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IMMEDIATE ATTENTION

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November 20, 2008

To: Members of the Executive Board

From: The Secretary

Subject: **The Macroeconomics of Scaling-up Aid Scenarios—the Cases of Central African Republic, Rwanda, and Sierra Leone**

Attached for the **information** of the Executive Directors is a paper on the macroeconomics of scaling-up aid scenarios—the cases of the Central African Republic, Rwanda, and Sierra Leone. This paper has been prepared in response to a request from the UN. It is intended that this paper will be published on the Fund's external website after November 26, 2008.

The staff proposes to transmit the paper to the UN in time for the upcoming Doha Conference on Financing and Development to be held on November 29, 2008. If no objections are received by **noon on Tuesday, November 25, 2008**, the paper will be transmitted to the UN.

Questions may be referred to Mr.Berg (ext. 38843), in AFR.

This document will shortly be posted on the extranet, a secure website for the Executive Directors and member country authorities.

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THE MACROECONOMICS OF SCALING-UP AID SCENARIOS: THE CASES OF CENTRAL AFRICAN REPUBLIC, RWANDA, AND SIERRA LEONE

Prepared by staff of the African Department

Approved by the African Department

November 20, 2008

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OVERVIEW AND SUMMARY

The following three notes[1] assess the macroeconomic implications of the spending of scaled-up aid to the Central African Republic, Rwanda and Sierra Leone in line with that promised by the G-8 at Gleneagles, Scotland in 2005. These assessments are prepared in response to a request from the UN. Similar notes were recently prepared for Benin, Niger and Togo.

In September 2007, the UN Secretary General launched the Millennium Development Goals (MDG) Africa Steering and Working Groups. The Steering Group brings together the leaders of multilateral institutions to identify practical steps needed for Africa to achieve the MDGs. The Managing Director of the IMF is a member of the Steering Group. The Working Group supports the Steering Group and is comprised of thematic groups in education, agriculture, health, infrastructure and trade facilitation, statistics, aid predictability, and MDG operationalization at the country level.

In addition to being co-coordinator of the thematic group on aid predictability (along with the Development Assistance Committee of the Organization for Economic Cooperation and Development) the IMF is supporting the work of the thematic group on MDG operationalization at the country level. This group is leading the preparation of "Gleneagles aid scaling-up scenarios" in 10 country cases, and the IMF has been requested to provide macroeconomic assessments of these scenarios. In addition to Benin, the Central African Republic, Niger, Rwanda, Sierra Leone and Togo, similar work is planned for Ghana, Liberia, Tanzania, and Zambia. The objective is to see if a dramatic boost in aid, promised at the G-8 Gleneagles Summit, can help countries meet the MDGs.

The scaling-up scenarios are based on sector-level analyses and spending plans by the country authorities. The UNDP, World Bank, and African Development Bank worked closely with country authorities in developing the spending plans. Fund staff are using a new state of the art model to analyze the effects of increased aid on key macroeconomic variables, such as real growth, inflation, the exchange rate, and the current account balance, and to assess the implications of different policy choices. The approach relies on a dynamic stochastic general equilibrium model (DSGE), with nominal rigidities, microeconomic foundations and multiple sectors.[2] This model is suited to address both short term demand-led issues and medium term implications (on capital accumulation and productivity) of aid expenditures. Given the current state of knowledge about macroeconomic relationships in

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[1] The principal authors of the notes are M. Pietri, N. Kinoshita, T. Hitakatsu and M. Zejan (Central African Republic); N. Toé and K. Kalonji (Sierra Leone); Z. Murgasova and S. Kaendera (Rwanda). J. Gottschalk and R. Portillo provided analytical support to the teams.

[2] See Berg, Andrew, Tokhir Mirzoev, Rafael Portillo and Felipe Zanna, "Large aid flows and monetary policy in a DSGE model: the case of Uganda" IMF Working Paper (forthcoming).

African countries, staff believe it is fruitful to use and compare different models, and previous work indicates that the assessment is robust to the different models. [3]

In addition to the common methodology, these assessments make similar assumptions about the grant element of additional aid. In particular, it is assumed that all of the additional aid is in the form of grants, and that no additional debt is created as a result of the scaling up. If that were not the case, debt sustainability considerations could arise, particularly if the aid is not used productively and its impact on growth is minimal.[4]

There are many caveats to this analysis. There is considerably uncertainty regarding many aspects of the methodology. Concerning the choice of parameters in the model—the calibration—efforts have been made to draw from the empirical evidence to the extent possible. Unfortunately, empirical studies that can help with the calibration are not common, as there are severe data limitations, and many assumptions need to be made. Also, countries in the region are undergoing rapid structural change and many of the parameters that describe key relationships in these economies may be changing. Finally, there may be channels of transmission that are relevant to Africa but are not well captured by the model that is used. For all these reasons, the results must be interpreted with caution.

The main conclusions of the studies are as follows:

The Central African Republic

- Meeting the Gleneagles commitment would require a scaling up of aid of 13 percent of GDP (approximately) over the next few years.
- These additional aid inflows would have a large impact on GDP growth—on account of higher investment in much needed public infrastructure and its positive impact on private sector investment—and would exert some short-term pressures on inflation and cause a real exchange rate appreciation.
- There are risks that the growth impact of additional aid inflows could be constrained by limited absorptive and administrative capacity and an underdeveloped private sector.

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[3] See Farah, Sacerdoti and Salinas, (forthcoming), "The Macroeconomic Impact of Scaling Up Aid: The Case of Niger", for a traditional IMF model. That model was used for assessing Scaling-Up scenarios for Benin and Niger. In the case of Benin, the two models were used and the overall findings were robust to the model.

[4] The Benin and Niger notes considered alternative assumptions about the grant element of aid to assess the impact on debt sustainability.

Rwanda

- Rwanda has already experienced a significant and consistent rise in aid flows during previous periods and the extra aid simulated under the Gleneagles scenario is very modest. The additional aid—about one percent of GDP—would not lead to significant macroeconomic challenges.

Sierra Leone

- The increase in aid required to meet the Gleneagles target amounts to an increase in aid disbursements of 15 percent of GDP over the next few years.
- The impact on GDP growth would be considerable as higher public investment would boost productivity and encourage greater private investment. The nominal and real exchange rate would appreciate as a result of higher aid inflows, but its impact on the export sector would be offset by higher returns to private investment. The nominal appreciation would contribute to lower inflation.
- The impact on growth might be constrained if Sierra Leone's limited absorptive and administrative capacity is not addressed. This reinforces the importance of a sustained implementation of the government's structural reform agenda.

CENTRAL AFRICAN REPUBLIC

This note assesses the macroeconomic implications for the Central African Republic (C.A.R.) that would result from realizing the Gleneagles commitment to increase aid to poor countries over the next three years to reach 85 dollars per capita by 2010 and keep it at that level thereafter ("the Gleneagles scenario"). A quantitative assessment is provided using a simulation analysis based on a dynamic stochastic general equilibrium (DSGE) model. The model predicts that such an increase in aid would have a significant effect on the C.A.R.'s economy, by considerably boosting economic growth and GDP per capita. While inflation would rise and the real exchange rate would appreciate in the short run, the adverse impact on the tradable sector should be relatively limited. The positive growth response is explained by the significant impact of higher aid on the accumulation of public and private capital, reinforcing the recent economic recovery after several years of political instability and deteriorating living standards. The numerical simulations must be interpreted with some caution: there are considerable data limitations for the C.A.R. and risks that the growth impact of additional aid inflows could be constrained by limited absorptive and administrative capacity and an underdeveloped private sector.

1. **This note assesses the macroeconomic implications for the C.A.R. of increasing aid over the next three years to reach $85 per capita by 2010 and keeping it at that level thereafter in line with the Gleneagles commitment by donors**. It focuses on how additional aid can be accommodated while safeguarding macroeconomic stability, and speeding up progress toward the MDGs. It does not, however, assess the likelihood of the C.A.R. reaching the MDGs by 2015 with the additional aid.

2. **A more stable political and security situation and prudent macroeconomic policies were instrumental in the recent recovery of economic activity in the C.A.R.**[1] After decades of political instability and severe deterioration of living standards, the C.A.R. has recently entered a period of economic recovery and reengagement with the international community. In light of the progress on economic reforms, on December 22, 2006, the IMF Executive Board approved a three-year PRGF arrangement. The C.A.R. reached the decision point for the enhanced Heavily Indebted Poor Countries (HIPC) Initiative in September 2007.

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[1] For the purpose of the simulation analysis, the impact of the food and petroleum price increases is not reflected in the steady-state scenario which assumes an absence of large exogenous shocks. Economic growth reached 4.2 percent in 2007 and is projected to fall to 3.5 percent in 2008 before recovering to 4.5 percent in 2009. Inflation is projected to accelerate to about 8.6 percent on average in 2008, largely reflecting the pass-through from world food and oil price increases, but is projected to decrease to around 5 percent in 2009. In contrast, for the simulation analysis, the steady-state real GDP growth and inflation rates are set at 5 percent and 2 percent, respectively.

