July 2007
IMF Country Report No. 07/239

Republic of Madagascar: Selected Issues

This Selected Issues paper for the Republic of Madagascar was prepared by a staff team of the International Monetary Fund as background documentation for the periodic consultation with the member country. It is based on the information available at the time it was completed on June 12, 2007. The views expressed in this document are those of the staff team and do not necessarily reflect the views of the government of the Republic of Madagascar or the Executive Board of the IMF.

The policy of publication of staff reports and other documents by the IMF allows for the deletion of market-sensitive information.

To assist the IMF in evaluating the publication policy, reader comments are invited and may be sent by e-mail to publicationpolicy@imf.org.

Copies of this report are available to the public from

International Monetary Fund ● Publication Services
700 19th Street, N.W. ● Washington, D.C. 20431
Telephone: (202) 623 7430 ● Telefax: (202) 623 7201
E-mail: publications@imf.org ● Internet: http://www.imf.org

Price: $18.00 a copy

International Monetary Fund
Washington, D.C.

INTERNATIONAL MONETARY FUND

REPUBLIC OF MADAGASCAR

Selected Issues

Prepared by a staff team consisting of Brian Ames (head), Mark Ellyne, Christian Josz (all AFR), and Jean-Jacques Hallaert (PDR)

Approved by African Department

June 12, 2007

Contents Page

MADAGASCAR: BASIC DATA

Area: 581,540 square kilometers
Population
  Total: 18.6 million (2005)
  Growth rate: 2.7 percent (2005)
GDP per capita (*2000 U.S. dollars*): US$233 (2005)

	2001	2002	2003	2004	2005	2006
National accounts			(Billions of Ariary)			
GDP at current prices	5,968.6	6,008.4	6,778.6	8,155.6	10,743.7	17,573.8
GDP at constant 1984 prices	494.3	431.6	473.9	498.8	521.7	547.2
			(Annual percentage change)			
GDP at market prices	6.0	-12.7	9.8	5.3	4.6	4.9
Primary sector (at factor cost)	4.0	-1.3	1.3	3.1	2.5	2.1
Secondary sector (at factor cost)	7.5	-20.7	14.5	6.5	3.0	3.7
Tertiary sector (at factor cost)	6.6	-15.8	13.1	6.0	5.7	6.5
			(Percentage of GDP)			
Consumption	84.7	92.3	98.2	88.9	91.6	86.4
Gross domestic investment	18.5	14.3	3.6	27.5	22.5	24.8
Gross domestic savings	15.3	7.7	1.8	11.1	8.4	13.6
Current account balance [1]	-1.3	-6.0	-6.0	-8.0	-10.9	-8.8
Price movements			(Annual percentage change)			
GDP deflator	7.3	15.3	2.8	14.3	18.4	11.3
Consumer price index (traditional basket) [2]	4.8	13.4	-0.8	27.0	14.3	10.9
Government finance			(Percentage of GDP)			
Total revenue and grants [3]	14.0	10.2	15.4	20.3	16.7	18.0
Current expenditure	10.3	10.3	11.4	12.6	11.0	11.1
Capital expenditure	7.3	4.8	7.8	12.5	10.3	10.3
Net domestic financing	1.9	2.4	1.8	-1.0	0.5	-2.5
Of which: domestic banks (net)	1.6	2.4	0.1	-2.6	-1.1	-3.0
Overall deficit, commitment basis, excluding grants (deficit -)	-8.2	-7.7	-9.3	-13.1	-10.4	-10.3
Overall balance on a cash basis, including grants (deficit -) [3]	-4.4	-6.2	-4.8	-5.7	-4.3	-3.8
Money and credit						
Foreign assets (net)	5.6	7.2	7.3	10.9	9.2	13.4
Domestic credit						
Claims on the government (net)	4.6	4.6	4.6	4.6	4.6	4.6
Claims on the economy	9.5	9.5	8.9	10.2	10.0	10.3
Broad money	22.1	23.3	21.9	21.6	18.3	19.5

Source: Malagasy authorities.

MADAGASCAR: BASIC DATA (CONTINUTED)

	2001	2002	2003	2004	2005	2006
	(Annual percentage change)					
Domestic credit						
Claims on the government (net)	-12.0	96.7	13.7	-34.1	-27.5	-120.7
Claims on the economy	18.5	0.4	6.4	38.2	21.1	20.4
Broad money	24.4	7.1	8.2	23.8	3.1	25.6
Balance of payments	(Millions of SDRs, unless otherwise specified)					
Exports, f.o.b.	757.9	375.0	672.8	673.2	579.9	662.3
Imports, f.o.b	-746.3	-465.5	-808.8	-969.2	-981.7	-1034.0
Trade balance	11.6	-90.5	-136.0	-296.0	-401.8	-371.7
Services (net)	-125.9	-134.3	-215.2	-141.0	-79.6	-47.9
Income	-46.7	-53.5	-57.0	-53.5	-53.0	-54.5
Of which: interest payments due	-44.4	-47.3	-42.7	-43.4	-33.9	-19.3
Current transfers (net)	114.6	74.2	216.5	222.7	163.6	145.4
Private transfers (net)	89.7	68.0	114.4	109.9	120.0	99.0
Public transfers (net)	24.9	6.2	102.1	112.8	43.6	46.4
Current account balance						
Percent of GDP [3]	-1.3	-6.0	-4.9	-9.1	-10.9	-8.8
Capital and financial account	65.9	105.1	165.3	230.1	311.4	487.8
Of which: government drawings	90.2	120.3	121.0	203.9	179.8	181.8
government amortization [4]	-68.7	-72.1	-73.4	-68.2	-60.2	-37.3
foreign direct investment	73.1	6.4	9.1	35.7	58.0	150.5
Overall balance	19.6	-99.0	-26.4	-37.7	-59.5	159.2
Debt relief and cancellation	55.8	57.5	47.8	43.7	34.2	14.5
IMF (net)	21.4	8.6	5.9	29.5	3.1	-129.4
Reserves (net) (increase -)	-98.3	31.4	-17.8	-35.5	22.2	-44.2
Gross official reserves [5]	3.3	4.1	2.7	2.8	2.9	3.0
Outstanding external debt (percent of GDP)	87.5	92.7	83.2	79.9	69.7	28.8
Exchange rates (period averages)						
Ariary per SDR	1678.2	1754.9	1734.8	2772.1	2958.8	3146.2
Ariary per U.S. dollar	1318.3	1318.5	1240.6	1870.9	2005.7	2142.3

Source: Malagasy authorities.

[1] Including official transfers.

[2] End of period.

[3] Excluding MDRI in 2006.

[4] Excluding capital transfers related to HIPC in 2004 and MDRI in 2006.

[5] In months of imports of goods and services.

INTRODUCTION

1. These papers explore several key themes associated with longer term development issues in Madagascar, complementing the analysis done in the Article IV staff report.

2. **Chapter I looks at the macroeconomic consequences of scaling up foreign assistance and foreign direct investment in Madagascar.** This chapter reviews the authorities' new poverty reduction strategy for 2007-2011, entitled the Madagascar Action Plan (MAP), discusses the resource requirements for making progress towards achieving individual Millennium Development Goals (MDGs) and the MAP's objectives, and focuses on the main macroeconomic implications and policy measures of higher public and private investment, with a view to providing the authorities with an analytical framework for assessing and managing such scaling up of resources.

3. **Chapter II considers the economic and fiscal effects of Madagascar joining the free trade area (FTA) of the Southern African Development Community (SADC).** Madagascar intends to start phasing out its customs tariffs on imports from the SADC in 2007. The Malagasy authorities have expressed great hope that joining the SADC FTA will boost the development of the country, by fostering trade and investment. However, this chapter finds that the SADC FTA will have only a limited impact on Madagascar's real GDP and welfare since less than 6 percent of the country's imports will be liberalized.

4. **Chapter III explores the challenge of increasing domestic revenues in Madagascar, which have historically been amongst the lowest in the world.** This chapter attributes Madagascar's poor tax performance to the complexity of the tax system and weaknesses in tax and customs administration. It uses cross-country evidence to estimate the tax revenue potential at about 30 to 40 percent more than current levels. It also analyzes the shortcomings in tax policy, which explain such low revenue performance, and reviews the key tax policy reforms that are needed to meet the tax revenue objective of the MAP.

5. **Chapter IV proposes the development of a measure of "core" inflation for Madagascar, which excludes energy and rice prices.** This provides an alternative measurement of the underlying rate of inflation by eliminating volatile components that are subject to frequent supply shocks from the overall index. This measure better identifies the current trend in underlying inflation and thereby helps policy-makers avoid reacting to false signals as they manage monetary and fiscal policies. Preliminary results suggest that this core inflation rate often provides a useful alternative perspective to policy makers on the short-term evolution of inflation, while working equally well or better in a standard money demand equation.

