms have already been implemented, and where public sector capacity is reasonable or is being re-built. It is certainly true that aid flows to these ‘post-stabilization’ countries are often already high, but equally the legacy of poor economic performance in the past means that domestic revenue mobilization is poor, the quality of public infrastructure is poor and private investment levels are low. Taken together these factors suggest that increased aid flows will place strains on the recipient economy but will do so in circumstances where the payoff to effective use of aid remains high.

5. In the context of this discussion, the medium term can be thought of as the period over which the effects of public and private investment and public augment the economy’s supply capacity, either its level, its rate of growth, or both. By contrast the long run is the period over which the economy’s stocks of physical and human capital have fully adjusted. It follows that the short-run span the period before the effects of investment are felt. For low-income ‘post-stabilization’ countries much of the effect of public and private fixed investment generates a relatively rapid supply response. For example, investment in the rehabilitation of rural roads, the construction of factories, cultivation or re-allocation of land to new uses, and even some health interventions may be expected to feed through over a period of one to five years; other aspects of investment, most notably those in education are likely to take significantly longer, up to as much as 10 to 15 years.

2. Short- and Medium-Term Effects of Aid.

In the short-run the economy gains in aggregate but export sectors may suffer...

6. 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 although aid directly increases the economy’s capacity to import, the expenditure it initially finances is often predominantly on domestic goods. The second is that aid accrues in the first instance to the government. Analysing the economic impact of aid flows therefore involves consideration of two key inter-sectoral balances, between tradable and domestic goods production and consumption on the one hand, and between the public and the private sector on the other.

7. The initial impact of increased aid on these inter-sectoral balances and the real exchange rate depends on the use to which it is put. If the authorities respond by spending the entire aid increase on imports, or choose to save it in the form of foreign reserves, the real exchange rate is, initially, unaffected. However, it is unlikely that either option will be optimal for the recipient, particularly if the aid increase is permanent, or at least not expected to be reversed in the near future.² It is much more likely that aid will increase the demand for both imports and domestically produced (or non-tradable) goods and services, including domestically produced public services such as health and education. 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 the domestic economy. 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 domestic 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 producing tradable goods (i.e. exportable and import-substituting goods) to producing non-tradable goods. In the process, then, the real exchange rate appreciates and the tradable goods sector shrinks relative to the non-tradable sector. This is the so-called 'Dutch Disease' effect.

8. Dutch Disease effects alter the balance between the tradable and non-tradable sectors in the short-run. 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).

9. The magnitude of the short-run Dutch Disease effect will depend on a number of factors. First, it will be stronger the greater the share of non-tradable goods in consumption. Second, however, it 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. Finally, it will 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. It follows therefore that different forms of aid will have different effects, reflecting differences in composition of the initial

² Examples of the former might include technical assistance, aid-financed emergency food imports, or (non-fungible) import-only projects such as drug procurement programmes or the purchase of aircraft. The allocation of aid to reserve accumulation might be optimal if reserves are sufficiently far below the level required for sound macroeconomic management. In both these cases, though, these are likely to be temporary rather than permanent responses.

expenditure the aid finances and the differential behaviour of the beneficiaries of that expenditure.

...but in the medium term supply-side effects allow all sectors to gain.

10. In the short run the impact of aid on the economy is felt predominantly on the demand-side. Hence although the economy as a whole is better off as a result of the increase in national income, Dutch Disease effects will be present to some degree. However, although these effects should not be dismissed, equally, aid effectiveness can only fully be judged over the medium term when the supply side effects of aid come into play. These will be determined both by the scale of the real resource transfer to the recipient country from the rest of the world but, as importantly, by how aid is used and how the supply side of the economy responds to these different uses.

11. Setting aside the option of simply accumulating higher reserves (which, as noted above, may be optimal in the short run but is not appropriate in the long run), government can use its increased resources to: (i) lower the tax burden on the private sector (i.e. by substituting foreign for domestic tax financing of the public expenditure programme); (ii) pay off domestic debt in order to crowd-in domestic credit to the private sector; (iii) increase the scale of public expenditure itself, either recurrent or capital; or (iv) some combination of all three.

12. The balance between these options necessarily depends on prevailing country-specific conditions including overall macroeconomic conditions, the structure of domestic taxes, the level of domestic indebtedness, as well as the state of the public capital stock and the anticipated capacity of the public sector to implement the public expenditure programme. Clearly each option entails different consequences for the scale and distribution of potential gains from aid and, of course, for the real exchange rate. Again, the actual outturn will depend on country-specific factors, but a number of general considerations are relevant.