3. **The Gleneagles scenario would imply a significant boost in foreign assistance to the C.A.R.** Foreign assistance in terms of grants and concessional loans is still very low by regional standards, at CFAF 33 billion (4 percent of GDP) in 2007. The C.A.R.'s poverty reduction strategy paper (PRSP), prepared in mid-2007, presents both a prudent scenario based on past tendencies with a limited impact on poverty reduction and a dynamic scenario which assumes financing of $1.5 billion from external sources over a period of 3 years (about 24 percent of GDP per year). The amount of aid under Gleneagles scenario would fall in between these two scenarios, reaching 16.8 percent of GDP in 2010 and giving a substantial enhancement to poverty reduction.

4. **Economic and social conditions in the C.A.R. clearly justify a scaling up of aid to make progress towards the Millennium Development Goals.**[2] The recent IMF and World Bank Joint Staff Advisory Note (IMF Country Report No. 08/12) concurs that achieving the objectives in the PRSP will be challenging given the ongoing regional and domestic security issues, as well as the capacity and financial constraints facing the C.A.R. The successful implementation of the poverty reduction strategy will heavily depend on scaled-up aid inflows and technical assistance across a broad range of areas. The challenge of reducing poverty in the C.A.R. is pressing, as 67 percent of the population lived below the national poverty line in 2003. The Gleneagles commitments to substantially increase aid by 2010, together with continued macroeconomic stability, a further acceleration of growth, and a strengthening of public finance management, thus represent a significant opportunity to eradicate extreme poverty and improve living standards.

5. **The macroeconomic consequences of the Gleneagles scenario are analyzed in a DSGE model**. The model uses certain economic parameters and steady-state values for key macroeconomic variables, which were estimated in line with the latest macroeconomic indicators.[3] The model simulates the impact of a large and persistent increase in foreign aid (grants) in line with Gleneagles commitments, and makes the following assumptions:

- Annual aid inflows increase to 16.8 percent of GDP in 2010 (compared to a steady-state level of 4 percent of GDP), and decline gradually to 11 percent of GDP after 20 years;

- Government spending increases by the same amount as the increase in aid, though with a lag of some six months (reflecting some capacity constraints in implementing higher spending). It is assumed that (i) 70 percent of additional spending is on public

[2] The spending plans jointly developed by the UNDP and the C.A.R. authorities indicate that a larger amount would be required to help the country achieve the MDGs than the Gleneagles commitments. In their estimates, about half of the additional spending should be allocated to infrastructure investment and about one third to health and education.

[3] The steady state variables are provided in Table 1. The model is described in the Appendix.

investment and 30 percent on public consumption; (iii) out of all public investment projects, 70 percent are efficient and would add to the public capital stock, while the remaining 30 percent would not. The implications of limited administrative capacity to manage such a large public investment program are analyzed in an alternative scenario.

- The C.A.R. is under the fixed exchange regime with euro (CFA franc zone), and the model assumes that the price level of foreign country is exogenously given. In this case, the appreciation of the real exchange rate derives mostly from the changes in the price level of non-tradable goods in the C.A.R..

6. **The model predicts a significant reallocation of resources in response to the aid increase (Figures 1 and 2)**. Specifically:

- The increase in aid-financed government spending, about two-thirds of which is allocated to non-traded goods (Figure 1), leads to an increase in demand for domestic and imported goods and services.

- Higher demand for non-traded goods leads to an increase in prices in this sector, which—through higher wages and profitability—helps to attract factors from the tradable sector (Figure 2). The increase in prices in the non-traded sector is large (more than 10 percent), with overall inflation rising at the same rate. Inflation peaks at about 12 percent in the first year, but rapidly falls back to the steady-state level of 2 percent. The real exchange rate, measured as the relative price of tradable and non-tradable goods, appreciates noticeably, which is a key element in the transmission mechanism of shifting resources from the tradable to the non-tradable sector.[4] Non-traded production is projected to increase by about 6 percent in the first two years, whereas output in the tradable sector contracts.

- Aid is almost fully absorbed (that is, spent on higher imports), with a minor time lag between the inflow of aid and the actual imports. This reflects the assumption that additional income earned in the non-traded private sector is ultimately spent on imports, rather than saved.

- The appreciation of the real exchange rate would moderately reduce production in the tradable sector in the short term. Nevertheless, production in the sector recovers over the medium term and surpasses its previous steady state level on account of strong

[4] The price elasticity of imports and exports to the real exchange rate helps determine the required real appreciation in the model in response to the increase in aid. The price elasticity of import is set to 1.5. While there is no parameter in the model that directly captures the price elasticity of exports, the reduced form elasticity is close to 1.2.

investment financed and induced by scaled up aid. Output could increase further if foreign aid boosts total factor productivity, which the model assumes exogenous. Productivity could theoretically decline if aid is not used efficiently and Dutch disease effects dominate; however, staff considers this to be less likely.

7. **The model also predicts that a permanent large increase in aid would have a substantial positive impact on growth and a permanent improvement in per capita GDP**.[5] In particular, GDP growth would accelerate in the first four years. In the Gleneagles scenario, the positive impact of higher aid on the accumulation of public and private capital is relatively large, given the C.A.R.'s low starting point with seriously deteriorated capital stock. Specifically, government investment could rise by 250 percent in the first two years while private investment would decline initially because disinvestment in the tradable sector would offsetting investment in the non-tradable sector, but after about three years private investment would increase strongly.

8. **Simulation results are subject to considerable uncertainties arising from data limitations and the features of the C.A.R. economy—limited absorptive capacity, weak public institutions, and poor business and regulatory environment**:

- Possible diversion of aid to unproductive government consumption: Because of limited administrative capacity and weak public finance management, additional aid could be diverted to unproductive government consumption or investment.[6] In those cases, the rate of capital accumulation may be less than predicted in the model.

- Delays in project execution: Limited government capacity may result in a longer delay in the use of aid for spending and absorption than is assumed in the simulation, leading to an accumulation of international reserves and reducing the positive impact of aid on growth and per capita GDP.

- Capital outflows: Higher aid may lead to significant capital outflows, especially given the C.A.R.'s relatively poor business environment. If returns to private capital are very low or risky, the private sector could end up using the foreign currency proceeds from aid to accumulate foreign assets, rather than import much needed capital goods. This could reduce the positive impact of aid on private investment and growth.

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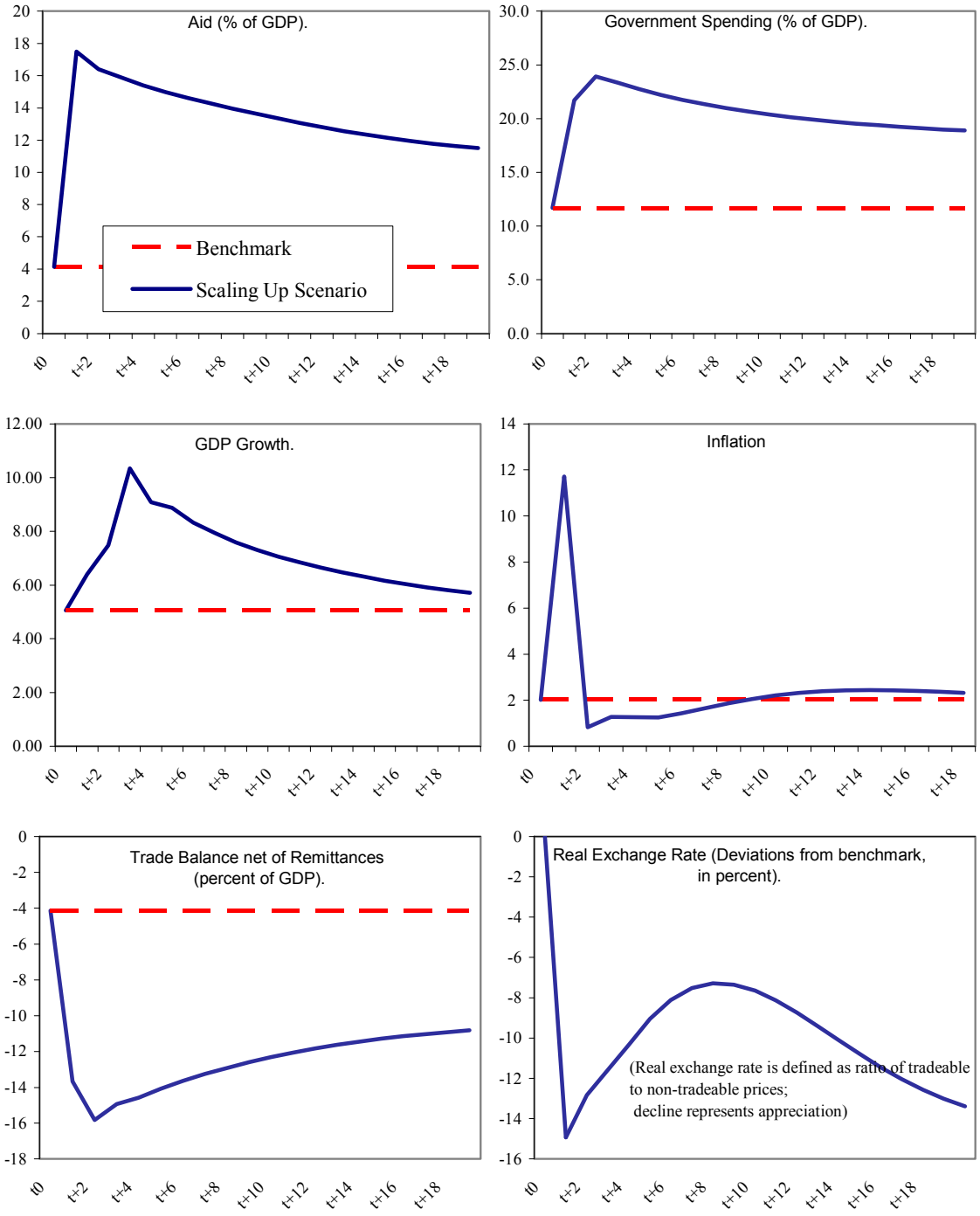
[5] If the aid scaling-up is only temporary, the growth impact would be much limited because of a lower level of public capital which would also lead to a slower accumulation of private capital.