I. Macroeconomic Implications of "Scaling-Up" Foreign Assistance and Foreign Direct Investment in Madagascar[1]

A. Introduction

1. **Madagascar has recently launched its second generation Poverty Reduction Strategy (PRS) entitled the MAP with a view to accelerating progress toward achieving the MDGs.** As one of the poorest countries in sub-Sahara Africa (SSA), Madagascar suffers from low levels of social indicators across all fronts—education, health, water and sanitation, and infrastructure. To make progress toward the MDGs, the country will need to "scale up" substantially both public and private investment, while taking actions to increase absorptive and institutional capacity and implementing supportive policies in each of the priority sectors. Scaling-up investment will involve a concerted effort aimed at mobilizing domestic revenues, increasing donor assistance, and creating an enabling environment conducive to foreign direct investment (FDI). Augmenting the absorptive capacity of the economy will require addressing the main obstacles to private sector development while undertaking key public investments which increase productivity. Improving institutional capacity will necessitate strengthening both public financial management and service delivery at both the finance and the sectoral ministries. The authorities will also need to maintain a stable macroeconomic environment and implement a set of sectoral policies supportive of achieving the MDGs.

2. **This paper discusses the macroeconomic implications of scaling-up donor assistance and FDI in Madagascar. Section II provides a brief overview of the international effort aimed at reducing poverty worldwide and of Madagascar's own poverty reduction strategy.** Section III highlights key social indicators in Madagascar, including in comparison with other low-income countries, and the targets that the authorities have set for 2012. Section IV discusses the resource requirements for making progress toward achieving individual MDGs drawing on recent sectoral studies. Because there are likely to be synergies between expenditures in one social sector and outcomes in another, the section also discusses the dynamic effects of scaling up and the associated savings. Section V focuses on the main macroeconomic implications and policy measures of higher public and private investment, with a view to providing the authorities with an analytical framework for assessing and managing such scaling up. The paper concludes with a proposed agenda for possible further analytical work.

[1] Prepared by Brian Ames.

B. Achieving the Millennium Development Goals through Country-Owned Poverty Reduction Strategies

3. **In 2000, the international community established a set of ambitious goals for reducing poverty worldwide—the MDGs.**[2] Using 1990 as the base year, the objective was to reduce income poverty[3] by one-half while improving key social indicators in the areas of education, health, water and sanitation, and infrastructure by 2015 (Box I.1). It was recognized that countries would be at different starting points and face different challenges. Hence, progress was to be measured relative to each country's starting point. To facilitate this, countries were encouraged to develop their own poverty reduction strategy (PRS) through a broad based participatory process involving civil society and development partners. The PRS would assess poverty in the country, set ambitious yet achievable goals customized to the country's situation, and define priority policies and measures that were to bring this about. Country authorities were to measure progress annually through a set of objective indicators that would be assessed and presented in annual progress reports. The PRS would then be updated every three to five years in light of implementation experience and possible changes in priorities.

4. **Madagascar prepared its first PRS in 2003 which guided social and economic policies and donor assistance through 2006.**[4] In November 2006, the authorities launched their second PRS, the MAP.[5] In contrast to the first PRS, the MAP is more results-oriented and prioritized. Key monitoring indicators, most with baselines for 2005 and targets for 2012, have been selected to measure progress toward achieving the MAP's goals and objectives (Box I.2). The 2007 Finance Law aligns the budget with the MAP commitments and presents medium term expenditure projections for 2007–11. The 2008 Finance Law and all subsequent finance laws are expected to do the same.

---

[2] United Nations Millennium Declaration (www.un.org/millennium/declaration/ares552e.htm).

[3] Using the standard World Bank poverty line of one U.S. dollar per day in purchasing power terms.

[4] For a more detailed discussion of the first PRS and assessments of its implementation, see Madagascar - Poverty Reduction Strategy Paper, Country Report No. 03/323, October 2003; Madagascar - Poverty Reduction Strategy Paper - Joint Staff Assessment, Country Report No. 04/43, February 2004; Republic of Madagascar - Poverty Reduction Strategy Paper Annual Progress Report, Country Report No. 04/402, December 2004; Republic of Madagascar - Poverty Reduction Strategy Paper Annual Progress Report - Joint Staff Assessment, Country Report No. 04/403, December 2004, Republic of Madagascar - Poverty Reduction Strategy Paper Annual Progress Report - Joint Staff Advisory Note, Country Report No. 06/304, August 2006; and Republic of Madagascar - Poverty Reduction Strategy Paper Annual Progress Report, Country Report No. 06/303, August 2006.

[5] The MAP website is www.madagascar.gov.mg/MAP.

Box I.1. The Millennium Development Goals

At the Millennium Summit in September 2000, world leaders adopted the UN Millennium Declaration, committing their nations to a new global partnership to reduce extreme poverty and setting out a series of time-bound targets, with a deadline of 2015, that have become known as the MDGs. These are the world's time-bound and quantified targets for addressing extreme poverty in its many dimensions-income poverty, hunger, disease, lack of adequate shelter, and exclusion-while promoting gender equality, education, and environmental sustainability. They are also basic human rights—the rights of each person on the planet to health, education, shelter, and security. The goals are to:

1. ***Eradicate extreme hunger and poverty***: Halve, between 1990 and 2015, the proportion of people whose income is less than $1 a day and halve the proportion of people who suffer from hunger.

2. ***Achieve universal primary education***: Ensure that, by 2015, children everywhere, boys and girls alike, will be able to compete a full course of primary schooling.

3. ***Empower women***: Eliminate gender disparity in primary and secondary education, preferably by 2005, and in all levels of education by no later than 2015.

4. ***Reduce child mortality***: Reduce by two-thirds, between 1990 and 2015, the under-five mortality rate.

5. ***Improve maternal health***: Reduce by three-quarters, between 1990 and 2015, the maternal mortality ratio.

6. ***Combat HIV/AIDS, malaria and other diseases***: Have halted by 2015 and begun to reverse the spread of HIV/AIDS , the incidence of malaria, and other major diseases.

7. ***Ensure environmental sustainability***: Integrate the principles of sustainable development into country policies and programs and reverse the loss of environmental resources. Halve, by 2015, the proportion of people without sustainable access to save drinking water and basic sanitation. Have achieved by 2020 a significant improvement in the lives of at least 100 million slum dwellers.

8. ***Develop a global partnership for development***: Develop further an open, rule-based, predictable, nondiscriminatory trading and financial system; address the special needs of the Least Developed Countries; address the special needs of landlocked developing countries and small island developing countries; deal comprehensively with the debt problems of developing countries though national and international measures in order to make debt sustainable in the long term; and develop and implement strategies for decent and productive work for youth in cooperation with developing countries.

Source: United Nations Millennium Project (www.unmillenniumproject.org).

Box I.2. Madagascar Action Plan Goals and Objectives

	2005	2012
UN Human Development Index (ranking)	146 out of 177	100
Poverty rate (% of pop. below $2/day)	85.1% (2003)	50%
Family size (fertility rate)	5.4	3 to 4
Life expectancy	55.5	58 to 61
Literacy	63%	80%
Percentage of children completing	Lower Sec. 19%	56%
secondary school	Upper Sec. 7%	40%
Economic growth	4.6%	8% to 10%
GDP (USD)	$5 billion	$12 billion
GDP per capita (USD)	$309	$476
Foreign direct investment	$84 million	$500 million
World Bank business climate ranking	131	80
Corruption Perception Index (scale 0 to 10)	2.8	5.2
Households having land title	10%	75%

Source: "Madagascar Action Plan 2007-12: A Bold and Exciting Plan for Rapid Development," www.madagascar.gov.mg/MAP, 2006.

C. The MDGs and Key Social Indicators

5. **Madagascar is one of the poorest countries in SSA with a per capita income of US$309 (2005) and a rank of 146 out of 177 on the United Nations Human Development Index in 2006.** Since the base line for measuring progress toward achieving the MDGs is 1990, this section provides a brief overview of the poverty and social indicators at that time and progress since. Relative to other SSA countries in 1990 (Table I.1), Madagascar had a higher poverty headcount (MDG 1), a lower primary school completion rate (MDG 2), and lower access to water and sanitation (MDG 7). In contrast, health indicators such as the under-5 mortality rate (MDG 4) and maternal mortality rate (MDG 5) were better than those in other SSA countries.