13. The case for using aid to reduce the level of domestic taxation hinges on two main arguments. First, in many countries one legacy of economic crisis and aggressive stabilization efforts is a fiscal structure characterized by relatively low efficiency but high and distortionary tax rates. Reducing tax rates in these circumstances may eliminate an important growth-retarding fiscal distortion and may also stimulate higher revenue mobilization in the future as incentives for tax avoidance are reduced. The second argument is that in circumstances where the public sector's delivery capacity remains limited, aid resources may have a larger impact if they are passed directly to the private sector than if they are routed through an inefficient and possibly corrupt budget process. However, many low-income countries already grapple with low levels of revenue mobilization (both in absolute terms and relative to their revenue potential) and there is a pervasive concern that high levels of aid have strong disincentive effects for domestic revenue mobilization, especially if aid is of finite duration. In these circumstances there is reluctance

on the part of both donors and recipient governments to see tax rates actively lowered in this manner, even in the short run.³

14. The case for using aid inflows to reduce domestic debt is based on similar arguments except in this case aid simply substitutes for domestic debt in the financing of a given budget deficit (before grants). Domestic debt reduction has three effects. The first is a reduction in the future cost of domestic debt service to the government. Second, assuming that domestic interest rates are influenced predominantly by domestic factors, including the level of government borrowing, debt reduction eases the pressure on domestic interest rates and hence lowers the cost of capital to the private sector. The third effect is a portfolio reallocation by private sector debt-holders – principally the banking sector -- in response to the net redemption of domestic debt by the government. The combined effect of these three changes is likely to involve some increase in lending to the private sector, either as working capital or to finance fixed investment. Obviously the scale of response will be governed by country-specific circumstances, specifically the interest elasticity of private saving and investment and how well the banking sector functions. In economies where the banking sector is fragile, and where government debt represents the only low-risk interest earning asset in the banking sector, a significant reduction in government debt may be destabilizing or, at best, translate into very little new lending to the private sector.

15. In both these cases the evolution of the long-run real exchange rate and inter-sectoral balances will depend partly on the private sector's propensity to save and invest out of its increased income, and partly on the sectoral composition of the additional private sector expenditure it finances. One important common feature, though, is that by definition neither route will directly increase the provision of public goods or public infrastructure capital to the economy, both of which are perceived to be well below their desirable levels in many HIPC countries.

16. It is for this reason that the marginal impact of aid in many circumstances is likely to be highest if used to scale up the public expenditure programme. In this case the precise medium term outcome depends on the composition of public expenditure between recurrent expenditure on services on the one hand and the development of infrastructure on the other, both of which have potentially important long-term growth and poverty reduction effects.

17. From a macroeconomic perspective, the key point is that over the medium-term public expenditure which augments the aggregate supply

³ This argument is often supported by the claim that aid is more volatile than domestic revenue (see Bulir and Hamann, 2001). Whether the higher volatility of aid flows relative to domestic tax revenue is deleterious for the volatility of total revenue depends on whether aid is pro- or counter-cyclical. If aid is counter-cyclical, so that it increases at times when domestic tax revenue is low, the volatility of total revenue will be lower than the sum of its components. The opposite will occur if aid is pro-cyclical.

potential of the economy (through the provision of infrastructure such as road rehabilitation, or institutional reforms to agricultural marketing for example) and increases the productivity of labour (through, for example, improved health and education provision) supports the growth of both tradable and non-tradable sectors. The actual sectoral pattern of growth and its consequences for income distribution and poverty relief will again depend on country-specific characteristics (see for example Adam and Bevan, 2002). In general, however, productivity gains in the non-tradable goods sector will tend to reverse the initial exchange rate appreciation, while producers of *all* goods, including exporters, will tend to expand their output if labour is healthier and more productive, the public capital stock is increased and its productivity improved, *despite the more appreciated real exchange rate*. Thus productivity effects emanating from aid-financed public expenditure raise the tradable (export) sector's competitiveness, allowing it to operate profitably at the new real exchange rate, and supporting higher overall growth. In other words the short-run Dutch Disease phenomenon, which underpins much of the donor community's anxiety about the effect of aid inflows, is reversed. Which sectors will benefit most from different public expenditure and productivity patterns will depend on the specific composition of expenditure, the structure of the economy, and the scope for productivity growth. Importantly, however, there is no inevitability that the export sector will suffer.

18. Existing econometric evidence provides rather limited guidance on the possible size of the medium term growth effects of aid. One problem is that much of the time-series econometric evidence that does exist covers the period from the 1970s to the 1990s and as such is more relevant to understanding the performance of economies whose trade and exchange rate policies are more distorted than is the case in most HIPC countries. Secondly, the literature often fails to distinguish between movements in the actual and the equilibrium real exchange rate. As Box 1 indicates, an appreciation in the actual (measured) real exchange rate may reflect the underlying evolution of the equilibrium rate or it may reflect misalignment of the actual rate from its equilibrium. Distinguishing these two effects is important, as the appropriate policy response to each will typically differ. Third, even in those cases where this distinction is made (for example the panel data study by Sekkat and Varoudakis (2000) on Sub-Saharan Africa)⁴, the evidence tends to be derived from a static framework which is unable to capture the dynamics of the supply side response to aid inflows; this literature therefore tends to emphasise short-run Dutch-Disease effects. Finally, the response of the real exchange rate and exports to aid is extremely difficult to disentangle, especially in the context of conditional lending. Here, the problem is that since aid is typically conditioned on the removal of other distortionary policies in the economy, empirical work often cannot distinguish between the extent to which aid *appreciates* the long-run equilibrium real exchange rate through Dutch disease effects on the one hand, and its role in 'purchasing' the elimination of other economic distortions (which tends to depreciate the rate) on the other.