[6] For example, if increased aid was used only to increase civil servant salaries in real terms rather than expanding employment in the health and education sectors, it would likely be unproductive. However, some increase in real wages would likely be necessary to attract additional teachers and health workers.

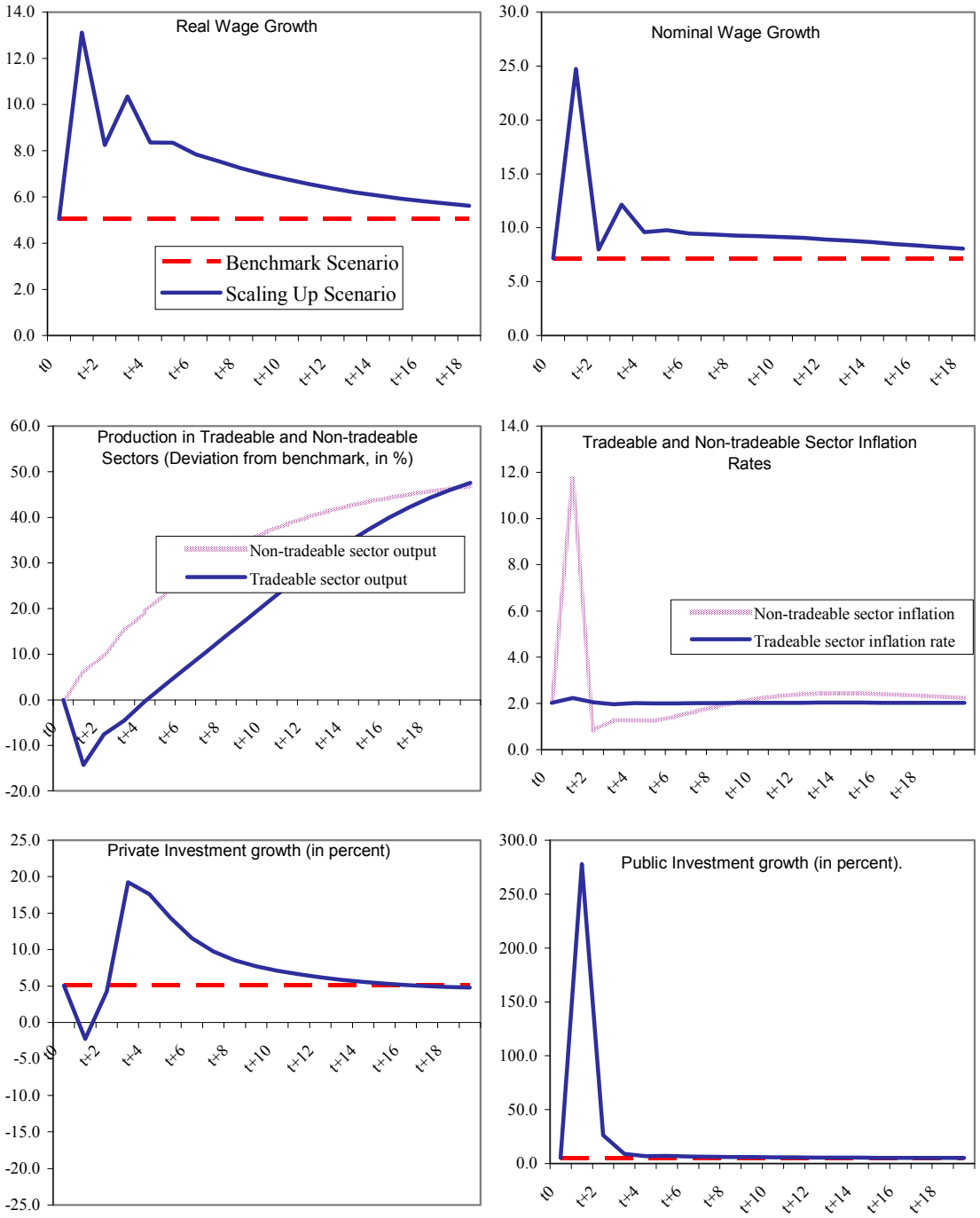
Figure 1. Central African Republic: Scaling Up Scenario 1/



Source: Fund staff estimates.

1/ Results are in percent unless otherwise indicated, and the time period is annual.

Figure 2. Central African Republic: Scaling Up Scenario



Source: Fund staff estimates

- Skills shortages and supply rigidities: Given skill shortages, depleted infrastructure, and a poor business environment, the supply response to the aid-financed increase in demand for non-traded goods and services may be much weaker than the model assumes. In this case, wages would be pushed up, while the impact on investment growth may be limited.

- Model uncertainty: The quantitative projections are highly uncertain. In particular, they reflect a number of difficult-to-verify assumptions and weak data. The most notable in the context of these scaling up scenarios is the assumption regarding the productivity of public investment.

- Effects of other reforms: The simulated growth rates do not take into account the effect of productivity increases that could arise from improvements in the management of public finances and the implementation of structural reforms.

9. **To address these uncertainties, additional simulations were conducted under alternative assumptions to assess two distinct downside risks**. The first alternative scenario illustrates the impact of limited administrative capacity to manage a large public investment program, stemming from weak public finance management (PFM). Under this scenario, it is assumed that public spending has a limited impact on public capital (equal to half of the previous effect). This can be the case if a large fraction of aid ends up being consumed rather than invested or if public investment projects are inefficient. Under the second scenario, it is assumed that investment is unproductive as in the first alternative scenario and, in addition, that the temporary contraction in exports, that follows from the real appreciation, leads to a persistent decline in productivity in that sector (leading to a similar phenomenon to what is commonly referred to as Dutch Disease). Figure 3 displays the implications for GDP per capita growth under these alternative scenarios. On average, annual GDP growth is 0.5 percent lower if public spending is 50 percent less productive, and an additional 0.3 percent lower if there are also persistent effects from output losses on productivity. In that case, GDP per capita growth would be even less than without additional aid; an extreme but theoretically possible scenario that illustrates the need for aid to be used effectively.

Figure 3. Central African Republic: Alternative Scenario for Growth Impact of Aid Scaling-up

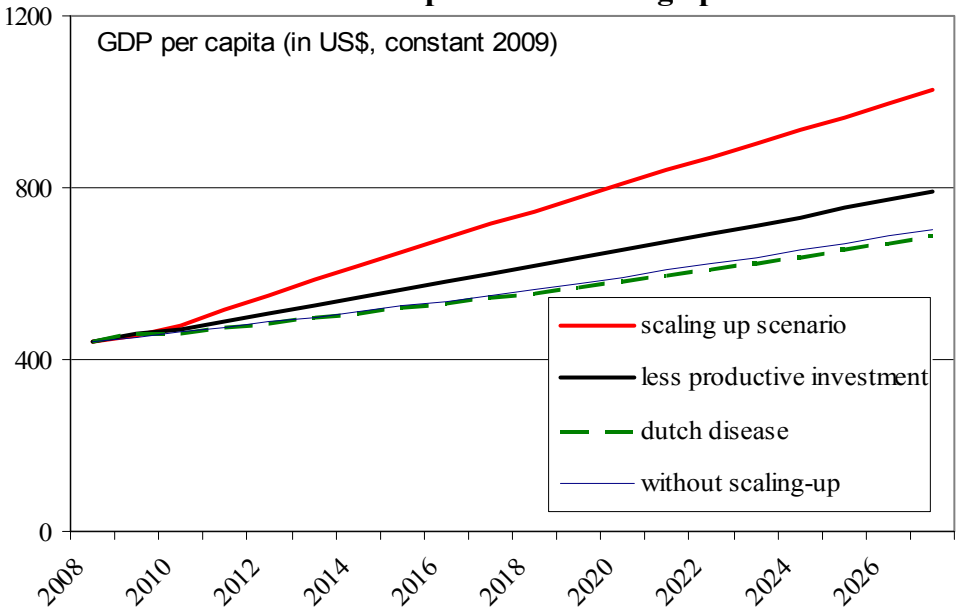


Table 1. Central African Republic: Macroeconomic Variables
(Steady-state values; in percent of GDP, unless otherwise specified)