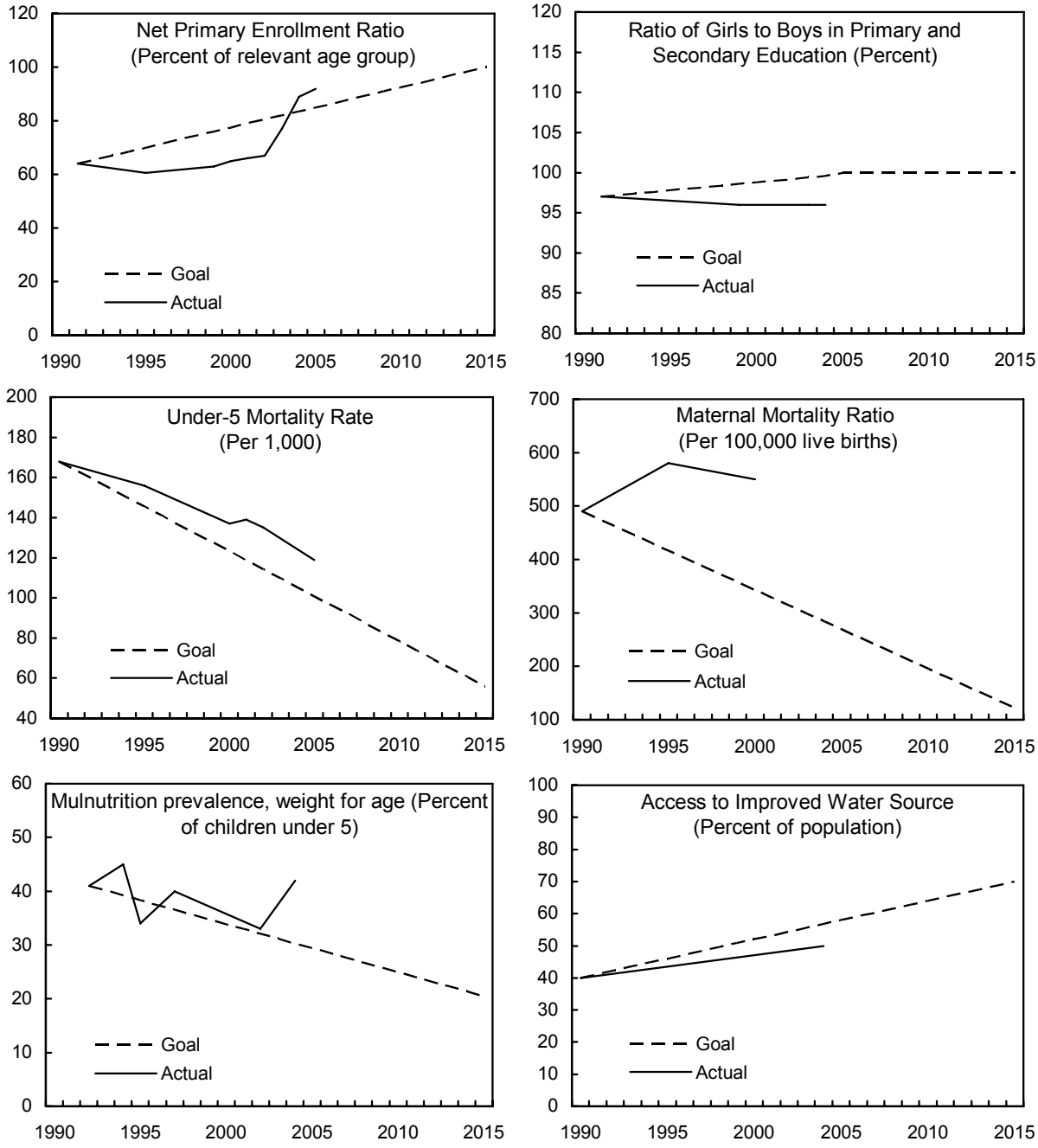
Table I.1. MDG Attainment in Madagascar and Sub-Saharan Africa

	Madagascar			Sub-Saharan Africa		
	1990	2004	2015 (target)	1990	2004	2015 (target)
MDG 1: Poverty headcount ratio at $1 a day (PPP) (% of population)	68	74	34	45	44	23
MDG 2: Primary completion rate (% of relevant age group)	35	45	100	51	61	100
MDG 4: Under-five mortality rate (per 1,000 births)	168	123	56	185	168	62
MDG 5: Maternal mortality ratio (per 100,000 live births)	550	550	138	921	830	230
MDG 7a: Access to improved water source (% of population)	40	46	70	49	56	75
MDG7b: Access to improved sanitation facilities (% of population)	14	32	57	31	37	66

Source: www.developmentgoals.org

6. **The 2002 political crisis resulted in substantial disruption and destruction of the country's social and economic infrastructure.** As a result, the poverty headcount rate actually rose from 68 percent in 1990 to 74 percent in 2004. While the country did make unprecedented progress toward achieving universal primary education and extending public infrastructure, particularly roads, there was only modest progress across most of the other social indicators. If the current trajectory is maintained, most MDGs in Madagascar will not be met by 2015 (Figure I.1). According to the World Bank, only the education MDGs are likely to be achieved, assuming that spending in this sector is increased as envisaged. Income poverty, however, would not be reduced by one-half (to 34 percent), and while progress is expected with regard to the health, water and sanitation, and infrastructure indicators, it will likely fall short of achieving the MDGs in each of these areas.

Figure I.1. Madagascar: Progress Toward Millennium Development Goals, 1990-2015
(Percent, unless otherwise indicated)



Source: World Bank, http://ddp-ext.worldbank.org; and United Nations, http://unstats.un.org.

D. Costing Estimates of the MAP

7. **The Malagasy authorities have attempted to estimate the cost of achieving the MAP's objectives in collaboration with World Bank and United Nations staffs.**[6] Although the authorities' costing estimates are preliminary and are expected to be refined during the period ahead, they nonetheless provide an initial basis for considering the magnitude of the resource requirements involved.

8. **The details regarding the costs of achieving each of the eight MAP commitments[7] over the period 2007–11 are summarized in Table I.2.** The authorities estimate the total cost to be US$11.6 billion, of which US$9.4 billion (82 percent) would be public expenditure and US$2.1 billion (18 percent) would be the expected private sector contribution in the form of direct investment in areas related to the MAP's objectives.[8] The magnitude of these spending requirements is significant relative to existing levels. For example, the average annual level of public sector capital expenditure (US$1,887) assumed in the MAP is more than twice the total public investment in the 2007 Finance Law (US$750 million). Similarly, the average annual level of additional FDI assumed in the MAP (US$427 million) is six times the historic average (US$70 million).

[6] Estimates of the cost of achieving the MDGs in Madagascar can be found in "Le Cadre de Dépense a Moyen Terme du Secteur de la Santé 2006-2008," Ministry of Health and Family Planning, Antananarivo, Madagascar, 2005 (for health-related MDGs), "Plan Education pour Tous: Situation en 2005: Actualisation des objectifs et stratégies," Ministry of Education, Antananarivo, Madagascar, 2005 (for education-related MDGs), and "Direction de l'eau de l'Assainissement," Ministry of Energy and Mining, Antananarivo, Madagascar, 2005 (for water- and sanitation-related MDGs).

[7] The eight MAP commitments are: (1) responsible governance; (2) connected infrastructure; (3) educational transformation; (4) rural development and a green revolution; (5) health, family planning, and the fight against HIV/AIDS; (6) high growth economy; (7) cherish the environment; and (8) and national solidarity.

[8] The authorities also expect the population to contribute to the MAP with its labor and creativity and have been conducting mobilization workshops throughout the 22 regions and 116 districts to this end.

Table I.2. Madagascar: Preliminary Costing for Achieving the MDGs
(Millions of U.S. dollars)

	2007	2008	2009	2010	2011	Annual Average	Total
Governance							
Public sector	197.5	315.5	344.8	425.9	384.1	333.6	1,667.8
Private sector	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Infrastructure							
Public sector	537.3	648.8	866.9	945.0	932.9	786.2	3,933.0
Private sector	257.9	311.4	416.1	453.6	448.8	377.6	1,887.8
Education							
Public sector	75.5	109.8	130.4	164.7	205.8	137.2	686.1
Private sector	9.1	13.2	15.6	19.8	24.7	16.5	82.3
Rural development							
Public sector	142.4	211.6	229.6	242.4	261.7	217.5	1,087.6
Private sector	11.4	16.9	18.4	19.4	20.9	17.4	87.0
Health, family planning, HIV/AIDS							
Public sector	144.2	191.7	227.5	252.7	308.0	224.8	1,124.0
Private sector	8.6	11.5	13.6	15.2	18.5	13.5	67.4
Economic growth							
Public sector	104.8	93.6	75.0	69.4	64.8	81.5	407.6
Private sector	3.1	2.8	2.3	2.1	1.9	2.4	12.2
Environmental protection							
Public sector	35.3	49.3	53.0	58.2	62.1	51.6	257.8
Private sector	0.0	0.0	0.0	0.0	0.0	0.0	0.0
National solidarity							
Public sector	48.0	51.1	56.9	55.5	62.5	54.8	274.0
Private sector	0.1	0.1	0.1	0.1	0.1	0.1	0.6
Total investment	1,575.2	2,027.3	2,450.1	2,723.8	2,797.1	2,314.7	11,575.4
Of which : contribution of public sector	1,285.0	1,671.3	1,984.0	2,213.7	2,282.1	1,887.2	9,438.0
Of which : contribution of private sector	290.3	355.9	466.1	510.1	515.0	427.5	2,137.4

Source: Malagasy authorities.