⁴ They estimate the elasticity of manufacturing exports supply with respect to the *equilibrium* real exchange rate to be in the range between -0.8 and -1.5 for countries outside the CFA Franc Zone, other things equal.

19. For these reasons the existing econometric evidence tends not to provide insights into the *dynamic* relationship between aid and exports. Alternative simulation evidence provides some insights. Based on a range of assumptions derived from recent conditions in Uganda, Adam and Bevan (2002) suggest a medium term elasticity of exports with respect to aid of between 0.3 and 0.9, across a range of key parameter values including the assumed productivity of public expenditure. This range of positive medium term effects stands in contrast to the estimated short-run elasticity of around -0.5. These positive medium term elasticities fall as the recipient economy grows and the public capital stock converges on its optimal level, at which point the marginal product of public capital is exactly offset by the real exchange rate distortion it generates. However the simulation evidence tends to concur with that of Collier and Dollar (2001) who suggest that countries such as Uganda are some way below this point.

Box 1. The Equilibrium Real Exchange Rate (ERER)

The equilibrium real exchange rate is the price of non-tradable relative to tradable goods which, for sustainable values of its fundamental determinants, ensures both internal and external balance in an economy. External balance means a sustainable balance of payments; internal balance means domestic price stability without excess unemployed resources. The ERER is neither directly observable, nor is it constant. Rather it evolves over time in line with the evolution of its fundamental determinants. In small open economies, economic theory identifies the following principal determinants of the ERER:

- Trade Policy / Openness to Trade The higher are taxes on trade (i.e. the less open the trade regime) the more appreciated the ERER. Sustained trade liberalization is therefore likely to be associated with a depreciation of the ERER;
- Terms of Trade Permanent terms of trade improvements induce both income and substitution effects; the former tends to appreciate the ERER and the latter tends to depreciate it (since the terms of trade improvement makes the production of tradables more profitable). Empirical evidence across a range of low and middle-income countries suggests that the income effects tend to dominate so that a terms of trade improvement appreciates the ERER;
- Productivity Growth (the Harrod-Balassa-Samuelson effect). Productivity growth (i.e. technical progress) which is typically concentrated in the tradable goods sector tends to drive up real wages across the economy as a whole and will tend to appreciate the equilibrium real exchange rate;
- Net Capital Flows (Official and Private) Other things equal the income effect of capital inflows will tend to appreciate the equilibrium real exchange rate;
- Government (Current) Expenditure For most economies, government consumption expenditure is relatively intensive in non-tradables compared to private sector expenditure. Hence a shift in the composition of total expenditure towards the government sector will tend to appreciate the equilibrium real exchange rate.

Thus, other things equal, an economy that is growing through productivity growth and is attracting foreign capital, is likely on balance to experience an appreciation in its equilibrium real exchange rate.

Persistent misalignment of the actual real exchange rate from this (moving) equilibrium represents a deviation from the economy's aggregate welfare-maximizing path.

Williamson (1994) and Hinkle and Montiel (1999) provide detailed and comprehensive discussions of alternative measurement and estimation techniques relevant for determining equilibrium real exchange rates and misalignment.

Nonetheless aid inflows entail some macroeconomic costs, particularly if they are volatile or badly managed...

20. The foregoing arguments assume both a degree of predictability to aid flows and, at least implicitly, that distributional considerations are not too serious. In these circumstances an aid-induced appreciation of the real exchange rate in the short-run should not be a serious source of concern. There are, however, a number of risks that need to be borne in mind.

21. First, *temporary* movements in the real exchange rate may be very costly, especially if they are unanticipated. These could be induced either by pro-cyclical volatility in aid flows⁵ or by poor domestic monetary management. These costs are likely to be especially high in economies where adjustment costs are high and the financial sector is weak. If firms believe temporary real exchange rate movements to be permanent, either because of uncertainty or poor signals from government, 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 but firms are unable to access sufficient credit from under-developed financial markets to finance the short-run losses brought about by temporary real exchange rate movements. In these circumstances firms 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. Small firms may be disproportionately vulnerable to this kind of market imperfection.

22. Second, most economists believe that there are important growth-enhancing productivity effects from producing for world markets⁶. If the appreciation of the real exchange rate induces an excess shift of resources towards non-tradable production, where latent productivity effects are typically assumed to be lower, this risks undercutting the dynamic gains from aid. Though contested⁷, 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 key challenge here is to ensure that poor management

⁵ It is important to distinguish 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.

⁶ This literature goes back to van Wijnbergen (1984) but is very apparent in contemporary analyses of aid by, for example Elbadawi (1999). Microeconomic evidence from Uganda would appear to bear this out. Gautier (2002) finds that for a variety of measures, exporting firms are significantly more productive, and enjoy higher productivity growth, than firms in the non-tradable sector.