National income accounts

Consumption	86.0
Traded sector	28.0
Non-Traded sector	58.0
Private investment	11.9
Traded sector	3.9
Non-traded sector	8.0
Government Spending	11.0
Government consumption	8.0
Government investment	3.0
Government spending on traded goods	3.8
Government spending on non-traded goods	7.2
Trade Balance	-9.2
Exports	14.0
Imports	23.2

Value added in the non-traded sector	75.0
Value added in the domestic traded sector	25.0

Government accounts

Primary spending	11.5
Taxes	7.3
Aid	4.1
Interest payments	0.1
Government debt	23.0

Central bank accounts

Government debt held by the central bank	9.5
Government deposits at the central bank	0.2
Net foreign assets (international reserves)	3.9

Financial assets

Real money balances (base money/broad money)	13.2
Foreign assets held by the private sector	1.8
Government bonds held by the private sector	13.5

Other variables (in percent change)

Annualized inflation (depreciation of nominal exchange rate)	2.0
Real GDP growth	5.0

RWANDA

This note examines the potential macroeconomic impact of scaling up of aid to Rwanda consistent with the G8 Gleneagles declaration. The analysis, generated through a dynamic stochastic general equilibrium (DSGE) model, suggests that the scaling up would not lead to significant macroeconomic challenges because Rwanda has already experienced a significant and consistent rise in aid flows during previous periods and the extra aid simulated under the Gleneagles scenario is very modest.

I. BACKGROUND

1. **Rwanda has made a remarkable progress in many areas, but continues to face challenges.** Since the late 1990s, Rwanda has embarked on ambitious programs of macroeconomic reform and poverty reduction fostered by political and social stability. To guide the development effort, Rwanda launched the first Poverty Reduction Strategy Paper in 2002, as a useful framework for development planning, poverty reduction, and sustaining high economic growth. While objectives for growth and macroeconomic stability have been largely achieved,[1] progress in poverty reduction has been slow. The 2007 United Nations Human Development Index ranks Rwanda low, 161 among 177 countries; and a recent Integrated Living Conditions Survey, showed that close to 60 percent of households lived below the poverty line in 2005/06. Looking forward, high and sustained growth rates and strong policy coordination are required to reduce the poverty count, in turn requiring substantial investments in infrastructure and human capital.

II. THE GLENEAGLES SCENARIO

2. **A scaling up of aid to Rwanda under the Gleneagles commitments would imply an increase in aid flows of about 1 percent of GDP between 2008 and 2010.** Rwanda has been receiving increasing support from its development partners in the recent past due to the country's commitment to economic reforms and the heightened attention to addressing poverty. Almost 50 percent of budget spending between 2004 and 2007 was financed by aid.[2] In 2008, aid flows are projected to reach 15.8 percent of GDP (US$634 million) financing

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[1] The effect of the rising food and petroleum prices is not incorporated in the macroeconomic framework because the ratios underlying the analysis represent a *steady state scenario* (without the large exogenous shock). Economic growth reached 6 percent in 2007 and is projected to stay at or above this level in 2008. Largely reflecting the pass-through from world food and oil prices, inflation is projected to accelerate to about 15 percent on average in 2008, but is expected to return to single digits in late 2009. In contrast, in this scenario inflation in 2008 is assumed to remain at 9 percent (average).

[2] This includes both direct budget support and aid tied to projects, but excludes aid disbursed directly to non-governmental organizations. Hence the aid inflows are smaller in this scenario than what is reported by OECD-DAC with the main difference stemming from the exclusion of aid disbursements outside the government, and differences in accounting for project aid between the government and donors.

about 55 percent of the budget spending and equivalent to $67 per capita. Additional assistance under the Gleneagles scenario would maintain aid at about 15.8 percent of GDP in 2009 and raise it to 16.7 percent of GDP in 2010, equivalent to $845 million or $85 per capita.[3]

3. **The macroeconomic consequences of the Gleneagles aid increase are analyzed in a DSGE model.** The model assumes that (i) all aid is spent;[4] (ii) the Rwanda franc remains fixed against the US dollar in nominal terms (broadly in line with the exchange rate developments over the past year)[5]; (iii) resources are allocated efficiently; and (iv) aid has differing impact on GDP based on its use (public investment versus public consumption)**.** The model is calibrated at a quarterly frequency and the choice of some parameters and steady state policy variables—broadly in line with the revised budget for 2008—are presented in Table 1.

4. **The simulations suggest that a scaling up of aid to $85 per capita does not induce major policy challenges.** While the model suggests that the aid flows would generate some reallocation in resources from the traded to nontradable sector, the impact on inflation, the real exchange rate and growth is short lived and modest, reflecting essentially the relatively low amount of additional aid needed to reach the Gleneagles commitment (an additional $18 per capita between 2008 and 2010).

- *There is a positive relationship between higher spending financed by the aid flows and real exchange rate appreciation.* Higher domestic government spending associated with the increase in aid boosts aggregate demand, in particular, in the nontradable sector. The corresponding price increase for nontradables leads to a real appreciation, an increase in the current account deficit, and a reallocation of factors from the tradable to the nontradable sector. These outcomes are needed to maximize

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[3] To reach the $85 per capita, aid flows are expected to increase by 33 percent in nominal US dollar terms between 2008 and 2010. With a cumulative population growth of 5 percent during this period, aid per capita increases by 27 percent. However, the scaling up is relatively muted in GDP terms (increase by 1 percentage point of GDP) reflecting a high growth in nominal GDP (and a constant exchange rate assumption—a continuation of current policies).

[4] *Spending* refers to the widening in the government fiscal deficit net of aid that is associated with an increase in aid, while *absorption* is the extent to which the non-aid current account deficit widens in response to an increase in aid inflows. Most of the spent aid is absorbed. It captures both the direct and indirect increase in imports financed by aid, i.e., direct purchases of imports by the government, as well as second-round increases in net imports resulting from aid-driven increases in government or private expenditures. The higher demand for imports by the private sector is induced by the appreciation of the real exchange rate (the real exchange rate appreciation in the scenario described in this note takes place through an increase in domestic prices).

[5] The assumption on the exchange rate regime does not take into account the changing external environment and focuses exclusively on the impact of higher aid in a steady state environment.

the gains from higher aid: (i) without the shift in resources from the tradable to the nontradable sector it would not be possible to meet the demand for nontradables by the government and scaled-up spending programs could not be implemented; (ii) the real exchange rate appreciation is the transmission mechanism that facilitates this reallocation of factors, and (iii) the higher current account deficit does not pose a balance of payments problem, because it is financed through the additional aid inflows. Nonetheless, the overall price response and the real exchange rate appreciation are relatively muted, given the small size of the scaling up.

- *The price increase is quickly mitigated by the supply response of the nontradable sector.* Reduced profitability (and higher costs) in the tradable sector leads to a reallocation of resources to the nontradables sector.

- *The growth impact is modest*. The growth response in the short term reflects the ability to draw, at a higher price, on unutilized capacity to increase output, but in the longer term higher production in the nontradable sector is offset by a decline in the tradable sector.

5. **The mechanism for real appreciation would vary depending on the exchange rate regime.** The central bank's foreign exchange intervention in this case is largely dictated by the need to support the stable exchange rate regime. The degree of absorption of the aid reflects the import component of aid-related fiscal spending and possible second-round effects from the fiscal stimulus. The real exchange rate appreciation takes place through higher prices. In a flexible exchange rate regime, the central bank would sell more foreign exchange to sterilize the excess liquidity associated with the aid, causing a nominal (and real) exchange rate appreciation and minimizing the inflation impact.

6. **The analysis suggests that additional spending from the aid flows would help maintain Rwanda on a sustained path of economic development.** Donor flows so far have provided room for an increase in government spending in the provision of social services and investment, allowing Rwanda to implement its poverty reduction strategy. A sudden reversal in aid could generate macroeconomic management problems: it could be difficult to reduce budget outlays that had been financed by aid and pressures to increase domestic financing could arise. Moreover, if aid were to fall, investment would be curtailed, having a negative impact on growth.

