# THE MACROECONOMICS OF AID

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## Summary

Since the advent of the MDGs, many costing exercises have highlighted that in order to attain the MDGs by 2015, current levels of Official Development Assistance (ODA) have to be at least double. But even though Developed Countries are prepared to finance the necessary increase in ODA, do the Developing Countries have the capacity to absorb efficiently the increase in resources? The absorptive capacity issue is then at the heart of the debate regarding the increase of ODA and the attainment of the MDGs.

Focusing on one aspect of the absorptive capacity constraint, namely the macroeconomic constraint, this paper first analyses the macroeconomic impact of an increase of ODA. One generally accepted phenomenon regarding macroeconomic impact of aid is "Dutch disease" whereby a sharp increase in external resources inflow impacts negatively on the external competitiveness of the economy and leads to a restructuring of the economy in favor of domestic production, due to a shift in the relative prices of traded to non-traded goods. Over the medium term, according to the theory, this would impact negatively on economic growth, because the tradable sector of the economy can benefit from externalities (notably learning by doing), unlike the non-tradable sector.

From the empirical attempts to measure the relationship between aid and exchange rate (which is at the heart of the Dutch disease), the case for strong Dutch disease-like effects of aid is, at best, not proven, some studies coming to the conclusion that the phenomenon does exist, other studies refuting its existence, and others being inconclusive. Face with this deadlock, some researchers have built macroeconomic simulation models in order to assess the likelihood impact of aid in certain circumstances, and no longer rely exclusively on actual history to provide quantitative insights on possible responses to aid.

Adam and Bevan for Uganda, and Agenor et al. for Ethiopia, among others, have built simulation models, informed by theory and calibrated by data and case study evidence. From the results of these enriching experiments, the following conclusions can be drawn:

- Even though Dutch disease may exist, this can be proved true only in the short run, when demand-side effects of aid excerpt upward pressure on domestic prices. In the medium to long term, once the productive capacity of the economy has been enhanced through aid-financed public investment, the phenomenon disappears ;
- The way aid is used critically influences its macroeconomic impact.

Finally, the paper analyses the best macroeconomic management's policy options in response to aid inflow:

- In the short run, well designed monetary and exchange rate policies can limit the negative macroeconomic impact without endangering growth and poverty reduction;
- In the medium and long run, it is essentially the utilization of aid that matters.

The paper comes to the conclusion that ideally, Aid should be mainly used to finance imports of capital goods, that will be invest mainly in the non-tradable sector of the economy, in order to increase its productivity and thereby, its productive capacity.

## I. Introduction

Since the Millennium Development Goals (MDGs) have been set by the International Community as the main goals for development, a particular focus has been given on the resources needed to achieve them.

The Zedillo report, designed to feed the Monterrey Conference estimated the global cost to achieve the MDGs. It was suggested that "the cost of achieving the 2015 goals would probably be on the order of an extra \$50 billion a year"<sup>1</sup>.

The World Bank's estimates the cost of achieving Goal 1 as ranging between \$54 billion and \$62 billion a year. It estimates the cost of achieving the other goals as ranging between \$35 and \$76 billion per year. According to the Bank, which stresses the theory that the attainment of Goal 1 will help to achieve the other goals, these two sets of figures should not be aggregated, in order to avoid 'double-counting'<sup>2</sup>

A background paper for the UNDP's Human Development Report 2003 (by Pettifor and Greenhill) takes a broadly similar approach to that of the World Bank and estimates the cost of achieving Goal 1 by attempting to identify the investments required to generate poverty-reducing increases in output in developing countries. The total cost estimate is an additional \$76 billion a year.

The Millennium Project of Pr Sachs is much more ambitious and estimates in its report<sup>3</sup> that there is a need to a net increase of ODA (from its 2002 level) gradually, from an extra \$70 billion in 2006 to \$130 billion in 2015 in order to meet the MDGs.

Finally, the Commission for Africa set up by the British Prime Minister asks for a doubling of ODA to Africa, approximately an extra \$25 billion a year.<sup>4</sup>

In view of the importance of the resources needed, a debate has been going on for some time that tends to imply that, even though the developed countries should be ready to finance entirely the associated costs, many developing countries will not be able to absorb these resources effectively. The corner stone of all this debate is about developing countries' absorptive capacity.

## Can developing countries absorb the additional resources?

Increasing ODA by an additional \$100 billion a year (which is roughly an average of the Millennium Project estimates) implies tripling its current level. Do Developing Countries have the capacity to absorb such an increase in external resources?

Absorptive capacity is a slippery concept. Broadly speaking, the absorptive capacity issue can take the following forms (see De Renzio(2005) and Nebie (2005)):

- Donor procedures and practices;
- Institutional and Policy constraints;
- Technical and Managerial constraints;
- Macroeconomic constraints.

Even though all aspects of absorptive capacity are equally important, we are going to focus our attention on the macroeconomic impact of Aid. Then we will analyze how well designed

<sup>&</sup>lt;sup>1</sup> United Nations (2001)

<sup>&</sup>lt;sup>2</sup> Devarajan S and al. (2002)

<sup>&</sup>lt;sup>3</sup> UN Millennium Project (2005)

<sup>&</sup>lt;sup>4</sup> Commission for Africa (2005)

macroeconomic management can help minimize the negative impact of external aid inflow, and foster a strong and pro-poor growth.

# II. The Macroeconomic Impact of a substantial increase of Aid

## 2.1. Real Exchange Rate (RER) and the Dutch Disease

## • Theoretical considerations

One of the surprising features of economic life is that resource-poor economies often outperform resource-rich economies in economic growth. According to Sachs and Warner (1995), this has been a constant motif of economic history. In the seventeenth century, resource-poor Netherlands eclipsed Spain, despite the overflow of gold and silver from the Spanish colonies in the New World. In the nineteenth and twentieth, resource-poor countries such as Switzerland and Japan surged ahead of resource-abundant economies such as Russia. In the past fifty years, the world's star performers have been resource-poor Newly Industrializing Economies of East Asia – Korea, Taiwan, Hong Kong, Singapore – while many resource-rich economies such as the oil-rich countries of Mexico, Nigeria, Venezuela, have gone bankrupt.