9. **Infrastructure improvements consists of one-half of the total estimated cost of the MAP, with governance (14 percent), rural development (10 percent), and health (10 percent) being the other main components.** The authorities have included allocations for recurrent expenditure along with their estimates of capital investment requirements.[9] The capital intensity of the public investment is assumed to vary across sectors, with health investment comprising principally intermediate equipment (30 percent) and investment in facilities (43 percent) versus labor (27 percent), while education spending goes mainly into wages (42 percent) and investment (48 percent) and water and sanitation investment is associated mainly with construction and rehabilitation costs (80 percent), with only minimal labor costs (3 percent).

10. **These preliminary estimates, however, are likely to overstate the true cost of achieving the MAP objectives because they do not take capture the synergies that are likely to be had from investments in one sector and their positive spillover affects in another.** For example, spending on infrastructure will boost development of the rest of the economy by increasing productivity and accessibility of public services, such as health and education. Spending on health will have positive spillover effects regarding improved productivity of workers. Similarly, spending on education will result in improved health outcomes and, in turn, improved productivity of workers. Clean water and improved sanitation would also have positive effects on health outcomes. World Bank staff have made preliminary estimates of the synergies between social sectors within the context of a computable general equilibrium model.[10] While the exercise to date has been limited to six MDGs, the implications appear quite clear—actual costs should be less than those estimated via partial sectoral analyses. There are other limitations to the authorities' initial estimates.[11] They intend to continue refining their costing estimates with assistance from the World Bank and other development partners and will report on progress in their subsequent annual MAP implementation reports.

11. **IMF staff had previously made estimates of the economic growth rates and aggregate investment levels that would be necessary to reduce income poverty by one half (MDG 1) using a growth accounting framework.**[12] If Madagascar is to reach this

---

[9] The authorities assume 15 percent of total expenditure for each of the eight MAP commitments are for recurrent spending, with the remaining 85 percent constituting capital expenditure.

[10] See "Maquette for MDG Simulation (MAMS)," World Bank, October 2006.

[11] These include the use of a constant factor (15 percent) for recurrent expenditure requirements across all sectors, the lack of use of sector-specific deflators in estimating annual investment costs, the need to consider sequencing between essential public infrastructure and private investment, etc.

[12] IMF Country Report No. 06/306, August 2006. For a detailed discussion on the determinants of FDI, the determinants of economic growth, and the impact of FDI on economic growth, see Noorbakhsh, F., Paloni, A.,

(continued…)

MDG by 2015, extreme poverty would need to be reduced by about 30 percentage points from its 1990 level of 59 percent (2004 level was 56 percent).[13] Using an estimated elasticity of poverty with respect to growth of -0.45, cumulative real per capita income would need to grow by about 60 percent over the next decade and overall real GDP by 107 percent (7.6 percent a year). To sustain this level of growth, investment would need to increase by 16 percent a year in real terms so that the investment-to-GDP ratio rises to 35 percent by the end of the period. It is assumed that most of this investment would come from the domestic private sector and support broad-based growth. In addition, foreign capital inflows (both foreign assistance and foreign direct investment) would need to rise to the equivalent of at least 12.5 percent of GDP, which would mean an annual increase of foreign capital inflows of about SDR 275 million above the base case by the end of the period.

E. Macroeconomic Implications of Resource Inflows

12. **A substantial increase in either donor assistance or foreign direct investment flows could have potentially destabilizing macroeconomic effects depending on the size and composition of the flows and the capacity of the economy to absorb these flows.** Such effects could include an appreciation of the real exchange rate and result in so called "Dutch Disease," which pose important challenges to competitiveness and macroeconomic management.[14] As will be discussed further below, the resulting challenges differ depending on which of the two distinct types of resource flows occurs.

---

et. al. (2001). "Human Capital and FDI Inflows to Developing Countries: New Empirical Evidence." World Development 29(9): 1593-610; Wheeler, D. and Mody, A. (1992) "International Investment Location Decisions: the Case of U.S. Firms." Journal of International Economics 33:57-76; Barro, Robert J., (2003). "Determinants of Economic Growth in a Panel of Countries." Annals of Economics and Finance; Block, Steven, (1997). "Does Africa Grow Differently?" Journal of Development Economics; Ndulu et. al., (2006). "Challenges of African Growth." World Bank (forthcoming); De Gregorio, J. and Lee, J-W., (1998). "How Does Foreign Direct Investment Affect Economic Growth?" Journal of International Economics, Vol. 45(1): 115-135, Elsevier; and http://rru.worldbank.org/PapersLinks/Impact-Foreign-Direct-Investment/.

[13] These poverty statistics are based on the national definition of poverty which differs from the World Bank definition (percentage of people whose income is less than $1 per day). See "Republic of Madagascar - Poverty Reduction Strategy Paper Annual Progress Report," Country Report No. 06/303, August 2006.

[14] For a further discussion on the problems and policy options regarding Dutch Disease and scaling-up effects such as a currency appreciation, see Adam and Bevan, "Aid, Public Expenditure and Dutch Disease," www.bepress.com/csae/paper184/.

Dutch disease

13. **The potential risk of "Dutch Disease" arises from the projected high levels of inflows of donor assistance and FDI as the domestic spending component of these foreign exchange inflows increases and places upward pressure on the domestic price level and, in turn, the real exchange rate if the absorptive capacity for a supply response is not in place (Box I.3).** The ensuing change in relative prices (tradable/nontradable) could render the tradable sector less competitive and shift resources toward the higher returns to be had in the nontradable sector. If left unchecked, the export sector could be at risk, particularly those firms that are already operating at the margin (e.g., textiles, shrimp).

Box I.3. "Dutch Disease"

"Dutch Disease" describes a situation in which currency appreciation makes tradable goods less competitive and leads to an increase in imports. The result is a shift of resources away from the production of tradable goods and toward nontradables.

Increased foreign assistance and foreign direct investment boosts demand for both imports and domestically produced nontradable goods. Public sector is typically assumed to have a higher propensity to consume domestically produced goods and services than the private sector. Thus, the domestic component of demand will likely be higher if the foreign assistance finances higher public expenditure. A country can import goods directly from the world market, but only domestic producers can supply nontradables.

Unless there is considerable excess supply in the economy, the price of nontradables must become higher than the prices of tradables (that is, the real exchange rate must rise) in order to encourage resources, including labor, to switch from the production of exportables to the production of nontraded goods. As the real exchange rate appreciates, the tradable goods sector contracts compared with the nontradable sector.

Source: Excerpts from "Macroeconomic Challenges of Scaling Up Aid to Africa: A Checklist for Practitioners," Sanjeev Gupta, Robert Powell, and Yongzheng Yang, International Monetary Fund, Washington, D.C., 2006.

Permanent versus temporary flows

14. **A key question that needs to be answered in order to determine the appropriate policy response, if any, is whether these flows are considered to be temporary or permanent?** If the scaled up donor assistance and/or private sector FDI are expected to be sustained over the medium term, a case could be made that a *permanent structural change* in the economy is under way. The exchange rate should therefore be allowed to move to its new equilibrium in line with market forces, with the monetary authorities intervening in order to smooth day-to-day volatility. The impact of an appreciation of the nominal exchange rate could be offset through measures aimed at increasing productivity, which would leave the real exchange rate unchanged and thereby safeguard competitiveness. Such productivity increases could arise from government expenditure in health, education, infrastructure (i.e.,

roads, power supply, etc.), and/or in manpower training. Considerable time will likely be required for productivity-enhancing reforms to take effect. This raises the question of whether the higher aid flows should be phased in gradually in order to avoid a strong appreciation of the exchange rate prior to these reforms taking effect. This would, however, involve a trade off between accelerating progress toward achieving the MDGs and protecting the export sector from such an appreciation.[15]

15. **If the higher inflows are expected to be *temporary* or *reversible*, then a case could be made for policy intervention.** In the event of a temporary increase in aid inflows, a judgment needs to be made whether the benefit of spending these resources outweighs the loss of competitiveness resulting from the accompanying real appreciation. If competitiveness concerns dominate, it would be preferable to save the aid inflow proceeds and utilize them gradually so as to minimize the impact on competitiveness (see ¶¶18 and 19). Typically, it would not be advisable to spend the additional resources while trying to resist the real appreciation through monetary policy measures. This is because higher spending places upward pressure on inflation as well as on the current account deficit. Rather, a more effective use of aid would be to link spending and real exchange rate appreciation closely together (the so called "spend-and-absorb approach").[16] If the central bank responds by selling sufficient foreign exchange from the aid inflows, the nominal exchange rate would appreciate, thereby dampening inflation and financing the widening of the current account deficit. The latter increases the resource envelope that is available to the economy, thereby absorbing the additional aid resources. If, in contrast, the central bank resists selling foreign exchange, the benefits of the increased aid would be negated as restoring macroeconomic stability would eventually require a tightening of monetary policy in order to bring down inflation and reduce the current account deficit, ultimately leading to a crowding out of private sector activity in order to make room for the fiscal expansion. In other words, without a widening of the current account deficit, aid inflows would not increase the resource envelope available to the economy and the higher fiscal spending would ultimately crowd out private sector activity (similar to a fiscal expansion without aid financing). Otherwise, an appreciation of the real exchange rate would be necessary to bring about a widening of the current account deficit.