7. **The scaling up scenario illustrates possible medium-term macroeconomic outcomes and should not be viewed as a forecast of the impact of higher aid flows to Rwanda**[6]. Aid would have a differing impact depending on the policy environment and the

[6] The simulation discussed in this note focuses primarily on a steady state scenario that assumes a continuation of current policies.

structure of the economy at a particular time. In this regard, a few caveats in interpreting the results are needed. Possible factors that could bias the result include:

- *The policy environment and composition of spending.* The impact of aid flows on the real exchange rate depends on (i) the allocation of aid among current—with a higher propensity to consume domestically produced goods—and capital spending (higher investment particularly on infrastructure can raise productivity and growth); (ii) the import component of the spending (a higher import component put less pressure on domestic demand and inflation and delivers the real resource transfer needed to boost productivity); and (iii) the degree of coordination between monetary and fiscal policies on sterilizing the liquidity impact of the foreign inflows (the smaller the import component of fiscal spending, the large the foreign currency sales of the central bank should be to maintain the same level of inflation).

- *Sectoral bottlenecks and limited absorptive and administrative capacity that hinders implementation and management of a large public investment program*. The analysis assumes that the pace of structural reforms will continue to address any significant bottlenecks in the economy that could jeopardize the effective use of the additional aid. A slowdown in these reforms would result in a much weaker outcome than presented here. Limited government capacity could also delay or even impede the use of aid and reduce the positive impact of aid.

- *There is the risk that the impact on the real exchange rate could have a negative and persistent effect on the export sector's competitiveness*, along the lines of what is often referred as "Dutch disease." The risk is minor, however, given the moderate real appreciation.

- *Lack of country specific parameters generates model uncertainties.* Some of the assumptions used are derived from data from the broader literature. Most notable in the context of this scaling up scenario, the assumption regarding the productivity of public investment is an average from cross country studies.

III. Some Considerations on the Experience with Scaling Up in Rwanda

8. **Recent initiatives by the international community to scale up aid to Rwanda have facilitated an expansion in public service delivery, but they have also given rise to macroeconomic challenges.** In the event aid is scaled up, Rwanda is encouraged to front-load public capital spending (which are import-intensive) to address the infrastructure gap and induce a supply response in the economy. Additionally, Rwanda should continue to put in place sectoral strategies that focus on raising productivity and removing barriers to development in order to improve growth prospects.

9. **Strengthening the public expenditure management has remained a priority to ensure accountability and transparency.** The recent episode of scaling up has reaffirmed

the importance of accelerating reforms to address weaknesses in designing multi-year spending programs (MTEFs) to align spending with medium-term goals. It has also highlighted the need to continue strengthening institutions, and capacity building in the public sector—even more important with the ongoing decentralization program—to effectively execute budgets and improve the quality of spending in an environment of high aid flows.

10. **Allocation of aid to the most efficient use requires a greater understanding of the impact of aid-financed spending on poverty and growth.** Decisions on the composition of spending also entail more emphasis on identifying and costing of priorities in the PRSP, establishing a clear link between the annual fiscal budget, the MTEF and poverty reduction, and developing outcome indicators to gauge the impact of different spending programs on policy goals.

11. **Donors play a critical role in determining the path of fiscal spending in Rwanda.** Donors will continue to play a pivotal role in ensuring that Rwanda does not become vulnerable in the medium term to aid shortfalls which might be difficult to finance domestically, even if temporary.

12. **The model suggests a negligible effect on inflation, particularly as the starting position is one of macroeconomic stability.** However, in reality inflation in 2008 is well above the long-term target, partly due to the exogenous shock arising from world food and fuel prices. To accommodate scaling up of aid in these circumstances, it would be important to ensure that macroeconomic policies and exchange rate flexibility in particular are in line with the objective of restoring single-digit inflation.

13. **Achieving Rwanda's development objectives would require substantially higher scaling up of aid.** Costing of MDGs done by the authorities in the preparation of their Economic Development and Poverty Reduction Strategy (EDPRS) suggests that $190 is needed for achieving the MDGs. The scaling up of aid to $85 per capita in this exercise falls short of this requirement.[7]

[7] Rwanda's MDG costings were summarized in the paper prepared by the Government of Rwanda on "Scaling up Opportunities for Rwanda", presented at the UN High Level Meeting on African Development Needs in Yew York, October 2008.

Table 1. Steady State Values

National Income accounts (as a share of GDP)

Consumption	81.5
Private investment	12.5
Traded sector	5.5
Non-traded sector	7.0
Government Spending	28.3
Government consumption	17.0
Government investment	11.3
Government spending on traded goods	11.3
Government spending on non-traded goods	17.0
Trade Balance	-22.3
Exports	9.5
Imports	31.8

Value added in the non-traded sector	67.8
Value added in the domestic traded sector	32.2

Government accounts (as a share of GDP)

Spending (net of interest)	28.3
Taxes	13.2
Aid	15.8
Seignoriage	0.0
Interest payments	0.7
Government debt	11.5
Held by the central bank	2.0
Government deposits at the central bank	5.5

Central Bank Accounts

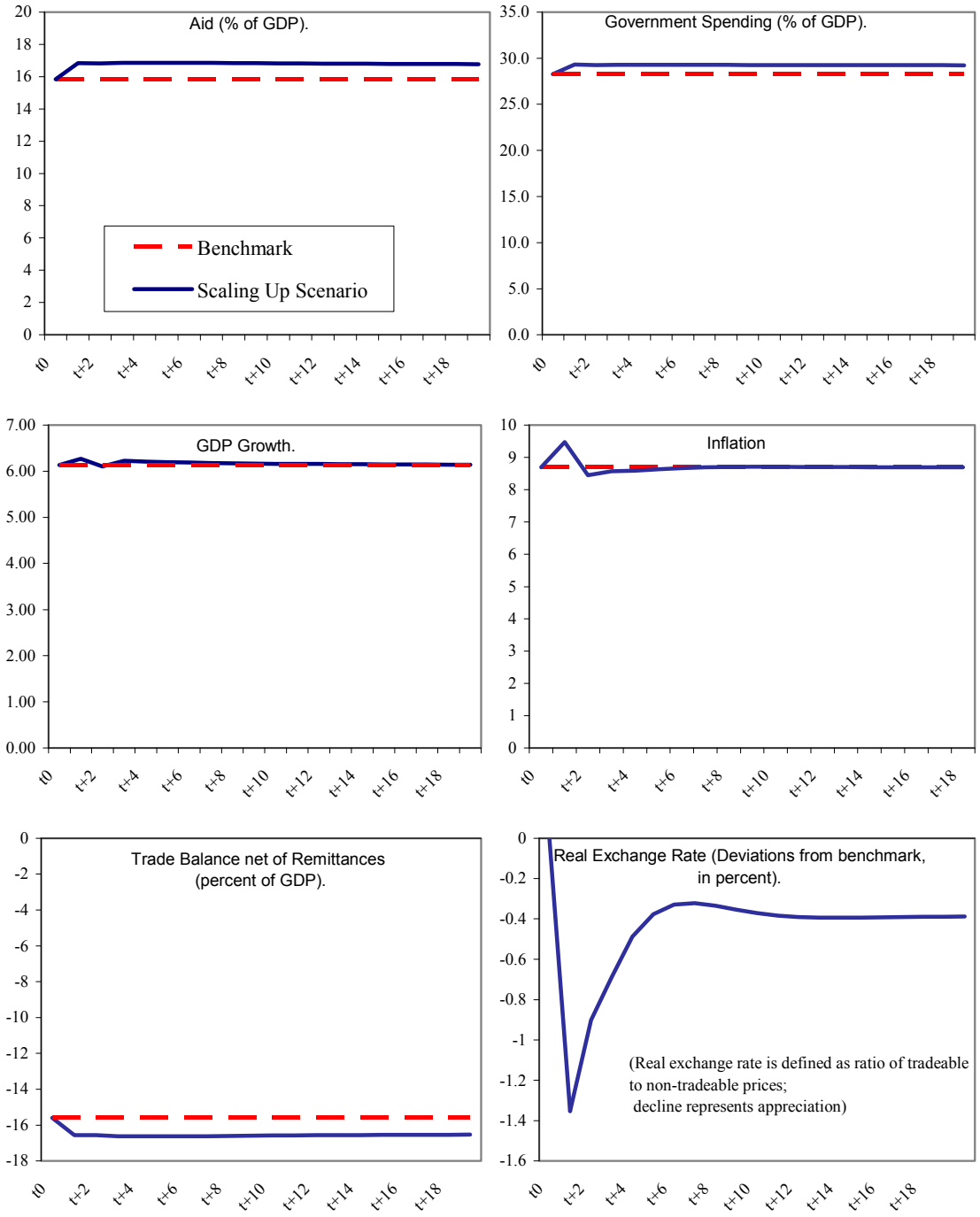
Government debt held by the Central Bank	2.0
Government deposits at the Central Bank	5.5
Net Foreign Assets (Reserves)	13.2

Assets (as a share of GDP)

Real money Balances (Base money/Broad money)	9.7
Foreign assets held by the private sector	3.5
Government bonds held by the private sector	9.5