⁷ An elegant paper by Matusyama (1992) shows how readily conflicting views on the link between agricultural productivity and growth can be reconciled when the role of openness is considered, while a recent paper by Tovik (2001) argues that productivity effects can be found in either the tradable or non-tradable sectors and that the conventional presumptions can readily be overturned.

of aid inflows does not leave the exportable sector *permanently* smaller than its growth maximizing level. If the productivity effects of the kind discussed above are realized, 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 short-run appreciation is more than compensated for by future growth in the export sector, allowing higher export-led productivity gains to be accessed in the future.

23. Third, although even in the short run the welfare gains to aid to the economy as a whole are positive, latent distributional tensions may be exacerbated and the political viability of higher aid flows threatened. One key tension is that public expenditure is typically intensive in formal sector (urban) employment and draws disproportionately on the manufactured goods and services sectors for its intermediate inputs. Hence the direct demand effects of increased public expenditure tend to favour urban rather than rural households. Moreover, circumstances in the market for food can strengthen this bias. In aggregate, the income elasticity of demand for basic food is typically lower than for other goods, so that as incomes rise total consumption shifts away from food. If this tendency is reinforced by supply-side effects that lower food prices relative to manufactured goods prices, net food producers (i.e. rural households) will enjoy lower real income growth than net consumers (typically urban households). Overall growth may ensure that the impact on poverty reduction is still positive but income inequality may be exacerbated.

...which has important implications for the efficient management of 'temporary' aid.

24. None of the foregoing risks necessarily reverses the basic argument about the medium-term potential for aid effectiveness, but they do need to be borne in mind in assessing the design and management of aid inflows and suggest that complementary policy actions may be required.

25. Moreover, they emphasise the need for flexibility in response to large temporary aid inflows such as those envisaged by the so-called 'global funds' for health. A vital element in the success of such initiatives is the capacity to smooth expenditure over time so as to take maximum advantage of the one-off aid pulse and incur the least possible adjustment cost on the domestic economy. Since, by the design of these funds, donors are unable or unwilling to do so, the smoothing function falls on the recipient. This requires the recipient to initially 'stockpile' the aid and draw it down over time, the most obvious mechanism for doing so being a temporary accumulation of foreign exchange reserves⁸. As with a permanent aid increase, the rate at which expenditure is incurred and reserves are drawn down will depend on the nature of the expenditure the aid is financing, its composition between traded and non-traded goods, the degree of excess capacity in the domestic

⁸ Other mechanisms such as stockpiling the goods themselves (for example in the case of drugs) could also be envisaged but in general stockpiling in this manner is costly, both in terms of the costs of storage and the physical depreciation of the inventory. Moreover, foreign reserves earn the country interest and have other important benefits such as signalling macroeconomic health.

economy, and the duration of the benefits expected to flow from the aid-funded expenditure. Thus the higher the import content and the higher the excess capacity in the economy the lower the adjustment costs from a temporary aid inflow will be and more easily temporary aid can be absorbed. Similarly, if the temporary aid is expected to have a permanent effect on productivity and growth, for example through a curative health intervention, the aid should be drawn down more rapidly so as to take advantage of the dynamic productivity gains.

26. The basic conclusion from this section is that beyond the short-run, in which demand-side effects dominate economic outcomes, the relation between enhanced aid flows, real exchange rates, export volumes and welfare is complex. However, it is certainly not inevitable that increased aid will result in 'Dutch Disease' effects in the medium- to long-run. The key to the evolution of the aggregate economy is the supply-side productivity response to aid-funded public expenditure. It is on the basis of these medium term effects that donors' assessment of aid effectiveness should be formed.

3. Monetary and exchange rate management of increased aid flows

Aid inflows are not necessarily inflationary, but effective management does require co-ordinated monetary management

27. The previous section was concerned with the real economy effects of aid and in particular the evolution of inter-sectoral relative prices. Aid inflows also have implications for the overall price level and the rate of inflation. A key question is therefore: how should the monetary consequences of increased aid flows be handled? In broad terms, the appropriate monetary policy response is not difficult to define; as with private capital flows, aid flows are not intrinsically inflationary although poor management – in particular, and as has too often been the case in the past, through un-coordinated fiscal and monetary policies – can cause them to be so. Nonetheless, even with appropriate policy co-ordination, large aid flows can make effective monetary management tricky for low-income countries, particularly in the short run.

28. This section commences with a description of the monetary consequences of a permanent increase in aid and proceeds to consider how these interact with broader monetary and exchange rate choices facing the authorities. In order to focus on the central themes, this discussion assumes that the recipient country maintains a floating, but not necessarily free-floating, exchange rate regime and pursues an inflation target, either explicitly or, more likely, as the implicit objective of monetary policy.⁹ In either case the broad objective of monetary policy is to pursue this target at the lowest cost in terms of volatility in output and in the instruments of monetary policy, namely domestic interest rates and the nominal exchange rate. Since any real exchange rate adjustment is consistent with an infinite number of combinations of domestic goods inflation and nominal exchange rate

⁹ This is the case for many countries that announce targets for inflation but still operate monetary target regimes.

changes, the choice of monetary and exchange rate policy response to an aid inflow is not pre-determined. The monetary authorities must therefore actively choose a specific monetary policy response.