16. **In the case of a temporary increase in FDI, the concern would be to offset the appreciation of the real exchange rate in order to protect the export sector from being**

---

[15] It should also be noted that productivity-enhancing measures such as road construction can be expensive and may divert resources away from supporting other MDGs. Trade facilitation could also facilitate imports and thereby reduce the appreciation pressure on the exchange rate, although there is likely to be little scope here as the Malagasy trade regime is already fairly liberal.

[16] For a more detailed discussion on of the spend-and-absorb approach, see "The Macroeconomics of Managing Increased Aid Inflow," IMF Occasional Paper No. 253, 2007.

wiped out in the short run since it would be viable in the long run. The authorities could choose to intervene in the foreign exchange market (i.e., purchase foreign exchange and thereby reduce pressure on the nominal rate) and mop up any excess liquidity injected from these operations. There would, however, be a cost associated with this policy that may have to be incurred by the budget, which would come at the expense of other expenditure assuming that the same aggregate spending ceiling and macroeconomic objectives are maintained.[17] Such a cost may be reasonable, however, given the implications for the export sector in the event of no intervention.

17. **Regarding FDI, present indications are that there may indeed be a structural change taking place in the economy and that the inflows are more of a permanent nature.** In addition to the two large mining projects that are presently at the construction phase, there are other mining projects that are at advanced stages of discussion as well as prospects for production of both onshore and offshore oil. There are also potential large investments to be made in the tourism sector and other sectors of the economy as well. As regards scaled up donor assistance, these flows have yet to manifest. The authorities are hopeful that with the recent launch of the MAP there will be a substantial scaling up of donor assistance, with their high case scenario assuming that donor assistance will increase by about 3 percentage points of GDP per annum. However, based on estimates recently provided by Madagascar's main development partners, net external foreign assistance is expected to decline (not increase) by 2.5 percentage points of GDP over the period 2006–09. So, for now, concerns over scaled up donor assistance are purely theoretical. Nonetheless, the authorities should carefully think through the implications of potential scaling up so that they can be well prepared to manage these flows, should they arise.

Donor assistance (budget and project) versus FDI

18. **As there are important differences between donor budget support, project support, and FDI regarding who controls these inflows, the policy response by the authorities will need to vary accordingly.** If scaled up foreign assistance comes in the form of *budget support*, the foreign exchange from the donor assistance would be lodged in the central bank and the domestic currency counterpart would be placed in a government deposit held at the central bank. In the first instance, foreign reserves would increase, net domestic assets of the central bank decline, and reserve money would therefore remain constant. The government could then choose if and when to draw down these deposits, which would result in an injection of liquidity into the economy. If the authorities determine that the absorptive capacity for such expenditure is not in place, they could elect to delay the expenditure until

[17] The cost would be the central bank losses arising from the difference between the rate of return earned on the newly acquired foreign assets and the interest that would have to be paid on the domestic instruments used for mopping up the excess liquidity.

the point in time when such capacity is in place, thereby eliminating the pressure for Dutch Disease.[18] This policy imposes no direct cost on the government, except the intertemporal opportunity cost of any delayed spending.

19. **If, however, the scaled up foreign assistance is in the form of *project support*, a portion of the proceeds would be set aside for import related expenses, with the remainder being for local costs.** The foreign exchange related to project imports is most often lodged in an external commercial bank account and, hence, never directly enters the country. The foreign exchange used to finance the project's local costs would, however, normally be lodged in a domestic commercial bank or central bank account. If the absorptive capacity for this domestic expenditure is not in place, the authorities could in principle choose to delay project implementation accordingly.[19] If the project's local currency deposits are held in the commercial banking system, they would nonetheless still have an expansionary impact on the money supply since the banks would be able lend against these deposits. The monetary authorities could, however, take offsetting operations to mop up the additional liquidity injection. If, however, the project accounts are held in the central bank, they would have no effect on liquidity or prices until the point in time that they are drawn down and spent.

20. **In the case of FDI, the private sector is the recipient of the inflows.** The domestic spending component of the FDI would be lodged in the commercial banks initially as a foreign exchange deposit and then as a local currency deposit after selling the foreign exchange and purchasing local currency in the interbank market. These deposits would normally be drawn down and spent within a short period of time as private sector agents would most likely transfer FDI for domestic spending requirements on an "as needed" basis. While the monetary authorities should allow broad money to grow in line with the higher demand for real money balances arising from the domestic spending component of the FDI, reserve money would grow by only a fraction (i.e., multiplier effect). The central bank would therefore need to sterilize a portion of domestic spending component by purchasing foreign exchange in the interbank foreign exchange market and offsetting the liquidity impact through open market operations. Alternatively, the authorities could consider running a fiscal surplus and thereby reduce the appreciation pressure on the exchange rate by accumulating local currency deposits at the central bank. However, it is unlikely that such a measure would be acceptable from a political economy point of view as it would require expenditure reductions that would likely come at the expense of making progress toward the MDGs.

---

[18] The question arises, however, as to whether a donor would provide additional budget assistance in cases where the authorities are not in a position to spend it and/or the economy is not in a position to absorb it.

[19] As in the case of budget assistance, the question arises as to whether a donor would disburse project assistance if the project was not able to be implemented in the period ahead.

F. Proposed Agenda for Future Analytical Work

21. **A sound understanding on how a country intends to spend additional foreign assistance, as well as the appropriate policy response to the possible macroeconomic impact of these and private sector FDI inflows, is essential to assessing the implications of scaling up public and private sector resources in support of poverty reduction.**[20] The authorities have taken good initial steps in costing their MAP, but further steps are needed to ensure that they are well informed of the macroeconomic implications and policy options before them. Key areas of further analytical work include:

a. *Improved sector-specific costing methodologies*, including more refined assessments of the necessary levels of recurrent expenditure relative to the investment expenditure in each sector; use of sector-specific deflators in estimating annual recurrent and capital expenditure needs, and consideration of sequencing between essential public infrastructure and private investment;

b. *Improved intersectoral costing*, including the use of the MAMS model to capture the inter-sectoral dynamic effects and synergies of public investment;

c. *Quantification of the impact of scaled up foreign assistance* on the real exchange rate, exports, and inflation taking into account the likely import content of additional expenditures;

d. *Consideration of sequencing investments with high import content* in public spending up front, and back loading investments with high domestic content in order to allow greater time for a supply response (absorptive capacity);

e. *Determination of whether the government has the institutional capacity to execute the scaled up expenditures effectively* with regard to both planning and implementation;

f. *Assessment of whether the envisaged spending and investment plans are consistent with reaching the growth object* as well as of the trade-off between directing aid toward enhancing growth (i.e., spending on infrastructure) and focusing aid on relieving poverty (i.e., aid to rural sectors);

[20] Staff from the African Department at the IMF have prepared a comprehensive checklist for practitioners on the macroeconomic analysis of scaling-up aid to Africa. See "Macroeconomic Challenges of Scaling Up Aid to Africa: A Checklist for Practitioners," Sanjeev Gupta, Robert Powell, and Yonzheng Yang, International Monetary Fund, Washington, D.C., 2006.

g. *Consideration of policies that that may assist in effectively absorbing higher aid levels* while taking into consideration emerging supply pressures in different sectors;

h. *Assessment of adequate sequencing for orderly liberalization of capital account flows* which may help to alleviate the appreciation pressure on the exchange rate arising from foreign assistance and/or FDI inflows. Such liberalization will need to be carefully sequence with measures aimed at strengthening the soundness of the financial sector; and

i. *Consideration of what to do (i.e., exit strategy) in the event that scaled up aid by donors and/or higher levels of FDI by the private sector are not sustained*. This could include determining the appropriate macroeconomic path to follow after the scaled up resource flows return to more normal levels and developing possible fiscal scenarios for an exit strategy based on estimates of the recurrent expenditure resulting from a scaling up of aid.

II. The Economic and Fiscal Impact of Joining the SADC FTA[1]

1. **Madagascar intends to start phasing out its customs tariffs on imports from the SADC in 2007.** The Malagasy authorities have expressed great hope that joining the SADC FTA will boost the development of the country, by fostering trade and investment. This paper intends to assess the economic and fiscal impact of this regional trade liberalization.