Annualized Inflation, nominal depreciation	8.7
Real GDP growth (in percent)	6.0

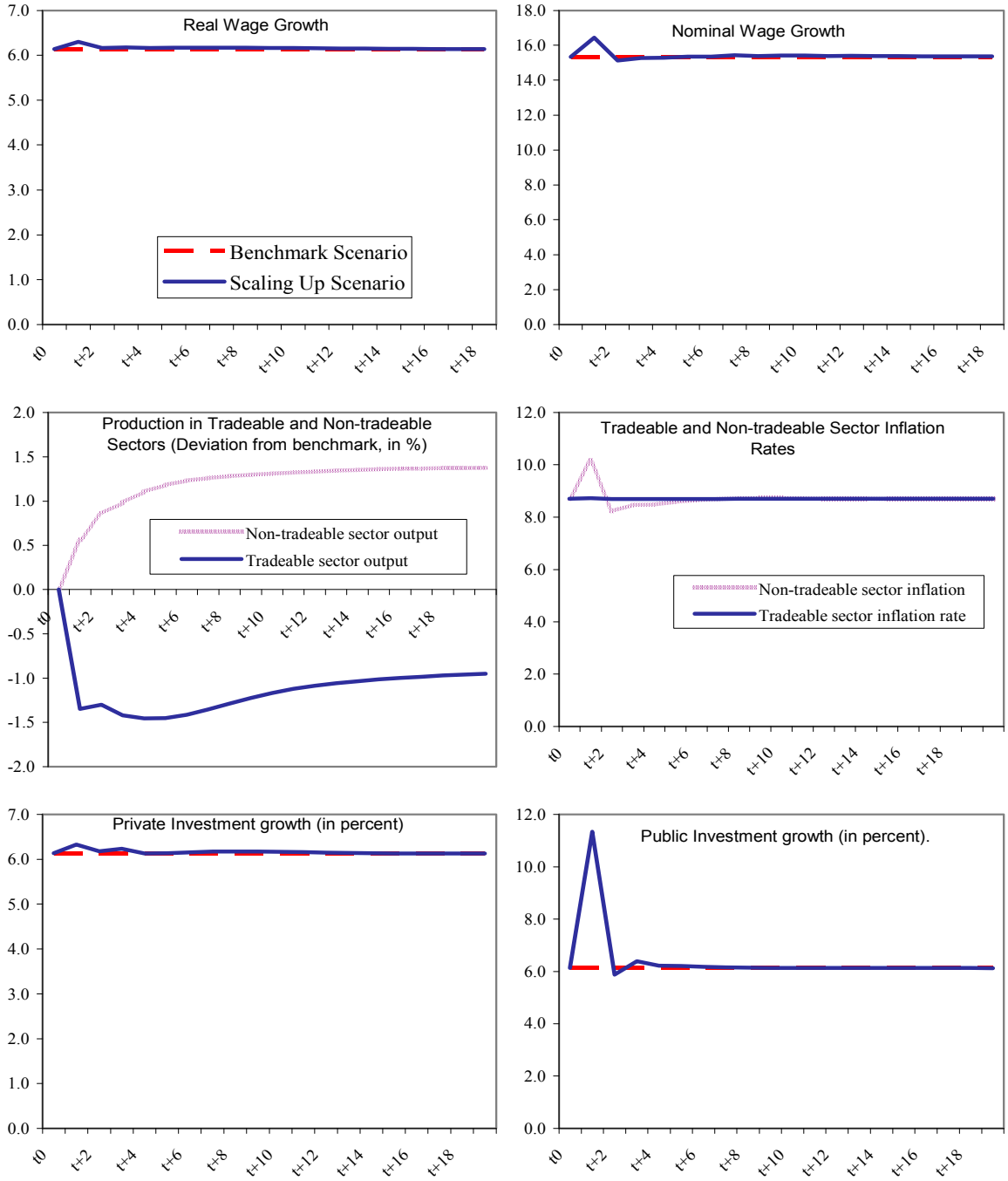
Figure 1. Rwanda: Scaling Up Scenario 1/



Source: Fund staff estimates.

1/ Results are in percent unless otherwise indicated, and the time period is annual.

Figure 2. Rwanda: Scaling Up Scenario



Source: Fund staff estimates

SIERRA LEONE

This note assesses the macroeconomic implications of a scaling up of foreign aid as envisaged under the Gleaneagles commitments, using a dynamic stochastic general equilibrium (DSGE) model. The analysis shows that the increase in aid will have a significant positive impact on output growth and per capita GDP, without major and lasting negative effects on macroeconomic stability. The results of the simulation must be interpreted with some caution, however, given the uncertainty regarding key macroeconomic relationships in Sierra Leone. There are also risks that the impact on growth might be constrained if Sierra Leone's limited absorptive and administrative capacity is not addressed. This reinforces the importance of a sustained implementation of the government's structural reform agenda.

1. **Since the end of the war in 2002, the government of Sierra Leone has restored macroeconomic stability and made important progress in implementing its structural reform agenda**. Debt relief under the enhanced HIPC and MDRI Initiatives at end-2006 has bolstered the economic outlook. Fund-supported programs have helped the authorities' efforts at achieving macroeconomic stability and implementing a reform agenda aimed notably at enhancing governance and transparency in order to lay the groundwork for scaled up aid inflows to support the achievement of the Millennium Development Goals (MDGs). Real GDP growth has rebounded strongly (averaging close to 8 percent per annum over the last five years) but inflation has remained in the double digits for most of the post-conflict period, fueled by supply factors and more recently, by the spike in global food and oil prices.[1] International reserves are at comfortable levels (around 4 months of import coverage).

2. **Despite robust growth rates since the end of the civil conflict in 2002, Sierra Leone's main economic indicators continue to lag behind the average for sub-Saharan Africa.** The country is listed at the bottom of the United Nations Human Development Index and 57 percent of its population lives below the poverty line of $1 a day. The authorities are making efforts to significantly increase the low domestic revenue base in order to create the necessary fiscal space to combat poverty, nevertheless, the dependence on foreign assistance remain high.

3. **To achieve the level of aid per capita prescribed under the Gleneagles commitment, foreign aid to Sierra Leone will need to more than triple from its current**

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[1] Following high rates of output growth during the post-conflict recovery period, real GDP growth is projected to decelerate to 5.5 percent in 2008 (from 6.4 percent in 2007) as result of the impact of the global food and fuel crisis. It is expect to rebound to 6.5 percent per annum in the medium term before stabilizing around 6 percent at the steady state. Average inflation is expected to revert to single digits by 2010 and is projected at 9 percent at the steady state.

levels, by 2010. Aid inflows are projected at 7.4 percent of GDP in 2008, equivalent to $29 per person. Under the Gleneagles scenario, foreign assistance will need to increase to 22 percent of GDP by 2010 in order to reach the nominal target of $85 per capita.

4. **A DGSE model is used to analyze the macroeconomic impact of the Gleneagles scenario** (see model description in Appendix 1). The model makes some assumptions with regards to economic parameters and steady-state values of key macroeconomic variables (Table1) in line with the latest IMF staff projections. It simulates the impact of a permanent increase in foreign aid (grants) as per the Gleneagles commitments under the following assumptions:

- Aid inflows shoot up to 22 percent of GDP (from 7.3 percent of GDP in the steady-state) before declining progressively to about 18 percent of GDP annually within a 20-year period.

- Government spending increases rapidly by 12 percentage points to reach over 40 percent of GDP after a one-year lag due to delays in implementation of the higher spending given administrative capacity constraints.

- Government spends 60 percent of the increased expenditure on imported goods and services against 40 percent at the steady-state before the scaling up of aid.

- About 80 percent of the additional aid is assumed to be invested in public capital, compared to the current share of about 60 percent. In addition, in line with assumptions for other countries participating in this exercise, it is assumed that 70 percent of all public investment projects are efficient, while the remaining 30 percent will not lead to an increase in public capital. The decade-long conflict has significantly depleted the country's physical infrastructure and thus, the increased capital investment is expected to have a strong positive impact on growth.

- There is full absorption of the increase in aid, i.e., the foreign currency proceeds associated with the higher aid that are not directly spent by the government on imports are made available to the private sector. There is no increase in international reserves as a result of the scaling-up.

5. **The scaling up of aid is projected to have the following macroeconomic implications (Figures 1 and 2):**

- The current account deficit will widen by about 12 percent of GDP. The higher current account deficit is sustainable given that it is entirely financed by the additional aid inflows.

- The appreciation of the nominal exchange rate resulting from the sale of the foreign exchange from the additional external aid, will lead to a real exchange rate

appreciation as domestic prices decrease. The magnitude of the real exchange rate appreciation would be relatively moderate due to the significant share of the additional aid spent directly on imports.

- With aid being fully absorbed (current account deficit widening in line with the increase in aid), pressure on the overall CPI will be small. The appreciation of the exchange rate will result in lower import prices which in turn will pass-through to the overall CPI. This will lead to a quick decline in overall inflation. Over time inflation would revert to its projected long run level (see Table 1).