29. Typically, when a government receives aid from a donor it sells the foreign exchange to its central bank. The latter's net foreign assets therefore rise by the amount of the aid and its net domestic assets, consisting principally of claims against the government, fall by exactly the same amount. Since total assets are unchanged by this transaction, the central bank's liabilities – the monetary base – are also unchanged. Aid therefore has no initial monetary impact. However, as the government starts to spend (in excess of its tax revenue) its fiscal deficit increases and it starts to draw down its balances at (or increase its overdraft with) the central bank, raising the bank's net domestic assets and hence increasing the money supply. It is at this point that the monetary effects of the aid inflow come into play. Depending on how the monetary authorities respond to the government's expenditure programme the impact could be either inflationary or deflationary.

30. The mechanics of intervention are simple: the authorities can run down its reserves by selling foreign exchange or issue domestic (government) debt, both of which withdraw (or 'mop up') the previous domestic currency injection. In the former case this appreciates the nominal exchange rate and in the latter it drives up interest rates.¹⁰ Buying foreign currency from the market (i.e. building foreign exchange reserves) or domestic debt has the opposite effect of injecting domestic liquidity into the market. The required real-exchange rate appreciation and the inflation target determine the *scale* of the intervention – given other monetary developments such as the evolution of the private sector's demand for money -- but as is illustrated in Box 2 the same real exchange rate adjustment can be achieved exclusively through movements in the nominal exchange rate, the domestic (non-tradable) goods price, or some combination of both.¹¹

31. It follows that insufficient sterilization (i.e. allowing overall domestic inflation to rise too much) over-appreciates the real exchange rate, while excessive sterilization under-appreciates the real exchange rate by imposing too deflationary a monetary stance. In either case, and in contrast to an 'equilibrium' real exchange rate appreciation, these actions are welfare-reducing for the recipient country as a whole. Appropriately co-ordinated intervention on the part of the monetary authorities is therefore required to ensure that neither occurs.

Over the medium term, for a given overall inflation target, most of the real exchange rate adjustment is likely to occur through nominal exchange rate adjustment...

¹⁰ This assumes, quite reasonably in the case of most low-income countries, that domestic interest rates are determined in the short to medium term by domestic money market conditions rather than by international arbitrage considerations.

¹¹ A good contemporary discussion of monetary policy strategies and choices is provided by Mahadeva and Sterne (2000).

32. Which monetary response emerges will depend on the actions of the authorities and the nature of price-setting institutions in the economy. If, over the medium term, the authorities maintain their foreign exchange reserves at their target level consistent with the growth of the economy, and allow the nominal exchange rate to float freely given this target, the equilibrium real exchange rate appreciation is likely to involve some nominal appreciation and some domestic goods price adjustment. The balance between these will depend on the relative flexibility of tradable and non-tradable prices. In small open economies with (relatively) liberal price systems this will tend to mean rapid nominal exchange rate adjustment leading to an adjustment path such as Figure 1(i). Such evidence as exists tends to bear out this pattern of response. On the other hand, if labour or suppliers of non-tradable goods and services are able to adjust their prices rapidly the balance will shift towards an adjustment such as described in Figure 1(ii) in which the real exchange rate is achieved through a rise in domestic prices (i.e. a temporary burst of inflation). Most economists would argue that over the medium term the monetary authorities should not attempt to interfere with this adjustment trajectory.

...although in the short-run efficient intervention may involve intervention in both foreign exchange and domestic debt markets...

33. In practice, however, although a free-floating nominal exchange rate delivers the authorities' appropriate medium-term sterilization strategy, efficient short-run monetary management of aid flows is more likely to typically call for a degree of managed floating involving some combination of intervention in both foreign exchange and domestic debt markets. This arises because central banks in low-income countries face at least three major challenges in the conduct of monetary policy.

34. First, despite the impression given above, it is typically extremely difficult to assess *ex ante* the extent to which the 'equilibrium' real exchange rate has appreciated in response to the aid inflow and hence what might constitute an appropriate degree of short-term intervention. This is true for all countries but is particularly acute in small open economies which are much more prone to large exogenous and policy shocks.

Box 2. Monetary and Exchange Rate Responses to Aid

Aggregate inflation can be defined as

$$P = P_T^\alpha P_N^{(1-\alpha)}$$

where P_T denotes the price of tradable goods and P_N the price of non-tradable goods. Letting $P_T = eP_T^*$ where e is the nominal exchange rate and P_T^* the world price for tradable goods, the real exchange rate can be expressed as

$$RER = \frac{P_T}{P_N} = \frac{eP_T^*}{P_N} \quad (1)$$

Using this definition, an increase in either e or RER represents a depreciation, and a decline an appreciation. Assuming there is no change in the world price of tradables, overall inflation can be expressed as

$$\hat{p} = \alpha \hat{e} + (1-\alpha) \hat{p}_n \quad (2)$$

where the hat (^) denotes the percentage change.