Many attempts have been made to try to explain this puzzle, from the "laziness" of the inhabitants of resource-rich countries to governance considerations (generalized corruption in resource-rich countries which generates into rent seeking attitudes). Other strictly economic explanations have been put forward, and we will stick to this latter category.

One of the economic explanations generally accepts today, is "Dutch disease," a term that broadly refers to the harmful consequences of large increases in a country's income. In the 1960s, the Netherlands experienced a vast increase in its wealth after discovering large natural gas deposits in the North Sea. Unexpectedly, this ostensibly positive development had serious repercussions on important segments of the country's economy, as the Dutch currency became stronger, making Dutch non-oil exports less competitive. This syndrome has come to be known as "Dutch disease." Although the disease is generally associated with a natural resource discovery, it can occur from any development that results in a large inflow of foreign currency, including a sharp surge in natural resource prices, foreign assistance, and foreign direct investment.

Why does a dramatic increase in wealth have this paradoxically adverse consequence? The answer is found in a classic 1982 paper by W.M. Corden and J. Peter Neary<sup>5</sup>. These authors divide an economy experiencing an export boom into three sectors: of these, the booming export sector and the lagging export sector are the two traded goods sectors; the third is the non-traded goods sector, which essentially supplies domestic residents and might include retail trade, services, and construction. They show that when a country catches Dutch disease, the traditional export sector gets crowded out by the other two sectors.

How does this happen? Let's take the example of a country that discovers oil. A jump in the country's oil exports initially raises incomes, as more foreign currency flows in.

If the country chooses to respond to the external resource inflow by simply building international reserves then there is no expansionary impact on aggregate demand, no pressure on the exchange rate or prices: There is no impact on the economy<sup>6</sup>. That is called by the IMF resource that is "neither absorbed nor spent" (Gupta et al. 2005). But one can reasonably make

<sup>&</sup>lt;sup>5</sup> Ebrahim-Zadeh (2003)

<sup>&</sup>lt;sup>6</sup> There may be second-order effects, e.g., expectations may change as a result of the central bank's higher international reserve position.

the assumption that no government can block for a long period all the external resources received, without reaction from his public opinion, particularly in poor countries.

If the foreign currency is spent entirely on imports (resource that is "absorbed and spent" (Gupta et al. 2005)), it would have no direct short term impact on the country's money supply or demand for domestically produced goods. In this case also, there should not be any adverse effect on the macroeconomic framework.<sup>7</sup>.

But suppose the foreign currency received is converted into local currency. Regarding central bank and fiscal accounting, we will have an increase of international reserves, and an equivalent increase of Government assets with the central bank. Suppose that the Government spent (entirely or partially) its resources on domestic non-traded goods. What happens next depends on whether the country's (nominal) exchange rate — that is, the price of the domestic currency in terms of a key foreign currency — is fixed by the central bank or is flexible.

If the exchange rate is flexible, the central bank will sell the foreign currency and the increased supply of foreign currency would drive up the value of the domestic currency (that is the nominal exchange rate), which also implies an appreciation of the real exchange rate<sup>8</sup>. But the selling of foreign currency will sterilize the increase in money supply induced by the increase spending of the government. So in the case of flexible exchange rate, the appreciation of the real exchange rate occurs only through a rise in the nominal exchange rate.

If the exchange rate is fixed, the spending of the Government would increase the country's money supply, and pressure from domestic demand would push up domestic prices (non-traded goods prices)<sup>9</sup>. This would amount to an appreciation of the real exchange rate. In both cases, real exchange rate appreciation weakens the competitiveness of the country's exports and, hence, causes its traditional export sector to shrink. This entire process is called the "**spending effect**."

At the same time, resources (capital and labor) would shift into the production of domestic non-traded goods to meet the increase in domestic demand and into the booming oil sector. Both of these transfers would shrink production in the now lagging traditional export sector. This is known as the "**resource movement effect**."

Finally, a third effect should happen: **The expenditure-switching effect** <sup>10</sup> refers to the disincentive to buy non-traded goods, induced by the appreciation of the Real Exchange rate (RER). Under the assumption that the traded and non-traded goods are not inferior, the increase in the relative price of non-tradables, coupled with the upward shift in real income brought about by financial inflow, is associated with an increase in the demand for traded goods. But the reduced production of tradables (resource-mouvement effect) implies that the country has to import in order to meet the increase demand for tradables. This would lead to a deterioration of the trade balance.

This model is sometime simplified, to analyze the impact of Aid, with only two sectors: a tradable sector and a non-tradable sector. The transmission mechanism is the same, and the analysis is not modified.

<sup>&</sup>lt;sup>7</sup> Strictly speaking, this is true only if directly imported good is one for which there was no existing effective demand. If the good transferred was already demanded domestically, then increasing the good's supply would depress the price of tradables relative to non-tradables, leading to real appreciation.

<sup>&</sup>lt;sup>8</sup> Real Exchange Rate is understood in this paper to refer to the relative price of non-traded to traded goods multiply by the Nominal Exchange Rate:  $RER = E.P/P^*$ . For RER to increase, either the nominal exchange rate (E) or/and the non-traded good price (P) have to increase, or the traded good price (P\*) has to decrease. <sup>9</sup> The traded good prices could not increase, since the increase demand for these goods can be met by

imports.

<sup>&</sup>lt;sup>10</sup> Nkusu (2004a)

As mentioned by Bulir and Lane (2002), there is nothing wrong with the shift in production away from tradables; it is merely an efficient adaptation of the economy to the receipt of a transfer, which is unambiguously welfare-improving for the recipient country. The expansion of the non-tradable sector can even be good for poverty reduction, since non-tradable sector is often more labor-intensive, and therefore creates more employment for non-skill workers, who are generally the poorest.