- Within the first two years, aid is assumed to be spent efficiently and the productivity of government spending will result in a significant accumulation of public capital. As the stock of public capital rises, so does the productivity of private capital, leading to a sustained increase in private capital over a period of 6 years. Output growth starts to increase after two years as a result, peaking at 10 percent (from a steady-state rate of 6 percent) before gradually returning to the steady-state rate.

- Higher public capital expenditure, of which a large portion is directed to investment in physical infrastructure, will boost production in the non-tradeable sector. The real exchange rate appreciation will temporarily reduce production in the tradeable sector. However, in the medium term, production in the tradeable sector will recover and eventually surpass its previous steady-state level as exports pick up following the increase in factor productivity. Note that the loss of competitiveness resulting from the real exchange rate appreciation is expected to be offset by the higher productivity that is associated with a higher public capital stock.

6. **There are downside risks to this scenario, particularly given Sierra Leone's limited absorptive and administrative capacity.** It is therefore important to be cautious in interpreting the model results as several assumptions must hold true. Hence the following caveats should be taken into consideration:

- The model assumes that the Sierra Leonean economy is able to absorb the significant increase in aid as the continuous implementation of the structural reform agenda eliminates any significant bottlenecks in the economy which could jeopardize the effective use of the scaled up aid resources. However, delays in the implementation of public financial management (PFM) reforms could hamper the productivity of public spending with the part of the additional aid being diverted to government consumption leading to a lower rate of capital accumulation than predicted in the model.

- Additionally, limited administrative capacity to manage a large public investment program could lead to delays in project execution resulting in an accumulation of

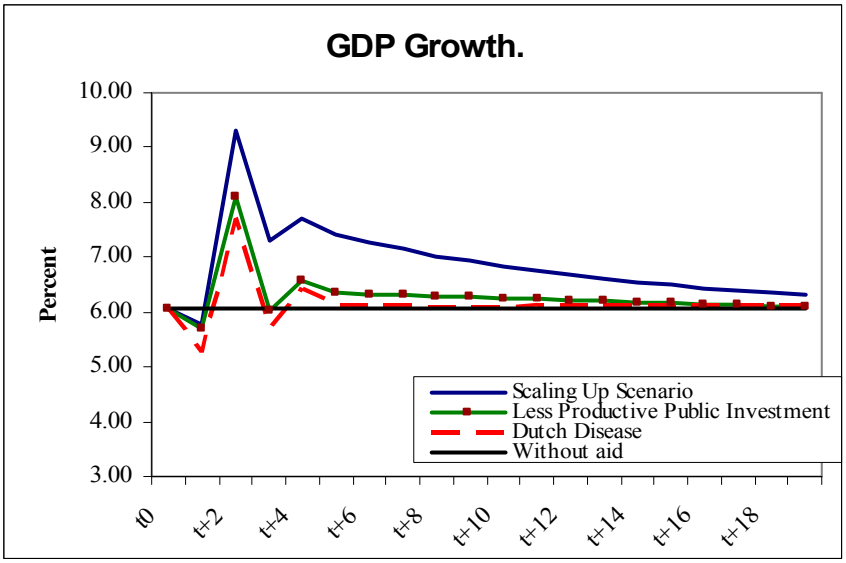
reserves, constraining aggregate demand and thereby limiting the impact of the additional aid on real GDP growth.

- If a significant part of the increased government expenditure is spent on domestically produced goods rather than imports, this would put significant pressures on domestic demand and thus on inflation.

- Given the weak business environment,[2] higher aid could lead to massive capital outflows. If returns to private capital are low or subject to considerable risk, private sector agents might opt to use the foreign currency proceeds from aid to accumulate foreign assets instead of importing capital goods, reducing the positive impact of aid on private investment and output growth.

- The weak business environment coupled with shortages in human capital and the poor state of infrastructure (in particular electricity supply and transportation network), could result in a weaker supply response to the increased demand for non-traded goods and services than envisaged under the model.

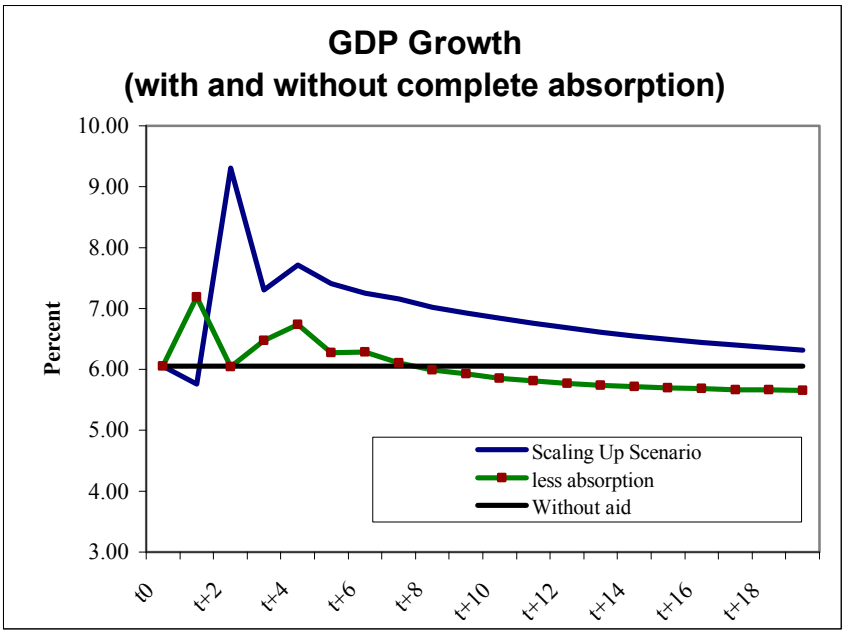
- The model results are uncertain as they are often based on assumptions derived from the literature and on sometimes, unreliable data for Sierra Leone. In particular, the key assumption regarding the productivity of public investment is derived as an average of cross-country studies.



[2] According to the World Bank's 2008 *Doing Business* report, Sierra Leone ranks 156 out of 181 countries on the overall ease of doing business.

7. **In light of some of the above-mentioned uncertainties, the model is simulated under alternative assumptions to assess two particular downside risks.** Firstly, public spending is assumed to result in a lower accumulation of public capital (equal to half of the previous effect). This would be the case if a large portion of the aid is wasted or consumed rather than invested or if public investment projects are inefficient. Secondly, the temporary exports contraction resulting from the real exchange rate appreciation is now assumed to lead to a persistent decline in productivity in that sector—a phenomenon commonly referred to as *Dutch Disease*. The figure above shows the impact on real GDP per capita from these alternative scenarios. On average, annual GDP growth is 0.6 percent lower when public spending is 50 percent less productive and 0.7 percent lower when there are persistent effects from output losses on productivity.

8. **Finally, an insight from this analysis is that absorbing aid (i.e., allowing the additional aid to finance higher imports) is important for maximizing the benefits from the scaling up**. Aid absorption allows the private sector to import much needed capital goods, thereby amplifying the positive impact of aid on growth. If the additional aid is not fully absorbed, such as in the case where the central bank does not sell all the foreign exchange resulting from foreign aid, and assuming a near complete sterilization of the foreign reserve accumulation, the resulting rise in interest rates would crowd out private sector investment and greatly reduce the medium term growth impact (see the figure below).[3]



[3] The simulation with less absorption assumes that about 40 percent of the aid is not absorbed, and that 80 percent of the resulting increase in international reserves is sterilized.

Table 1. Sierra Leone: Steady State Values

National Income accounts (as a share of GDP)

Consumption	80.3
Private investment	13.8
Traded sector	6.5
Non-traded sector	7.2
Government Spending	28.3
Government consumption	17.0
Government investment	11.3
Government spending on traded goods	11.1
Government spending on non-traded goods	17.2
Trade Balance	-22.3
Exports	9.1
Imports	31.5

Value added in the non-traded sector	70.3
Value added in the domestic traded sector	29.7

Government accounts (as a share of GDP)

Spending (net of interest)	28.3
Taxes	21.1
Aid	7.3
Seignoriage	0.0
Interest payments	0.1
Government debt	21.1
Held by the central bank	11.2
Government deposits at the central bank	1.7

Central Bank Accounts

Government debt held by the Central Bank	11.2
Government deposits at the Central Bank	1.7
Net Foreign Assets (Reserves)	10.7