Suppose we consider a country with a 5% inflation target, which is being met prior to the aid inflow, that experiences a step increase in aid sufficient to permanently appreciate the real exchange rate by 20 percent. Figure 1 plots four time paths for inflation and the real exchange rate given alternative forms of sterilization. The first three illustrate alternative 'equilibrium' sterilization strategies, the fourth the case where domestic liquidity growth is under-sterilized. For convenience we assume $\alpha = 0.5$ and $\hat{p} = \hat{e} = \hat{p}_n = 5\%$ prior to the aid inflow.

- i) The full extent of the real exchange rate appreciation is brought about by an appreciation in the nominal exchange rate so that the numerator in (1) falls. As a result of the nominal exchange rate appreciation, \hat{e} is negative the economy temporarily *undershoots* its inflation target before returning to its target level. In this case the overall price level is permanently lower than it would have been in the absence of the aid inflow.
- ii) The nominal exchange rate is fixed so that domestic (non-tradable) inflation rises to bring about the necessary appreciation in the real exchange rate. In this case the economy temporarily *overshoots* its inflation target and then returns to the target level, and the overall price level is permanently higher than it would have been in the absence of the aid inflow.
- iii) The real exchange rate adjustment is achieved by a combination of nominal exchange rate appreciation and inflation in domestic (non-tradable) prices. In this case the real exchange rate adjustment is implemented with no deviation from the inflation target.
- iv) Domestic goods inflation is under-sterilized so that overall inflation exceeds its target with a consequent misalignment of the real exchange rate.

35. Second, for many HIPC countries emerging from periods of aggressive inflation stabilization the authorities' intervention strategy must be developed in circumstances of a gradual but highly uncertain recovery in the demand for (domestic) money in which the inflationary consequences of a given monetary injection or withdrawal are extremely difficult to predict. In the presence of a rising demand for money, though, the authorities can (and should) let the overall money supply grow more rapidly than otherwise might be the case without jeopardizing the inflation target. Failure to allow for this recovery will result in a sterilization strategy that is unintentionally deflationary, forcing the economy to operate with an inefficiently depreciated real exchange rate.¹²

36. Third, in a number of countries governments have sought to shield public expenditure programmes from the short-run vicissitudes of donor aid flows by establishing a separation between it and its financing. In other words the public expenditure proceeds according to its own rhythm without being dictated by the exact timing of donor disbursements leaving the central bank the task of managing the short-run monetary consequences of the mis-match between expenditure and aid. This confers a potentially large benefit on the fiscal programme in terms of improved expenditure management but does so by shifting the full burden of accommodating short run fiscal volatility on to the monetary authorities. Given that aid flows to low-income countries, even when fully predicted, tend to be relatively large, irregular, and driven by donor disbursement cycles rather than the pattern of government expenditure programmes, this is often a substantial burden. The monetary authorities will periodically need to absorb large aid inflows with no immediate expenditure response on the part of the government and *vice versa*. Accommodating the full effect of these short-run changes in the monetary base simply by letting the nominal exchange rate adjust is feasible but is likely to result in damaging short-run exchange rate volatility. In these circumstances optimal monetary policy requires sterilization to be conducted across both the foreign exchange and domestic debt markets. If the required adjustment is 'too large' – in the sense that it confronts the private sector with excessive adjustment costs -- some degree of 'fiscal sterilization' is warranted. This could involve adjustments to the speed with which aid commitments are drawn down or to the scale and composition of public expenditure, in either case geared towards avoiding excessive real exchange rate movements.

...the balance of which should be chosen to minimize the volatility of interest rates, exchange rates and inflation.

37. The appropriate balance between the two instruments is that which sterilizes the required volume of liquidity at the lowest cost to the private sector. These costs are manifest principally in terms of the impact of exchange rate and interest rate volatility on private sector output. Interest rate and exchange rate volatility affects the economy in a number of ways. First, it makes price signals difficult to interpret; it makes the authorities' policy stance

¹² Even if the demand for money function is stable since the aid flow augments (either directly or indirectly) private incomes, the transactions demand for money is likely to rise so that 'full' dollar-for-dollar sterilization of the aid inflow will tend to be deflationary.

less transparent; and it increases the costs of doing business (for example, by making forward exchange contracts more expensive). Second, and perhaps more importantly, volatility creates incentives for banks to avoid term lending and for investors to remain excessively liquid and forgo irreversible investment.

38. The authorities also need to strike a balance between instrument volatility and 'target volatility', i.e. volatility of inflation around its target. When the cost of instrument volatility is high, it does not make sense to attempt to hit the inflation target at every point in time but rather to approach the inflation target gradually. Assessing these monetary management costs is difficult. Changes in the interest rate, the exchange rate, and overall inflation impact different sectors of the economy differently depending on, amongst other things, their structure of production, their working capital requirements and their access to the formal financial sector. Hence, as with assessing the real effects of aid, the appropriate design of monetary policy management is not only country specific but must also be sensitive to potential distributional considerations between sectors and between households and the corporate sector.