For the effects of aid to be a problem, some other elements would need to be taken into consideration. One possibility would be some kind of distortion which could include the possibility that production of traded goods generates positive externalities such as those associated with learning-by-doing (managers and workers in developing countries working in the tradable sector can acquire products and techniques create in developed countries, which boost productivity in this sector, but not in the non-tradable sector). Another possibility is that aid (or natural resource) is temporary: it would not be desirable for the structure of production and consumption to adapt fully to a situation that is temporary.

Therefore, the concern with Dutch disease follows not from the impact of aid on the traded goods sector per se, but from worry that the traded goods sector may be particularly important for future growth because of external benefits such as increased technology transfer and learning by doing from the participation in trade. The long term impact of Dutch disease on growth is suppose to be negative, because the production of export products is suppose to be more growth-enhancing than the production of the other products.

### • Empirical studies

# Assessment of the aid-RER relationship

Most of the studies that have been done on the Dutch disease issue have focused on the estimation of an econometric relation between the real exchange rate and external aid. The main objective is to assess whether aid inflow induces an appreciation of the real exchange rate as claimed by theory. In general the results are mixed, some studies confirming the existence of Dutch disease, others refuting it.

In a study covering 62 developing countries, including 28 African countries, Elbadawi (1999) finds that aid inflow have induced an appreciation of the real exchange rate, a conclusion confirmed by other studies, notably Opoku-Afari et al. (2004) and Adenauer and Vagassky (1998) respectively for Ghana and 4 CFA Franc countries (Burkina, Cote d'Ivoire, Senegal, Togo).

But many other studies have refuted the phenomenon. Sackey (2001) for Ghana, and Nkusu (2004b) for Uganda, come to the conclusion that the real exhange rate didn't appreciate in these countries, while they are receiving large amount of external aid. Ouattara and Strobl (2004) for 12 African countries from the CFA Franc area, come also to the conclusion that foreign assistance does not lead to Dutch disease. Opponents to Dutch disease also mentioned Botswana, which is an example of good economic management, despite relying mainly on diamond exports. Mozambique is also often quoted as a country that received huge external assistance (up to 50% of its GDP), without Dutch disease.

Comparing 11 studies on the relation between aid inflow and exchange rate appreciation, Gupta et al. (2005) finds that 6 studies out of the 11 come to the conclusion that the aid-exchange rate appreciation relation is verified; 3 studies come to the opposite conclusion, and 2 were inconclusive.

According to Adam and Bevan (2004), current policy debates on macroeconomics of aid often concentrate on short run Dutch disease effects, while ignoring the possible supply side impact of aid financed public expenditure. In their study, their simulations show that beyond the short-run, where conventional demand-side Dutch disease effects are present, the relationship between enhanced aid flows, real exchange rates, output growth and welfare is less straightforward than simple models of aid suggest.<sup>11</sup>

Torvik (1999) from his part built a model where learning by doing also apply to the nontradable sector, and with learning spillover between the sectors. Within such a model, a foreign exchange gift results in a real exchange rate depreciation in the long run (opposed to the Dutch disease hypothesis).

Other authors insist on the restrictive theoretical assumptions of the Dutch disease model. Nkusu (2004a) indicates that the core Dutch disease model assumes full and efficient employment of production factors, a mobile production factor transferable between sectors, and a perfectly elastic demand for tradable goods associated with the small country assumption. All these assumptions may not be verified in developing countries.

## Macroeconomic Simulation Models

In view of the difficulties to estimate a reliable econometric relationship between aid and exchange rate, 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. Simulation models can focus attention on those factors whose importance is known in order to gauge how a particular economy may respond to a scaling up of aid. We will analyze two recent models.

### ✓ Adam and Bevan model

The model, which is described in detail in Adam and Bevan (2004), is designed to capture the salient features of a typical 'poststabilization' African country. The model is calibrated to the Uganda economy (See annexes for a more detailed description of the model).

The simulations are designed to examine the sensitivity of possible macroeconomic responses to aid-funded public expenditure programmes. The aid flow in the model is used exclusively to finance an increase in public infrastructure investment. A full set of experiments has been done, based on 5 assumptions, over a ten years period, and the trajectories of the main macroeconomic variables are analyzed:

- 1. Experiment 1: Public investment has no effect on private sector productivity;
- 2. Experiment 2 : Public investment does enhance private sector productivity uniformly across all sectors of the economy ;
- 3. Experiment 3 : Public investment does enhance private sector productivity, but disproportionately in the export sector
- 4. Experiment 4 : Public investment does enhance private sector productivity, but disproportionately in the domestic sector
- 5. As 4, with subsistence threshold for food.

## The followings conclusions can be drawn from this model:

1. To fully assess Dutch disease effects, we need to consider medium to long term and take into account supply-side effects. A short term analysis (demand-side) cannot allow for a full assessment of all possible impacts ;

<sup>&</sup>lt;sup>11</sup> This model will be detailed latter.

- 2. Dutch disease effects are fully verified only if aid has no impact on the productive capacity of the economy (experiment 1);
- 3. Public investment strategy that seeks to enhance productive capacity of the nontradable sector delivers the largest aggregate return to aid: the real exchange rate appreciation is reduced or reversed, with highest growth and investment, enhanced export performance (experiment 4). However, this scenario is the worse for rural households income in relative terms (rural households income increase compares to overall income increase), even though, in absolute terms, they gain more as compare to the other scenarios. A strategy based on this scenario will delivers the largest growth, but will increase inequality.
- 4. The less unfavorable scenario to rural households, in relative terms, is the investment strategy that seeks to enhance the productivity of the tradable sector (experiment 3). But beside experiment 1, this is the one where rural households are gaining the less in absolute terms. Hence, the recurrent debate on pro-poor growth: what is better? A growth where the poor are gaining more in absolute terms (but may gain less in relative terms (Ravallion)); or a growth where the poor are gaining more in relative terms (but may be losing in absolute terms (Kakwani)).
- 5. Experiment 2 (with public investment enhancing private sector productivity uniformly across all sectors of the economy) may be a credible alternative. It allows for reasonable economic performance while limiting the worsening of inequalities.