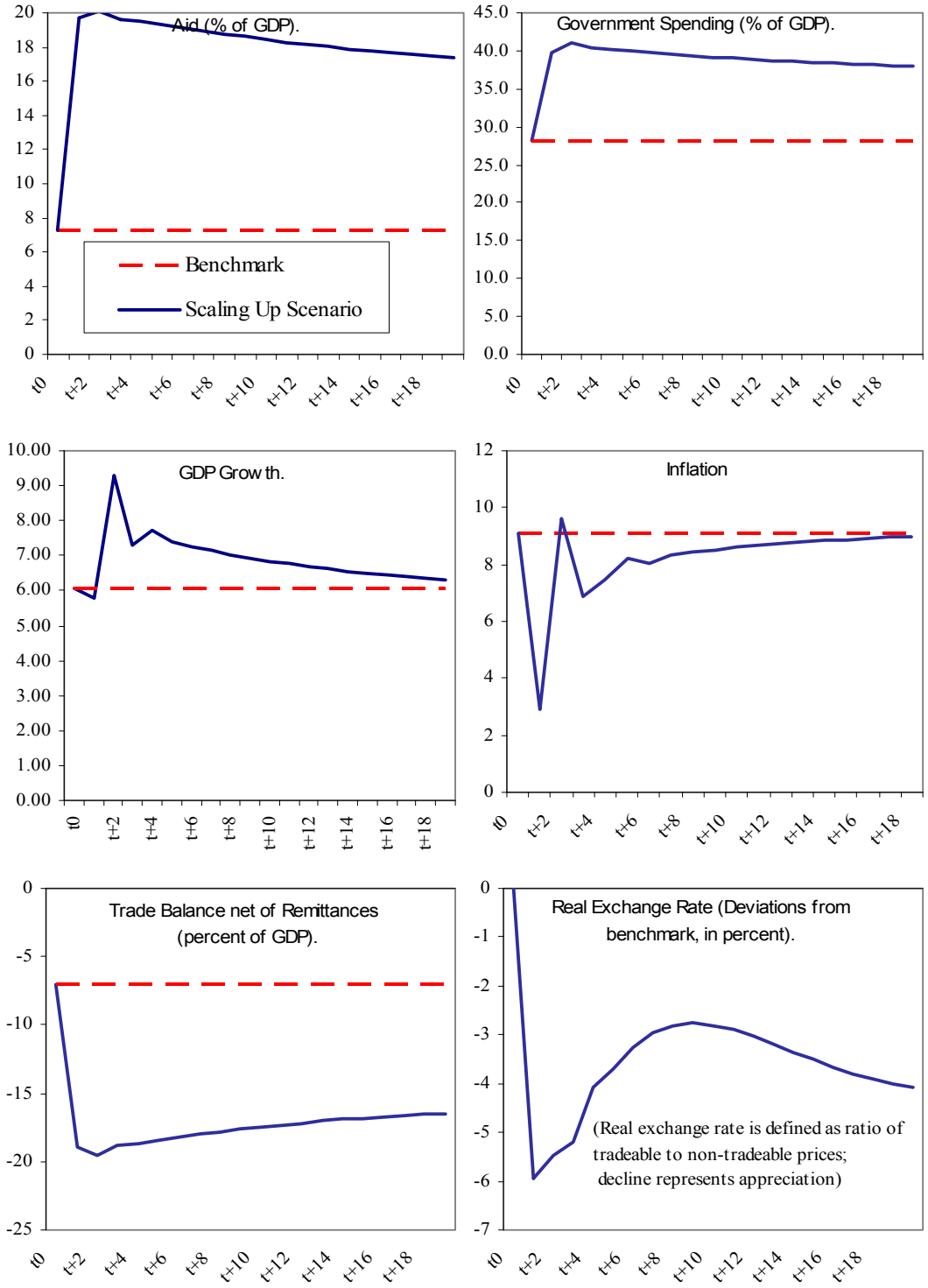
Assets (as a share of GDP)

Real money Balances (Base money/Broad money)	20.2
Foreign assets held by the private sector	3.7
Government bonds held by the private sector	9.9

Annualized Inflation, nominal depreciation	9.1
Real GDP growth (in percent)	6.1

Source: Fund staff estimates.

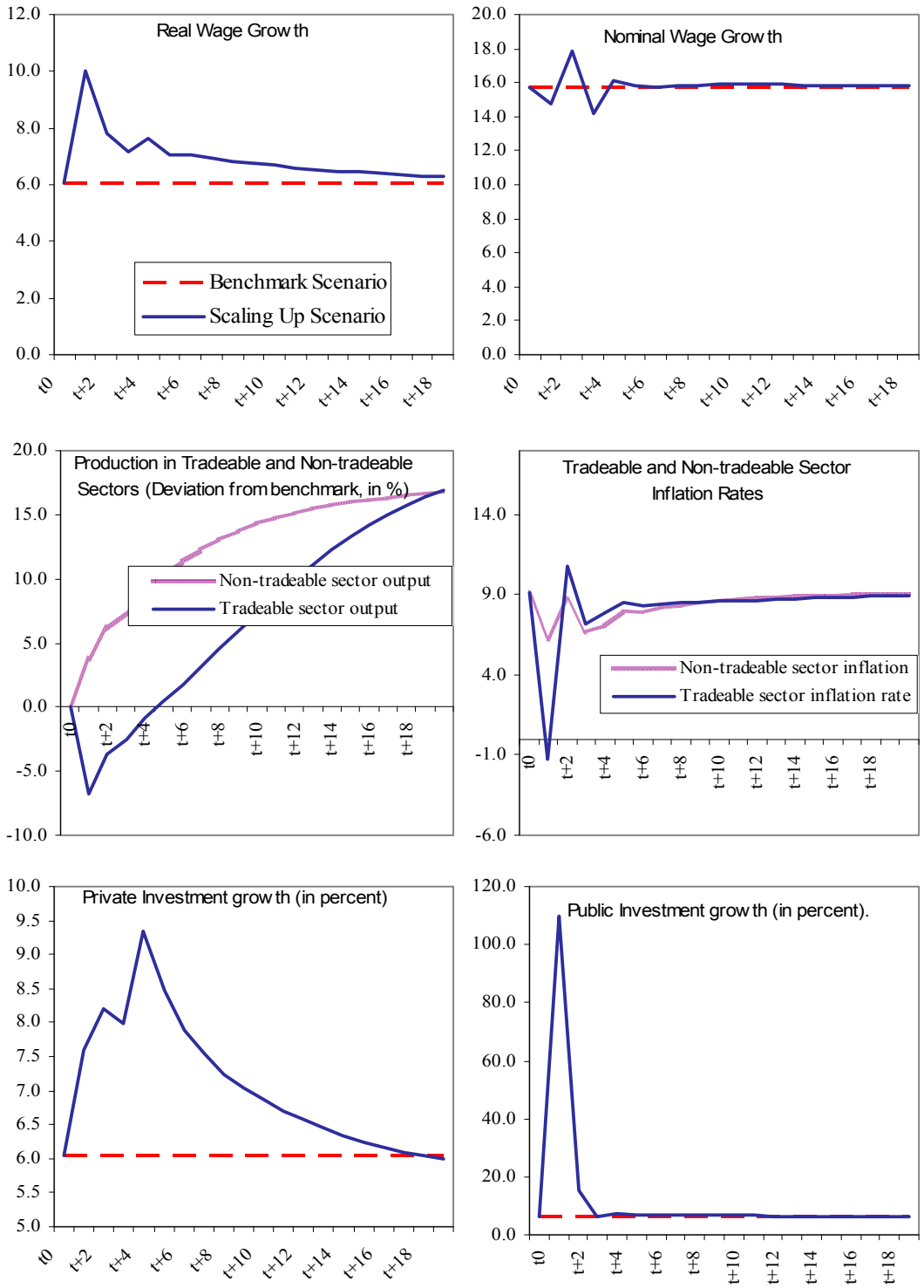
Figure 1. Sierra Leone: Scaling Up Scenario 1/



Source: Fund staff estimates.

1/ Results are in percent unless otherwise indicated, and the time period is annual.

Figure 2. Sierra Leone: Scaling Up Scenario



Source: Fund staff estimates

Appendix I. The DSGE model

The model represents a small open economy model, with multiple sectors (exportables, non-traded and imports) and economic agents (firms, households, a government and a central bank). It can be summarized as follows:

- Consumers/workers decide how much labor to supply, make savings decision, invest in different types of financial assets (domestic government debt, foreign assets and money) and allocate consumption between different goods (non-traded, exportables and imports).

- Firms in different sectors must decide the optimal amount of labor to hire, how much real investment to undertake, and how to set prices. Firms in the non-traded sector are subject to price adjustment costs, which leads to a new-Keynesian Phillips curve for non-traded goods inflation. Firms in the exporting sector are exposed to potential learning by doing effects, which imply that a temporary contraction in exports—resulting from a real exchange rate depreciation—can have near-permanent effects (a similar phenomenon to what is commonly referred to as "Dutch Disease").

- There is a single labor market, where firms from both traded and non-traded sectors interact with workers to determine wages and employment. Wage setting is also subject to adjustment costs.

- The government must choose how to allocate the aid transfer between public savings, consumption or investment and whether to spend on local goods and services or imports. The government also taxes labor income and receives seignoriage revenue from the central bank.

- Additional features include limited international capital mobility and steady state growth.

The output of the model is a sequence of all macroeconomic variables (prices and quantities, real and nominal variables) which clears all markets for goods, factors and financial assets over time. For more details, see Berg, Andrew, Tokhir Mirzoev, Rafael Portillo and Felipe Zanna, "Large aid flows and monetary policy in a DSGE model: the case of Uganda" IMF Working Paper (forthcoming).