Donors can support good monetary policy....

39. Donors cannot themselves insulate recipient countries against these problems but they can help to ensure that the real economy benefits of aid inflows are not put at risk by confronting the recipient with unmanageable monetary policy problems. There are a number of ways in which donors can ease this task. The single most valuable contribution would be to provide as much predictability as possible over the timing and size of aid flows. Timing embraces two dimensions: in the medium term the authorities require a degree of predictability upon which to base expenditure and tax decisions and to allow the appropriate relative price and other signals to flow to the private sector about anticipated macroeconomic developments. In the short run the lumpiness of aid disbursements imposes significant costs on the monetary authorities. When aid disbursements represent a large proportion of total foreign exchange flows a certain degree of lumpiness is unavoidable. But here donors can also support recipients by reducing the unpredictability of flows, allowing for better co-ordination of expenditure and its financing and hence reducing the need for excessive smoothing on the part of the monetary authorities.

40. An important element in efficient monetary policy for any central bank is reserve management. The nominal exchange rate can be insulated from temporary peaks and troughs in net foreign exchange demand through central bank sales or purchases of foreign reserves (which, depending on circumstances, can themselves be sterilized through offsetting transactions in domestic assets). Given the thinness of domestic debt and foreign exchange markets in low-income countries this extra policy instrument is particularly valuable. Donors can assist this by supporting greater discretionary use of foreign exchange reserves for monetary policy purposes. It is inappropriate for donors to read short-term reserve accumulation as a "failure to use aid". Rather it should be viewed as a mechanism to maximize the efficiency of the

public expenditure programme. Depending on patterns of aid disbursements, there may be a case for supporting an increase in the average foreign exchange reserve coverage to facilitate effect short run intervention.

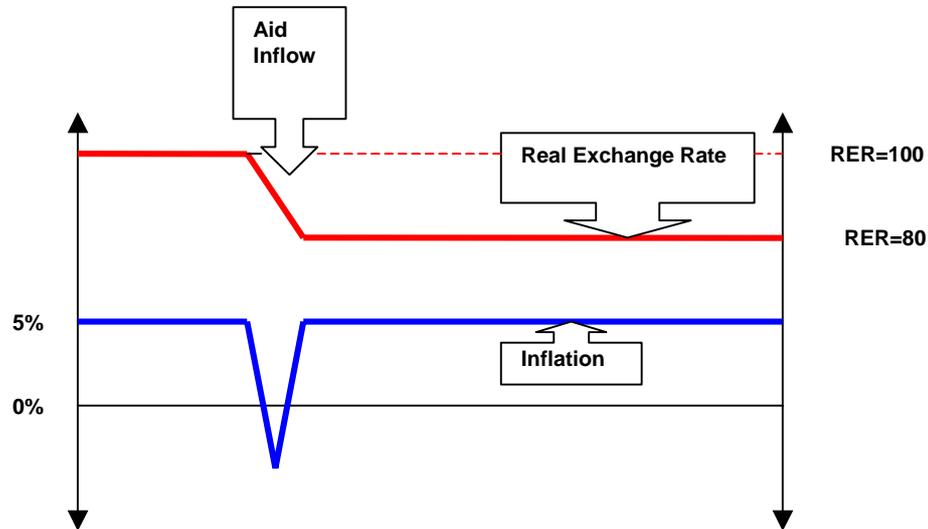
4. Conclusions

41. Two fundamental conclusions follow from this paper.

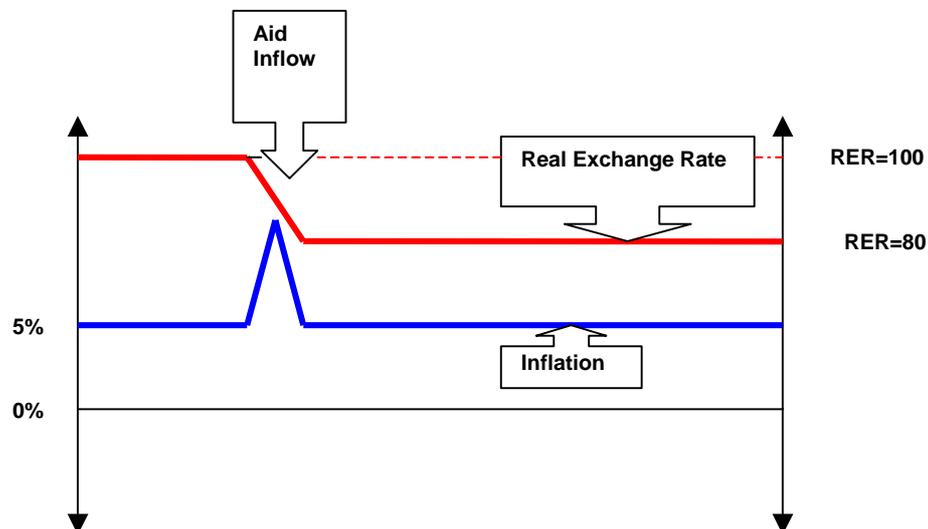
- Increased aid flows represent a transfer of resources from rich to poor countries, leaving the recipient better off. However, this transfer alters relative prices and in the short-run can reduce the profitability of the tradable sector. These short-run “Dutch Disease” effects must be set against the medium-term gains from aid -- in terms of their contribution both to current poverty reduction and to future growth. Although increased inflows can certainly be mis-managed, this is not inevitable; if supported by appropriate economic policies in the recipient country, the net gains to higher sustained levels of aid remain strongly positive and donors should continue to make these resources available to recipient countries pursuing sound macroeconomic policies.
- Increased aid inflows are not intrinsically inflationary but must be met by an appropriately coordinated monetary policy stance. By virtue of their size and lumpiness relative to the size of the domestic financial system of the recipient, aid flows often present the monetary authorities with challenging short-run management problems. For small open economies with floating exchange rates, most of the monetary accommodation of movements in the equilibrium real exchange rate will come through movements in the nominal exchange rate. However, in the short-run optimal monetary policy is likely to require active intervention by the central bank in both foreign exchange and domestic debt markets. Given the equilibrium appreciation of the real exchange rate the authorities should aim to meet their inflation target with the least instrument volatility. Donors can support this process by making aid flows as predictable as possible, coordinating them as much as possible with the rhythm of the recipient’s public expenditure programme, and by supporting discretionary short-run reserve management by the authorities.