Even though this model is not perfect (and the authors do recognize that), it gives some indications regarding the main thrust of a possible investment strategy in response to a sharp increase of foreign assistance.

# ✓ Agenor, Bayraktar and El Aynaoui Model<sup>12</sup>

These authors develop a macroeconomic framework that captures linkages between aid, public investment, growth, and poverty. The impact of policy shocks on poverty is assessed by linking the model to a household survey. The model is calibrated for Ethiopia and changes in the allocation of aid and public investment are simulated. The amount by which foreign aid should increase to reach the poverty targets of the Millennium Development Goals is also calculated. The Government receives foreign assistance, which takes two forms: food aid and nonfood aid. Both components are treated as a source of revenue for the government, but in addition food aid is assumed sold on local markets at face value (See annexes for a detailed description of the model).

Four types of policy experiments have been done: changes in the level and composition of foreign aid (which implies also changes in the level of public investment), changes in the composition of public spending coupled with a reallocation of public investment (for a given level of foreign aid), and an evaluation of the level of aid needed by Ethiopia to achieve a 50 percent reduction in poverty between 2003 and 2015.

# **Conclusion of the Model**

- 1. From this model, and whatever experiment, the Dutch disease hypothesis is not verified, no matter the level and duration of Aid inflow.
- 2. The model shows the importance of the composition of Aid and Public investment. For a given level of aid, an increase in aid to finance public investment (to the detriment of food aid) has a positive effect on growth and income. Similarly, a reduction of current expenditure in favor of capital expenditure fosters growth. However, the model is inconclusive regarding

<sup>&</sup>lt;sup>12</sup> Agénor Pierre-Richard et al. (2004).

whether investing in infrastructure is more growth enhancing and poverty reducing than investing in social services.

- 3. From the model it appears that due to the fact that part of the aid inflow comes as food aid that increases the domestic supply of goods, this allows avoiding Dutch disease symptoms even in the short run. In other words, one way to avoid Dutch Disease is to use part of foreign assistance to import goods and services that will complement domestic production thereby avoiding pressures on domestic prices.
- 4. Finally, this model shows that even in Ethiopia that is one of the poorest countries in the World, the target of halving poverty by 2015 is feasible, with a reasonable increase of ODA.

# 2.2. Aid and fiscal revenue

Even though empirical evidences are inconclusive, it is generally accepted that aid can be a disincentive to domestic revenue effort. A substantial scaling up of aid flows could dampen a county's domestic revenue effort. Why hassle tax payers and become unpopular if one can avoid that? For some economists, to the extent that a weaker tax effort reduces domestic distortions and transfers resource to the private sector (less tax means more income available for the private), it might help spur economic activity. For others, a weaker tax effort can have an adverse effect on domestic institutions because citizens are less likely to hold the government accountable when they pay lower taxes (Bevan, 2005).

It is generally accepted that since aid may not be permanent, it is necessary to increase revenue mobilization effort, particularly since fiscal revenue/GDP ratio is relatively low in developing countries, and avoid in so doing a high dependence on aid.

# 2.3. Aid, Savings and Investment

What are the effects of a large increase of aid on private savings and investment? Economic theory teaches us that government spending crowds out private sector, by absorbing much of the domestic savings, and therefore denying them to the private sector. In the case of aid, the government resources are external. Therefore we should not have the crowding out effect. Furthermore, due to the likely dampening of domestic revenue effort experienced by countries receiving large foreign assistance, the private sector should have more resource at its disposal for investment.

However, due to the appreciation of the real exchange rate, and the subsequent deterioration of the current account, there might be a reduction of domestic savings.<sup>13</sup> But this will depend on the utilization of aid. If aid is use to increase government consumption, this will result in an increase of importations, an increase of the balance of payment deficit, and then, a decrease of domestic saving, according to the equation below:

From the equilibrium equation of income and expenditure:

(1) Y + M = C + I + X

With: Y= domestic production; M= imports, C= consumption, I= investment and X = exports, we can rewrite:

(2) (Y-C) = I + (X-M)

<sup>&</sup>lt;sup>13</sup> See McKinley (2005)

(Y-C) is domestic savings, and (X-M) is net exports.

An increase in consumption (C), will induce, all other things being equal, a decrease of savings (Y-C). To balance equation (2), we need to have an equivalent decrease of net exports (X-M).

(3) 
$$(Y-C) \downarrow = I + (X-M) \downarrow$$

On the other hand, if aid is used to finance public investment, then we should have, over a certain period, an increase of private savings and investment, for many reasons:

- First, equation (2) shows us that if aid is invest (used to increase I), in the short run (demand-side effect) we will have a decrease of net exports (to compensate the increase of I), but domestic savings (Y-C) will not change. Private sector will then not be crowd out and will have resource to invest.
- (4)  $(Y-C) = I \uparrow + (X-M) \downarrow$
- In the medium and long term (supply-side effect) investment should permit to increase domestic product Y, and therefore, to increase domestic savings (Y-C). Investment (private notably) will then be foster.
- (5)  $(Y-C) \uparrow = I \uparrow + (X-M)$

Public investment can also crowd-in private investment, leaving aside income-effect. A country that have proper infrastructure (roads, electivity, etc.) will attract much more easily foreign investment. This is the reverse of crowding out: the more public investment, the more private investment.

Gupta et al. (2005) have analyzed 5 studies on the relationship between public and private investments. All 5 studies come to the conclusion that public investment increases private investment in Sub-Saharan Africa.

## **III.** Aid and Macroeconomic Management

The Macroeconomic impact of Aid depends fundamentally on the country policy response to aid inflow and how it spends the resources. In particular, it is the interaction between the fiscal, the monetary and the exchange rate policies that matters.