A. Madagascar Trade Liberalization

2. **Madagascar has been liberalizing its trade regime on an unilateral and regional basis.** Unilaterally, it reduced its simple average most favored nation (MFN) tariff from16.2 percent at the end of 2005 to 13.5 percent in 2006 and then at 12.9 in 2007, slightly below SSA average of 13.0 percent. On a regional basis, Madagascar is a member of the COMESA since 1993 and was one of the nine countries forming the COMESA FTA in 2000. In 2004, Madagascar became the 14th SADC member and, in 2007, intends starting phasing out its tariff on imports from SADC. In a first phase, customs duties on 78 percent of tariff lines will be eliminated and duties on 7.7 percent additional tariff lines will be reduced. The remaining duties will be almost fully eliminated by 2012. The phasing out of Madagascar tariff on SADC import will discriminate between South Africa and the rest of SADC. Nonetheless the differences between tariff on South Africa imports and rest of SADC will be minimal (Table II.1).[2]

Table II.1. Planned Reduction in Madagascar Customs Tariff on SADC Imports
(Simple tariff average, in percent)

	2006	2007	2008	2009	2010	2011	2012
M.F.N. tariff	13.5	12.9	…	…	…	…	…
South Africa	13.5	2.6	2.5	1.2	1.2	0.6	0.0
Rest of SADC	- [1]	2.6	2.6	1.2	0.61	0.0	0.0

[1] Countries that are both members of COMESA and SADC already had preferential access to the Malagasy market under the COMESA. Other countries faced MFN tariffs averaging 13.5 percent.
Source: Staff calculation based on the tariff reduction agreed in October 2006.

[1] Prepared by Jean-Jacques Hallaert.

[2] Tariff will remain on sugar products as well as oil, petroleum products, and gases.

B. The SADC FTA: A limited Trade Liberalization for Madagascar

3. **The liberalization of the SADC FTA is limited.** At first glance the SADC FTA will lead to a significant liberalization of imports. SADC countries account for 12.5 percent of Madagascar imports. However, in practice, the liberalization will be much more limited: only 5.6 percent of Madagascar imports will benefit from the tariff cut. The reason is overlapping membership (Table II.2). Four SADC countries (including Madagascar's main trading partner in SADC, Mauritius) are also members of the COMESA FTA. As a result, their exports to Madagascar already benefit from a duty-free access. Since Madagascar imports from SADC are extremely concentrated (Mauritius and South Africa account for 93 percent of Madagascar imports from the bloc), South Africa accounts for 88 percent of the trade that will actually be liberalized. Appendix II.1 provides more details on Madagascar trade with Africa.

Table II.2. SADC and COMESA: Overlapping Memberships

SADC Members	that are also Members of the COMESA	and of the COMESA FTA	Share in Madagascar imports (in percent, 2005) [1]
Angola	X		0.0
Botswana			0.0
Democratic Republic of the Congo	X		0.0
Lesotho			0.0
Madagascar	X	X	
Malawi	X	X	0.2
Mauritius	X	X	6.7
Mozambique			0.0
Namibia			0.0
South Africa			4.9
Swaziland	X		0.4
Tanzania			0.3
Zambia	X	X	0.0
Zimbabwe	X	X	0.0

[1] IMF's Direction of Trade database.

4. **Moreover, empirical literature suggests that the potential from African regional trade agreements to increase trade may be low.**

- First, Foroutan and Pritchett (1993) on intra-SSA trade and, more recently, Chauvin and Gaulier (2002) on intra-SADC trade use gravity models to estimate bilateral and regional trade potential. Both conclude that, although small, the actual level of intra-African trade is not below its potential.

- Second, past experience shows that the actual intra-regional trade liberalization was limited in Africa because of (i) import-substitution policies;[3] (ii) tariff-revenue constraints; (iii) inequal distribution of costs and benefits of integration; (iv) severe distorsions in the trade regimes of many African countries; (v) high transaction costs due to inadequate infrastructures; (vi) limited product complementarities;[4] and (vii) institutional constraints as well as conflicting goals due to African countries' membership in several regional groups. Moreover, the complementary policies (macroeconomic stability, appropriate exchange rate, investment policies, …) that are crucial to ensure that trade liberalization promotes growth were often not implemented (Chauvin and Gaulier, 2002; Foroutan, 1993; Hallaert, 2004; Khandelwal, 2004; SADC 2006, Yeats, 1998).

C. CGE Simulations[5]

5. **Quantifying the economic impact of a regional trade agreement requires a general equilibrium analysis.** Using the Global Trade Analysis Project (GTAP) model described in Appendix II.2, four scenarios on the impact of the SADC FTA are simulated. They differ regarding assumed rigidities in the labor and capital markets.

- In the first scenario, all prices and wages are assumed to be flexible so as to maintain the current level of employment;
- In the second scenario, real wages are assumed to be rigid so as to allow the SADC FTA to affect the level of employment;
- In the third scenario, the real price of capital is fixed so as to allow the SADC FTA to affect the level of capital;
- In the fourth scenario, both real wages and real price of capital are fixed.

6. **Under all scenarios, Madagascar static gains from a full FTA (i.e., eliminating all tariffs on intra-SADC trade) are limited.** At most, real GDP would increase by 0.4 percent (Table II.3) and welfare by at most 17.5 million US dollars. The first scenario can be interpreted as the outcome of the SADC FTA if there is, initially, full utilization of both

[3] For example, provisions for protection of infant industries are included in the SADC agreement.

[4] Significantly, the Communiqué of the 2006 SADC extraordinary summit indicated: "Summit noted that SADC's trade pattern consist mainly of commodities and that there is a need to diversify the SADC economies and increase intra-regional trade and growth" (SADC, 2006). Yeats (1998) as well as Chauvin and Gaulier (2002) argued that while there is little potential to increase intra-African trade under a FTA because of the limited product complementarities, an exception may be trade with South Africa.

[5] This section draws on Hallaert (2006), which provides more details on the model, specification, and results.

capital and employment or if rigidities prevent to move to the full employment. Other scenarios relax this assumption for employment (scenario 2), capital (scenario 3) or both (scenario 4). These scenarios are alternative closures, but they have policy implications. If there are rigidities in the economy that affect the utilization of capital and/or labor, complementary policies that would remove these rigidities will increase the gains from the SADC FTA. The latest investment climate assessment published by the World Bank documents the various rigidities affecting the use of both labor and capital and thus suggests possible complementary policies. For example, 67 percent of firms surveyed quote the cost of finance as a major or severe constraint, 59 percent the access to finance, 31 percent the skills and education of workers and 15 percent labor regulations (Shah and al., 2005).

Table II.3. Impact of the SADC FTA on Real GDP

	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Real GDP (in percent)	0.00	0.03	0.02	0.43
Consumption	-0.02	0.01	-0.01	0.38
Investment	0.01	0.02	0.01	0.08
Exports	0.10	0.10	0.09	0.22
Imports	-0.08	-0.10	-0.07	-0.25

7. **Although the SADC FTA would have only a limited impact Madagascar's total trade, it would affect significantly its trade pattern and thus the structure of production.**

- First, the direction of trade would be substantially altered. Trade between SADC members would increase substantially at the expense of trade with third countries. While Madagascar total trade would barely increase (0.4 percent at most), its trade with SADC would increase by about 5 percent while its trade with the rest of the world would decline. This points to the possibility of a trade diversion. Results also confirm that the increase in Madagascar trade with SADC would be driven by trade with South Africa (+12.5 percent). In particular, exports to South Africa are expected to double. In contrast, Madagascar trade with the rest of SADC would increase by less than a percent with Madagascar's exports to that region dropping by 8 percent.

- Second, the product pattern of Madagascar trade would change. While, despite the hope that Madagascar would become the region's bread basket (IMF, 2006), agricultural and food exports and production (including rice) would not be affected by the SADC FTA. The textiles and clothing industries would be the major beneficiaries of the SADC FTA. Total exports would increase leading to an

expansion of production of apparel (0.5 percent) and of textiles (1 percent). The expansion of trade in textiles and clothing is, as expected, explained by trade with South Africa. Exports of textiles to South Africa would jump by more than 500 percent and exports of clothing by 200 percent. Suggesting an increase in intra-industry trade, imports from South Africa would also increase by respectively 58 and 116 percent. In contrast, trade in textiles and clothing with the rest of SADC and the rest of the world would not be affected much. Reflecting the current small share of South Africa in the Madagascar exports, the total impact on Madagascar exports of textiles will be limited to about 1 percent and of 0.5 percent for apparel.

D. Multilateral Liberalization

8. **The gains from the SADC FTA are limited for Madagascar. But, this does not mean that trade liberalization cannot foster significantly its growth.** The gains from the SADC FTA are small because

- It is actually a small trade liberalization covering less than 6 percent of Madagascar imports; and
- A regional liberalization is a discriminatory liberalization and, as such, involves costs.

Table II.4. SADC and Multilateral Liberalization [1]

		Real GDP (change in percent)	Welfare (in millions of U.S. dollars)	Welfare (in dollars per capita)
Scenario 1	SADC only	0.0	-1.0	-0.1
	SADC and a multilateral tariff cut	0.1	27.9	1.6
Scenario 2	SADC only	0.0	0.5	0.0
	SADC and a multilateral tariff cut	1.5	94.7	5.3

[1] The multilateral cut simulated is a uniform and non-discriminatory 10 percent cut in the applied customs tariff rate of all regions on all goods. For SADC, the cut is limited to trade with non-SADC countries while intra-SADC trade is fully liberalized.