Figure 1. Monetary and Exchange Rate Responses to Aid

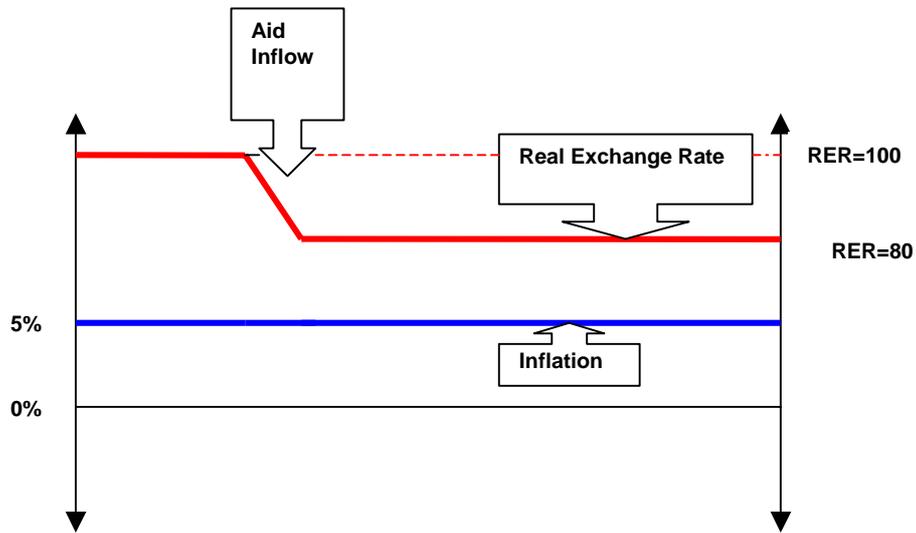
- i) Nominal exchange rate appreciation: inflation temporarily undershoots target, nominal exchange rate more appreciated and overall price level permanently lower than in no-aid scenario.



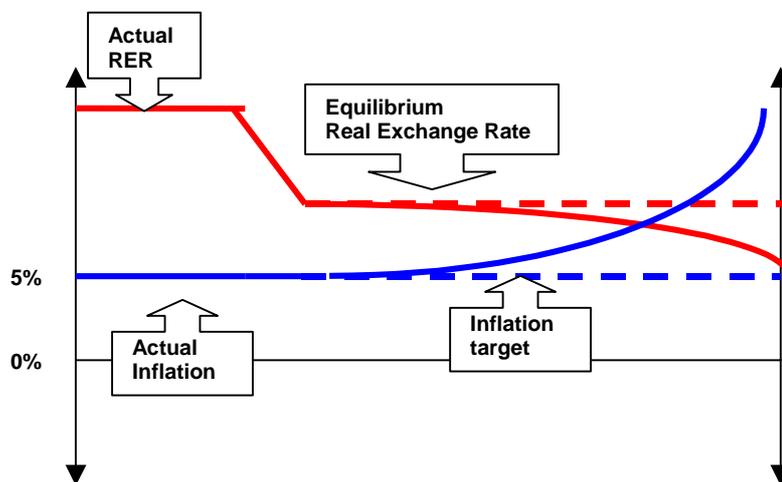
- ii) Non-tradable price inflation: inflation temporarily overshoots target. Domestic goods and overall price level permanently higher than in no-aid scenario.



iii) Mixed strategy: inflation hits target. nominal exchange rate more appreciated and domestic goods price level permanently higher than in no-aid scenario.



iv) Under-sterilized intervention: inflation over-shoots and real exchange rate over-appreciated.



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