Faced with and inflow of external resources, a government has many policy options to manage these resources wisely while maintaining macroeconomic stability. One possibility is not to use the external resources. This is the case for aid that is neither absorbed nor spent. In this extreme case, aid resources can be kept abroad, in foreign accounts, or in the Central bank books. The only advantage is building international reserves. It will be difficult to have donors accepting such a policy.

Another possibility is to absorb and spend aid. In that case, the negative macroeconomic impact of aid can be managed in two ways: in the short run, using mainly monetary and exchange rate policies to mitigate demand-side effects. In the long run, using fiscal policy, particularly the composition and design of public investments.

In the short run, in order to limit inflation pressure, the central bank can sterilize liquidity impact of increases aid-induced spending. In fact, once the government has spent aid resources, these resources are now with the private sector, increasing accordingly the liquidity of the economy. There is an inflation risk. The central bank can operates a foreign sterilization, selling foreign currencies to absorb the increase domestic liquidity. However, the increased supply of foreign exchange creates pressure for nominal appreciation of exchange rate.

The central bank can also choose to have a domestic sterilization, by selling government securities or increasing bank reserve requirements. This can be efficient to reduce domestic liquidity, but has a major drawback: this will increase domestic interest rate with all the related consequences: crowding-out of private sector, increase of domestic public debt service, etc.

Then, whatever instrument is used to absorb domestic liquidity, there are negative effects on the economy. One can then wonder whether it is not preferable to tolerate a bit more of inflation in a country receiving high level of aid. Until recently the IMF was opposed to such a possibility, and most IMF-supported programs have very low inflation target. However, this stance may be changing. Gupta et al. (2005) state clearly "...some inflation could enhance real wage flexibility, and if nominal prices are inflexible, an excessively low inflation target can render an economy more vulnerable to prolonged downturns in case of adverse supply shocks." They then elaborate:" An inflation target below 5 percent may not be appropriate".

It is generally accepted that when inflation is very low, a policy that favors the expansion of aggregate demand (public expenditure for example) will create a bit more inflation and a lot of growth. Since prices are generally rigid in the short run, an increase in aggregate demand will generate more production from firms, rather than price increase, as suggested by orthodox model. But if this policy of increasing aggregate demand is pursued, the more inflation will go up, the less growth will be. And after a certain threshold, the level of inflation will be so high that it will completely hinder growth.

Many empirical studies have tried to find out the growth-maximizing level of inflation. Within the IMF, a study by Khan and Senhadji (2000) finds that inflation becomes to be harmful to growth beyond certain levels: For developed countries, the threshold is between 1-3%; for developing countries, the threshold is around 7-12%. That means that for developing countries, as long as inflation is not above 12%, it is not bad for growth.

Another study by Bevan and Adam from Oxford University,<sup>14</sup> finds that the growthmaximizing rate of inflation lies between 5 and 10% for developing countries. Finally, a study by Easterly and Bruno<sup>15</sup> comes to the conclusion that there is no negative correlation between inflation and growth as long as inflation rates are under 40% a year.

One can wonder then why is it that PRSP are targeting inflation rate that are so low. According to a study by Action Aid International USA<sup>16</sup>, IMF-supported programmes generally have inflation targets that are under 10%, and often as low as 3-5%. The main argument generally put forward is that inflation is bad for the poor. In fact, inflation is bad for everybody when it reaches high levels. It is not sure however that inflation is worst for the poor than for the other component of the population.

With inflation, the value of the local currency is decreasing. Consequently, all monetary asset value is depreciating and their owners are getting poorer. It is generally accepted that the richer can diversified their portfolio and acquire non monetary assets such as land, buildings that are no affected by inflation. It is also suggested that due to the trade unions, salaried employees can put pressure on the government and firms to get salary increase that compensate for inflation. Finally, the poorest should be the loser from inflation.

This reasoning is not always true, particularly in the Africa context. In Africa, the vast majority of the poor lives in rural areas. These poor have no monetary asset, no salary. The only assets they have are their land and work-force. These production factors are not affected by inflation. Furthermore, these poor live almost in autarky: The vast majority of their production is

<sup>&</sup>lt;sup>14</sup> Bevan and Adam (2001)

<sup>&</sup>lt;sup>15</sup> See ActionAid (2004)

<sup>&</sup>lt;sup>16</sup> ActionAid (2004)

self-consumed. All in all, if we take into consideration the fact that they don't have monetary assets and are consuming their own production, then they are not much affected by inflation. In such a case, which is generally the case in Africa, a policy choice that consists of having moderate level of inflation is not necessary bad for the poor, particularly if the cause of this inflation is public investments in social and infrastructure sectors.

In the case of a fixed rate of exchange, the national currency can be devaluated in order to offset the real exchange rate appreciation. Indonesia had used successfully such a policy in the 1970s to limit the real exchange rate increase of its currency.

In the medium to long term the way aid is used can limit the negative macroeconomic consequences. The two simulation models analyzed above give some precise guidance on this. A first possibility to use aid in order to minimize its negative macroeconomic impact is to use the stock of foreign currency to import goods and services. The main disadvantage of such a scenario is that the multiplier impact of government expenditure would be minimized.<sup>17</sup>Furthermore, if aid allows for massive imports of goods and services that are already produced locally, all the import-substitution industry will be affected, prices will decrease in this sector as compare to the non-tradable sector, and the real exchange rate will increase.

But if aid is used to import goods and service that used to be in the non-tradable sector, this will allow for a price decrease in the non-tradable sector, thereby decreasing the real exchange rate and improving the competitiveness of the economy. Agenor et al. (2004) show with their model which postulates that part of aid is food aid that this allows to maintain low domestic price, thereby avoiding real exchange rate increase. A government could use aid resource to recruit expatriate workers (nurses, doctors, building workers) to carry out many tasks.<sup>18</sup> Finally, the Government could also decide to import capital goods, which should raise domestic productivity. This has been the traditional argument for ODA.