9. **A multilateral trade liberalization would both increase the coverage of the trade liberalization and eliminate the costs associated with trade diversion.** For illustrative purpose, Table II.4 presents a scenario under which the full liberalization of intra-SADC trade is combined with a partial and small (10 percent) multilateral reduction in applied tariff. The result then appear much larger and consistent with Vamvakidis' (1998)

conclusion. Vamvakidis found that economies have grown faster on average and have a higher investment share after a nondiscriminatory liberalization but not after joining a preferential agreement.

E. Fiscal Impact

10. **The CGE simulations ignore the fiscal implications of the SADC FTA.** The fiscal impact is crucial for Madagascar because the country has one of the lowest tax revenue-to-GDP ratios in the world (about 10.7 percent of GDP in 2006) and about half of the tax revenue is tax on international trade.[6] Thus, Madagascar will have to find domestic measures to offset the losses in government revenue from regional tariff reductions.

11. **In order to assess the fiscal impact, data on imports from the pre-shipment inspection company Société Générale de Surveillance (SGS) have been used.**[7] SGS data, which were available at the HS-6 digit level for January-November 2006, allow to distinguish tax exempt export processing zones (EPZs) imports and dutiable imports.

12. **This paper focuses on imports from South Africa since they account for almost 90 percent of Madagascar imports that will be affected by the tariff cut.** It appears that revenue on taxes on South Africa imports are larger than South Africa's share in Madagascar imports would suggest because:

- Imports from South Africa are on average more taxed than imports from the rest of the world. The basket of South Africa exports to Madagascar is such that it faced a trade weighted average tariff of 10.3 percent in 2006 compared to 7.5 percent for the rest of the world.[8] In 2007, assuming the same structure of imports, this average would drop to 1.5 percent and would disappear in 2012.
- Second, although South Africa accounted for 5.2 percent of Madagascar imports, it's share in dutiable imports was 6.6 percent because tax exempt EPZs import relatively less from South Africa than from the rest of the world.

13. **As a result, assuming constant import weights, the phasing out of tariffs on South African imports would lead to a reduction in Madagascar revenues from customs**

---

[6] See Chapter III, Tax Policy Reform Priorities to Improve Revenue Performance.

[7] This period covers the relevant pre-FTA period, because data for 2005 were biased by the end of the temporary customs exemption on investment goods and because the phasing out of the tariff on SADC imports was launched in November 2006.

[8] This ratio is calculated on imports excluding EPZ imports, which are granted duty-free treatment, for the period January-October 2006.

tariff of 7.7 percent. Since the customs duty enters in the basis of other taxes levied on imports, the cut in tariff will affect the collection of excise taxes as well as VAT. However, the revenue on imported petroleum will not be affected because the specific tariff levied on these products will not be cut. Overall revenue of taxes on international trade would decrease by 2.6 percent in 2007 up to 3.1 percent in 2012 (Table II.5).[9]

Table II.5. Revenue Losses on Imports from South Africa[10]

(In percent of the respective tax receipts)

	2007	2008	2012
Customs duties	7.7	7.9	8.9
Tax on petroleum products	0	0	0
Excise Tax	5.8	5.8	7.0
VAT	0.9	0.9	1.1
Total (taxes on international trade)	2.6	2.7	3.1

14. **This revenue loss should be considered as a lower bound because**

- Table II.5 presents revenue losses on only 88 percent of liberalized imports. A rough calculation thus suggests that the total impact of the SADC FTA may be up to 3 percent; and
- The CGE simulations point that Madagascar imports from non-SADC members would decline and be replaced by duty-free imports from SADC. This means that there is a second-round negative impact on customs revenue since only imports from non-SADC countries will continue to face a customs duty (IMF, 2005). However, this

[9] SGS data provide dutiable imports but do not single out if these imports benefit from exemptions. This could bias slightly the result presented here. Revenue losses are compared to the potential revenue in January-October 2006 (i.e., assuming no exemption) dutiable rather than actual revenue collection. If exemptions existed prior to the SADC FTA, their elimination would reduce the fiscal losses presented in this paper (Hallaert, 2004 and IMF, 2005).

[10] The calculation presented in this table remain unchanged when elasticity price of import demand (Khee and al., 2004) are introduced because the tariff cut are very large. At the extreme, an elimination of a tariff will trigger an increase in the volume of imports but since the tariffs are eliminated, this increase does not provide additional customs revenue. There is an expected increase in revenue of other taxes on imports but that effect is largely offset by the reduction of the taxable base (value of imports plus customs tariff that are cut).

impact is likely to be limited since CGE simulations suggest that non SADC imports would decline only by 0.5 percent;

- In addition, the reduction in the average MFN tariff rate in 2007, albeit limited, as well as the appreciation of the currency will add to revenue losses.

15. **In contrast, customs reforms and the move from preshipment inspection to the TradeNet system are likely to improve the customs efficiency and thus the collection of taxes on international trade.** TradeNet, is an electronic platform linking the various trade parties (importers, trade forwarders, customs, central bank, …) which will facilitate and reduce the cost of customs procedures. Singapore and Ghana have implemented it have experienced improved revenue (Engman, 2005).

F. Conclusion

16. **The SADC FTA will only have a limited impact on Madagascar's real GDP and welfare because less than 6 percent of the country's imports will be liberalized.** Most of the impact will come from trade liberalization with South Africa. Nonetheless, the SADC FTA will alter Madagascar's trade structure. Madagascar's trade with South Africa would increase substantially under the SADC FTA but the impact on trade with the rest of SADC is limited and trade with third countries would decline. Most of the change in trade is due to changes in trade in textiles and clothing that would be the main beneficiaries of the SADC FTA.

17. **Although the economic impact is expected to be limited, the fiscal cost appears somewhat larger.** Assuming fixed imports weight, the revenue of taxes on international trade, which account for about half of Madagascar tax revenue, would decline by about 3 percent in 2007[11] and possibly slightly more. Thus, Madagascar will have to find domestic measures to offset the losses in government revenue from regional tariff reductions because, unlike many African regional agreements such as SACU or COMESA, SADC has no provision for compensating fiscal losses (Walkenhorst, 2006) except that countries affected by the tariff cut would have a privileged access to the SADC regional development fund (SADC, 2006).

[11] Since the tariff cut has not be implemented starting January 1, 2007 as initially plenned the actual impact on the 2007 budget will be more limited.

References

Chauvin, Sophie and Guillaume Gaulier, 2002, *Regional Trade Integration in Southern Africa*, Working Paper 2002-12 (Paris: CEPII).

Engman, Michael, 2005, *The Economic Impact of Trade Facilitation*. OECD Trade Working Paper No. 21 (Paris: OECD).

Foroutan, Faezeh, 1993, "Regional Integration in Sub-Saharan Africa: past experience and future prospects," in: de Melo and Panagariya, *New Dimensions in Regional Integration*, Cambridge: Cambridge University Press).

_____ and Lant Pritchett, 1993, *Intra-Sub-Saharan Africa trade: Is It Too Little?* Policy Research Working Paper WPS1225 (Washington DC: World Bank).

Hallaert, Jean-Jacques, 2004, "Implications of Trade Liberalization on Government Revenue," *An OECD Tool Kit for Trade Policy Makers III – Trade in the Service of Growth* (Paris: OECD).

_____, 2006, *Can Regional Integration Accelerate Development in Africa? CGE Model Simulations of the Impact of the SADC FTA on Madagascar*, IMF Working Paper WP/07/66.

Hertel, Thomas W., 1997, *Global Trade Analysis – Modeling and Applications*, (Cambridge: Cambridge University Press).

International Monetary Fund, 2005, *Dealing with the Revenue Consequences of Trade Reform*, Background Paper for Review of Fund Work on Trade. (Washington DC: International Monetary Fund).

_____, 2006, *Republic of Madagascar- Request for a Three-Year Arrangement Under the Poverty Reduction and Growth Facility and Activation of the Trade Integration Mechanism,* Country Report No. 06/306. (Washington DC: International Monetary Fund).

Khandelwal, Padamja, 2004, *COMESA and SADC: Prospects and Challenges for Regional Trade Integration*, Working paper WP/04/227 (Washington DC: International Monetary Fund).

Kee, Hiau Looi, Allesandro Nicita, and Marcelo Olarreaga, 2004, *Import Demand Elasticities and Trade Distortions*, Policy Research Working Paper No. 3452 (Washington: World Bank).

Mlachila, Montfort and Yongzheng Yang, 2004, *The End of Textiles Quotas: A Case Study of the Impact on Bangladesh,* Working paper WP/04/108 (Washington DC: International Monetary Fund).

SADC, 2006, *Final Communiqué of the SADC Extraordinary Summit of the Heads of State and Government to Consider the Regional, Economic and Political Integration*.

Shah, Manju Kedia, James Habyarimana, Linda Cotton, and Ivan Rossignol, 2005, *Madagascar: Investment Climate Assessment — Technical Report* (Washington DC: World Bank).