Another possibility for the government is to invest aid resources in public services and infrastructure (roads, irrigation, electricity, schools, health centers), which will improve the competitiveness of the economy. The central hypothesis of the Dutch disease is the price increase in the non-tradable sector which cannot import to cope with the increase aid-induced demand. If investment can reduce bottlenecks in the economy and increase production in all the sectors, then the economy could meet the increase demand over time, and the exchange rate will come back to acceptable levels. In this line, some authors suggest that aid-financed public investments should be directed mainly to enhancing the productivity of the non-tradable sector. According to Adam and Bevan (2004), this is the most efficient option.

Aid can also be used to reduce taxation, to transfer resources to the private sector, to pay for domestic public debt. In these cases, Dutch disease effects would be minimized, because the public sector is typically assumed to have a higher propensity to consume domestically produced goods and services than the private sector (Bevan 2005). Then arises the question whether this type of investment is really a priority in very poor countries, from the point of view of the government as well as from that of donors.

Ideally, Aid should be mainly used to finance imports<sup>19</sup> of capital goods, that will be invest<sup>20</sup> in the non-tradable sector<sup>21</sup> of the economy, in order to increase its productivity and thereby, its productive capacity.

<sup>&</sup>lt;sup>17</sup> See McKinley (2005)

<sup>&</sup>lt;sup>18</sup> Voir Heller (2005)

<sup>&</sup>lt;sup>19</sup> Imports can limit domestic demand thereby limiting upward pressure on domestic prices in the short run.

<sup>&</sup>lt;sup>20</sup> Investment in general increases productive capacity of the economy.

<sup>21</sup> Investment in the non-tradable sector delivers the largest aggregate return to aid according to Adam and Bevan: This allows for a depreciation of the real exchange rate (due to a plenty supply of domestic goods), which fosters the competitiveness of the export sector. However, according to Agenor et al. it is not possible to posit that investing in infrastructure is more growth enhancing and poverty reducing than investing in social services. Then, it will certainly be wise to invest simultaneously in infrastructure and basic social services.

ANNEXES

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# **Macroeconomic Simulation Models**

#### Adam and Bevan model

The model, which is described in detail in Adam and Bevan (2004), is designed to capture the salient features of a typical 'poststabilization' African country. Thus it assumes that the economy produces basic food crops, export cash crops, manufactured goods (including non-traditional exports) and services. 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. Firms are assumed to be perfectly competitive, producing goods which can be sold to either the domestic or export markets. 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. It is a model of a small open economy enjoying no market power in world markets, either for its imports or exports, so that the terms of trade are independent of domestic policy choices.

The distributional consequences of aid and public expenditure are tracked though their impact on three different households. The first is a 'rural' household, which is primarily involved in food-crop agriculture (it owns the land and capital in this sector) but it also supplies unskilled labour to the cash crop sector. This household is outside the direct tax net, and has zero net savings. The second household is the 'urban unskilled' household whose only factor of production is unskilled labour which it supplies to the manufacturing, services and government sectors. It owns no capital or land, has zero (gross and) net savings, but in contrast to the rural household it does pay direct taxes. Finally the 'urban-skilled' household supplies skilled labour to the manufacturing, services and public sectors and owns the remainder of the land and capital in the economy. This household pays direct taxes to government, at a higher rate than the unskilled household, earns interest on its net holdings of government domestic debt, and has a non-zero but constant propensity to save out of disposable income.

The simulations 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 aid flow in the model is used exclusively to finance an increase in public infrastructure investment, and the simulations take the tax structure and the recurrent expenditure as given. A full set of experiments has been done, based on 5 assumptions, over a ten years period, and the trajectories of the main macroeconomic variables are analyzed.

- 6. Experiment 1: Public investment has no effect on private sector productivity;
- 7. Experiment 2 : Public investment does enhance private sector productivity uniformly across all sectors of the economy ;
- 8. Experiment 3 : Public investment does enhance private sector productivity, but disproportionately in the export sector;
- 9. Experiment 4 : Public investment does enhance private sector productivity, but disproportionately in the domestic sector;
- 10. As 4, with subsistence threshold for food.

For the different experiments, variants have been included:

- Variant a : The returns to infrastructure are high and the initial stock is far from its optimal value ;
- Variant b: Returns are low and the initial stock is close to its optimal value.

Finally, regarding variant b, 3 other sub-variants have been made: i) elasticity of manufacturing sector Total Productivity Factor (TPF) with respect to non-traditional export is 20%; ii) elasticity of manufacturing sector Total Productivity Factor (TPF) with respect to non-traditional export is  $45\%^{22}$ .; iii) this variant allows for infrastructure investment expenditure to augment the capital stock with a lag of 3 years rather than the one year lag assumed in the baseline experiments.

### **Results of the simulations**

Due to the high numbers of experiments done, we will only analyze the 5 that are the most relevant. The reader can revert to Adam and Bevan (2004) to have the full results.

#### **Experiment 1**

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. The aid flow obviously augments aggregate real income but has little initial impact on GDP. It does, however, lead to an appreciation of the real exchange rate, and a sizeable contraction in exports (in favor of higher production of domestic goods). This is the classic Dutch Disease effect (demand-side effect).

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<sup>23</sup> which, in turn, is underpinned by two features of the model. The first is the growth slowdown 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)<sup>24</sup>. 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.

Finally it is worth noting that in this simulation while total real income increases, rural households actually suffer a decline in their income. The principal reason for this outcome is that the demand effects from increased government expenditure (either capital or current) fall disproportionately on urban skilled and unskilled labor and on intermediate goods from the manufacturing and services sectors. Over the medium term, therefore, aid which delivers no supply side benefit does indeed act as a brake on economic growth et impoverishes the poorest.

## **Experiment 2**

In Experiment 2 government infrastructure investment raises private sector productivity uniformly across sectors. There is now a fairly substantial cumulative growth in GDP over the ten years, some improvement in the fiscal balance, and a marked increase in private investment. As a consequence, while the impact effects on the real exchange rate and on exports are very similar to experiment 1 in the short run, over the medium-term most of the real exchange rate appreciation

<sup>&</sup>lt;sup>22</sup> In order to include externalities in the model, it is assumed that non-traditional-exports sector performance is a function, during period t, among other things, of exports of the previous period, t-1. We then have learning by doing effect. The more there are exports in t-1, the more the non-traditional export sector will learn, and the more its productivity will be enhanced.

<sup>&</sup>lt;sup>23</sup> This reflects a decline in total savings as the fiscal balance deteriorates, which in turn reflects the adverse effects of the real exchange rate on the budget. Since government is a net seller of foreign exchange, the real exchange rate appreciation reduces the domestic value of the budget balance and therefore increases the domestic financing requirement.

<sup>&</sup>lt;sup>24</sup> The appreciation of the real exchange rate increases prices in the non-tradable sector as compared to the tradable sector. If capital formation is intensive in non-tradable service sub-sector, this means that capital costs in this sub-sector will follow prices' increase in the non-tradable sector, thereby inducing an increase in the cost of all capital goods in the economy.

has been reversed, but more importantly, even though the real exchange rate remains appreciated relative to its baseline value, the initial fall in exports is reversed, moving to an increase over the baseline by the end of the simulation.

While the impact effects on household incomes are the same as in the previous experiment, matters improve over time so that not only is total real income more higher over the long run but the previously poor and declining position of rural households has been reversed. Rural households enjoy an increase in real income over time in this experiment, even though their gain is appreciably lower than that of the urban households.

### **Experiment 3**

In experiment 3, the gains from the infrastructure are biased in favor of the export sector. In this case, once the effects of the public investment begin to be felt, the now higher returns to producing exports draw resources away from the non-tradable sector, thereby inducing a further appreciation of the real exchange rate. 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

Rural households benefit from a modest increase of their income, but less proportional than the global income increase, due to the fact that much of the demand-side effects of public investments accrue to urban households.

### **Experiment 4:**

When the productivity gain is biased towards the production of domestic goods, however, outcomes are markedly different. 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 high aid inflows and in fact shows depreciation in the medium term. This is the most favorable scenario, with the most favorable impact on export performance and GDP growth due to the beneficial effects of a weaker real exchange rate appreciation in the short-run which helps to suppress the overall cost structure for the export sector.

However, regarding income distribution, due to the public investment led output growth of non-tradable, 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.

The followings conclusions can be drawn from this model:

- 1. To fully assess Dutch disease effects, we need to consider medium to long term and take into account supply-side effects. A short term analysis (demand-side) cannot allow to fully assess all possible impacts ;
- 2. Dutch disease effects are fully verified only if aid has no impact on the productive capacity of the economy (experiment 1);
- 3. Public investment strategy that seeks to enhance productive capacity of the nontradable sector delivers the largest aggregate return to aid: the real exchange rate appreciation is reduced or reversed, with highest growth and investment, enhanced export performance (experiment 4). However, this scenario is the worse for rural households income in relative terms (rural households income increase compare to overall income increase), even though, in absolute terms, they gain more as compare to the other scenarios. A strategy based on this scenario will delivers the largest growth, but will increase inequality.

- 4. The less unfavorable scenario to rural households, in relative terms, is the investment strategy that seeks to enhance the productivity of the tradable sector (experiment 3). But beside experiment 1, this is the one where rural households are gaining the less in absolute terms. Hence, the recurrent debate on pro-poor growth: what is better? A growth where the poor are gaining more in absolute terms (but may gain less in relative terms (Ravallion)); or a growth where the poor are gaining more in relative terms (but may be losing in absolute terms (Kakwani)).
- 5. Experiment 2 (with public investment enhancing private sector productivity uniformly across all sectors of the economy) may be a credible alternative. It allows for reasonable economic performance while limiting the worsening of inequalities.

Even though this model is not perfect (and the authors do recognize that), it gives some indications regarding the main thrust of a possible investment strategy in response to a sharp increase of foreign assistance.

### Agenor, Bayraktar and El Aynaoui Model

These authors develop a macroeconomic framework that captures linkages between aid, public investment, growth, and poverty. Public investment is disaggregated into education, infrastructure, and health, and affects both aggregate supply and demand. Dutch disease effects are captured by accounting for changes in the relative price of domestic goods. The impact of policy shocks on poverty is assessed by linking the model to a household survey. The model is calibrated for Ethiopia and changes in the allocation of aid and public investment are simulated. The amount by which foreign aid should increase to reach the poverty targets of the Millennium Development Goals is also calculated.

The economy that is considered produces a single (composite) good that is imperfectly substitutable to an imported (composite) good. Domestic production requires land, educated labor, private capital, and public capital in health and infrastructure. All factor income accrues to a single, aggregate household that holds the totality of domestic public debt and receives interest payments on it. It pays taxes, as well as interest on its foreign debt, and receives unrequited transfers from abroad.

The government collects taxes (on income, imports, and domestic sales), and spends on goods and services (including for maintenance purposes). It also services its domestic and foreign debt, and invests in education, health, and infrastructure. It receives foreign assistance, which takes two forms: food aid and nonfood aid. Both components are treated as a source of revenue for the government, but in addition food aid is assumed sold on local markets at face value. The deficit is financed by domestic and foreign borrowing.

Four types of policy experiments have been done: changes in the level and composition of foreign aid (which imply also changes in the level of public investment), changes in the composition of public spending coupled with a reallocation of public investment (for a given level of foreign aid), and an evaluation of the level of aid needed by Ethiopia to achieve a 50 percent reduction in poverty between 2003 and 2015.

#### Experiment 1: Change in the level of foreign Aid

This experiment consists of a permanent increase in the aid-GDP ratio by one percentage point relative to the baseline scenario. This implies that both categories of aid increase in the same proportion, given that the shares of food and nonfood aid remain constant.

An important feature of this simulation is that Dutch disease effects do not materialize—not even in the short run. Because the increase in nonfood aid raises public investment, and thus private capital formation, the adverse effect of a rise in aggregate demand on prices is offset by the positive supply-side effects of the increase in public and private capital25. At the same time, the inflow of aid leads to a reduction in government foreign borrowing, which dampens the initial upward effect of the increase in foreign exchange supply on the nominal exchange rate. In effect, there is substitution between debt and non-debt creating capital inflows. The net effect is a reduction in domestic prices, a real depreciation, and a rise in exports. Higher domestic output in turn raises consumption spending and lowers poverty.

### **Experiment 2: Change in the composition of Foreign Aid**

The second experiment involves a change in the initial allocation of foreign aid between food and nonfood assistance. Specifically, it is assumed that the share of food (respectively nonfood) aid in total aid is changed permanently by 2 percentage points.

The results of this experiment show an increase in public investment which stimulates growth per capita. As a result of both the expansion in output and the increase in public capital in infrastructure, private investment rises over time, albeit by a small amount. Real disposable income increases also in the long run and poverty falls. Given the magnitude of the shock, it has relatively limited aggregate effects. Nevertheless, these results indicate that a large reallocation of aid could have potentially large effects on poverty.

## Experiment 3: Change in the composition of Public Spending and Investment

The third experiment involves a change in the composition of government spending, consisting of a 7 percent reduction in consumption expenditure, coupled with an offsetting increase in public investment, and accompanied by a reallocation of outlays involving an increase in investment in infrastructure that is twice as high as the increase in health and education. This experiment helps to illustrate a strategy that attaches more importance to public infrastructure as the "engine" of growth.

To the extent that changes in public consumption and investment tend to offset each other in the initial period, the net effect on output growth is negligible. However, in the intermediate run, because supply-side effects develop only gradually, the reduction in aggregate demand tends to dominate and to exert a downward effect on output. Real GDP per capita falls between the second and sixth periods. Over time, as the supply-side benefits associated with higher public investment start kicking in, output begins to grow, increasing in the long run by about 0.2 percentage points. The rate of growth of real private disposable income follows a similar pattern over time. Thus, the effect on poverty is fairly small, even though both health and education indicators improve

This experiment helps also to illustrate the need to be cautious in drawing too sharp a distinction between investment in "services" (that is, health and education) and investment in "growth" (that is, infrastructure). In the present framework, all three types of public investment have a direct effect on the supply side and therefore affect the rate of growth. At the same time, of course, all three categories of investment affect production in a different manner—with health and education affecting the "effective" supply of labor, and infrastructure affecting the marginal productivity of all inputs used in private production. The relative magnitude of these effects depends, among other things, on the nature of the production process, the education technology, and the efficiency with which health services are provided.

## **Experiment 4: Aid and Poverty Reduction Targets**

The last experiment involves calculating the level of aid necessary to induce a sharp reduction in poverty in Ethiopia between 2002 and 2015. To this end, 3 different hypotheses have been made:

<sup>&</sup>lt;sup>25</sup> L'accroissement de l'aide alimentaire permet d'accroître à court terme l'offre intérieure de biens, ce qui contribue à réduire les pressions inflationnistes intérieures.

**Hypothesis 4a**: A permanent increase of 5 percentage points of the aid-GDP ratio (equivalent increase of food and non food aid) could lead to a reduction in the proportion of poor by about 20 percentage points between 2002 and 2015. One of the main mechanisms, of course, is through an increase in public investment, which rises by about 5 percentage points (in terms of GDP) in the long run. The growth rates of real GDP per capita and disposable income follow an inverted U-shape pattern. Despite the sharp increase in aid, there is no evidence of a "Dutch disease" effect; in fact, the real exchange rate depreciates (because the increase in domestic supply puts downward pressure on domestic prices), leading to higher exports. Higher income and tax revenue lead to a lower budget deficit (despite the increase in spending), and a large drop in the external debt-GDP and debt service-exports ratio in the long run.

**Hypothesis 4b** : A permanent, 5 percentage point increase in total foreign assistance as a share of GDP that takes the form of an increase in nonfood aid only; because the effect on public investment is larger, the effects on the growth rates of output and disposable income per capita, as well as on private investment, are magnified. As a result, poverty drops by a much larger amount than in experiment 4a—between 28 and 29 percentage points.

**Hypothesis 4c** : Finally, instead of a permanent shock, one could ask if a "big push", taking the form of a sizable, but temporary, increase in (nonfood) foreign aid, would not lead to similar outcomes. They correspond to a temporary, 10 percentage point increase in the aid-GDP ratio over 5 years, allocated entirely to nonfood aid. A temporary but large increase in the flow of aid-financed public investment has a sizable effect on output and income growth. These effects persist for several years after the shock is reversed, because the supply-side effects of public investment are driven by stocks (which depreciate only slowly over time), not by flows. The reduction in the poverty rate, by 2015, is significant and similar in size to the results of 4b.

### **Conclusion of the Model**

- 1. From this model, and whatever experiment, the Dutch disease hypothesis is not verified, no matter the level and duration of Aid inflow.
- 2. The model shows the importance of the composition of Aid and Public investment. For a given level of aid, an increase in aid to finance public investment (to the detriment of food aid) has a positive effect on growth and income. Similarly, a reduction of current expenditure in favor of capital expenditure fosters growth. However, the model is inconclusive regarding whether investing in infrastructure is more growth enhancing and poverty reducing than investing in social services.
- 3. From the model it appears that due to the fact that part of the aid inflow comes as food aid that increases the domestic supply of goods, this allows avoiding Dutch disease symptoms even in the short run. In other words, one way to avoid Dutch Disease is to use part of foreign assistance to import goods and services that will complement domestic production thereby avoiding pressures on domestic prices.
- 4. Finally, this model shows that even in Ethiopia that is one of the poorest countries in the World, the target of halving poverty by 2015 is feasible, with a reasonable increase of ODA.