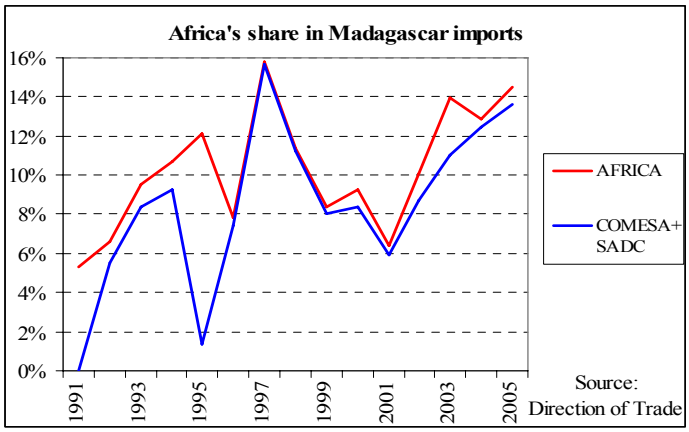
Vamvakidis, Athanasios, 1998, *Regional Trade Agreements Versus Broad Liberalization: Which Path Leads to Faster Growth? Time-Series Evidence*, IMF Working paper WP/98/40 (Washington DC: International Monetary Fund).

Walkenhorst, Peter, 2006, *Compensating Lost Revenue in Regional Trade Agreements*, Trade Note 28 (Washington D.C.: World Bank).

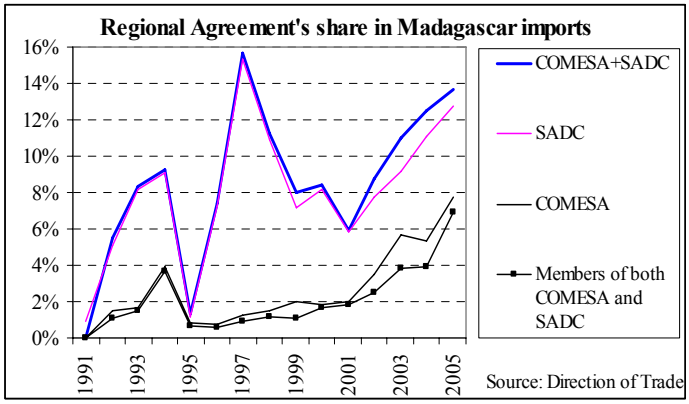
Yeats, Alexander J., 1998, *What Can Be Expected from African Regional Trade Arrangements? Some Empirical Evidence*, Policy Research Working Paper WPS2004 (Washington DC: World Bank).

APPENDIX II.1—MADAGASCAR IMPORTS FROM AFRICA

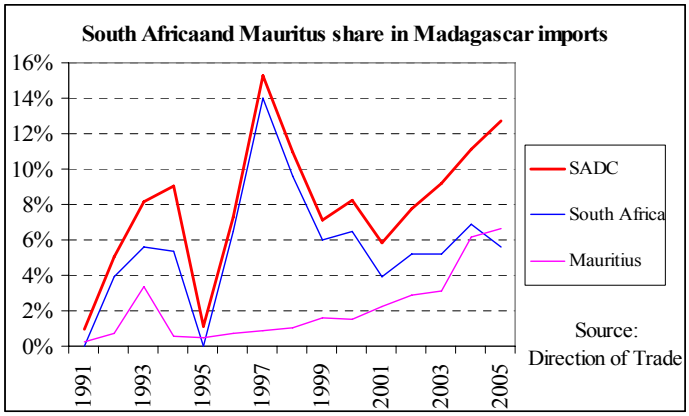
Imports from Africa represent only 15 percent of Madagascar total imports. However, this share has been increasing since 2001, recouping the loss experienced in the second half of the 1990s.



Virtually all Madagascar imports from Africa are from the COMESA and SADC areas. The exceptions are Côte d'Ivoire (0.1 percent of total imports) and the Maghreb countries (0.2 percent).



Trade with SADC appears more important than trade with COMESA. Moreover, in 2005, 89 percent of COMESA imports are from countries that are members of both SADC and COMESA (90 percent of which is imports from Mauritius). This is less true for imports from SADC: in 2005, only 35 percent of SADC imports were from countries belonging both to SADC and COMESA.



This reflects the weight of South Africa in Madagascar imports from both Africa and SADC. South Africa accounts 40 percent of Madagascar imports from SADC but imports from South Africa do not explain the recent increase in Africa and SADC market share since its share in Madagascar imports has been flat since 2000. Imports from Mauritius are the main reason fro the increase in trade with Africa and various African groups. Their value was 12 times higher in 2005 than in 2000.

APPENDIX II.2—MADAGASCAR: THE GTAP MODEL [1]

The GTAP model used in this paper is a comparative static, global general equilibrium model based on neoclassical theory. Firms maximize their profits while consumers maximize their utility. All markets are assumed to be perfectly competitive, and constant returns to scale prevail in all production and trading activities.

Firms use both a composite of primary factors and a composite of intermediates to produce their output according to Leontief production technology. The primary factor composite is a constant elasticity of substitution (CES) function of labor, capital, land and natural resources, while the intermediate composite is a Leontief function of material inputs, which are in turn CES blends of domestically produced goods and imports. Imports are sourced from all regions, with their share depending on trading prices (the Armington approach).

On the demand side, each country or region is assumed to have a "super" household disposing of regional income in fixed proportions in the form of private consumption, government expenditure and savings. Household consumption is assumed to be a constant difference in elasticities function of various consumer goods while government expenditure is based on a CES function of various commodities. Both household and government consumption are CES blends of domestically produced goods and imports, which are in turn sourced from all trading regions based on the Armington approach.

In closing the model, regional savings are assumed to be homogenous and contribute to a global pool of savings, which is then allocated among regions for investment in response to changes in regional expected rates of return. These changes are assumed to be equalized across regions, thus giving rise to capital (i.e., savings) mobility across regions. This allows for greater changes in the trade balance as a result of trade liberalization and tends to dampen the terms of trade effects. In contrast to savings, capital stocks are assumed to be immobile across regions, although they are perfectly mobile within a region, as is labor. Land and natural resources are industry-specific, and only limited transformation of their uses among industries is possible.

The simplicity of the GTAP model makes its simulation results relatively easy to interpret, but limits its capacity to deal with more complex economic issues, such as the adjustment path over time and long-term effects of trade policies associated with investment accumulation, technology and productivity change. Also absent in the model are adjustment costs associated with trade liberalization. These limitations must be kept in mind when interpreting the results presented in this paper.

---

[1] This appendix is from Mlachila and Yang (2004). See Hertel (1997) for more details on the GTAP model. More information on the database can be found at: https://www.gtap.agecon.purdue.edu/databases/v6/v6_doco.asp.

III. MADAGASCAR-TAX POLICY REFORM PRIORITIES TO IMPROVE REVENUE PERFORMANCE[1]

A. Introduction

1. Domestic revenue mobilization is a core element of the strategy to reach the Millennium Development Goals. At Monterrey in June 2002, heads of states agreed on a two-pronged strategy to achieve these goals: donor countries committed to increase aid and open their markets to low income countries, and aid recipient countries agreed to improve public financial management and increase domestic resource mobilization.

2. Improving tax revenue is particularly relevant in Madagascar where it amounted to only 10.7 percent of GDP in 2006, one of the lowest levels in the world. The 2005 Ex-Post Assessment of longer term program engagement in Madagascar identified the lack of progress in tax performance as a major failure of Fund-supported programs during the past decade (IMF, 2005). In addition, raising tax performance is a core objective of the PRGF-supported program for 2006–08 and Madagascar's new poverty reduction strategy for 2007–11, the MAP.

3. This paper attributes Madagascar's poor tax performance to the complexity of its tax system, and the weakness of the tax administration. The next section uses cross-country evidence to estimate the tax revenue potential at about 14 to 15 percent of GDP, which is 30 to 40 percent more than current revenue. The third section analyzes the shortcomings in Madagascar's tax policy, which explain such low revenue performance. And the last section sums up key tax policy reforms that are needed to meet the tax revenue objective of the MAP.

B. Revenue Under-Performance

4. **Madagascar has some characteristics of a relatively modern tax system, with most of the revenue generated by indirect taxes**. Custom duties account for a declining share of tax revenue, as the authorities have been liberalizing their trade regime on an unilateral and regional basis.[2] The low share of trade taxes may also reflect the weakness of the customs administration (Montagnat–Rentier et al., 2006). The tax system is characterized by a single VAT rate, a set of corporate and individual income taxes, a four band tariff structure, and various registration duties (which are summarized in Appendix III.1).

---

[1] Prepared by Christian Josz, with the assistance of Leighton Harris and Asegedech WoldeMariam. Based on the February 2007 Aide-Mémoire of the Tax Policy mission 2007 "Madgascar-Towards a Simple, Fair Tax System Conducive to Growth" by Michael Keen, Alain Jousten, Christian Josz and Martin Grote.

[2] See Chapter II, The Economic and Fiscal Impact of Joining the SADC FTA.

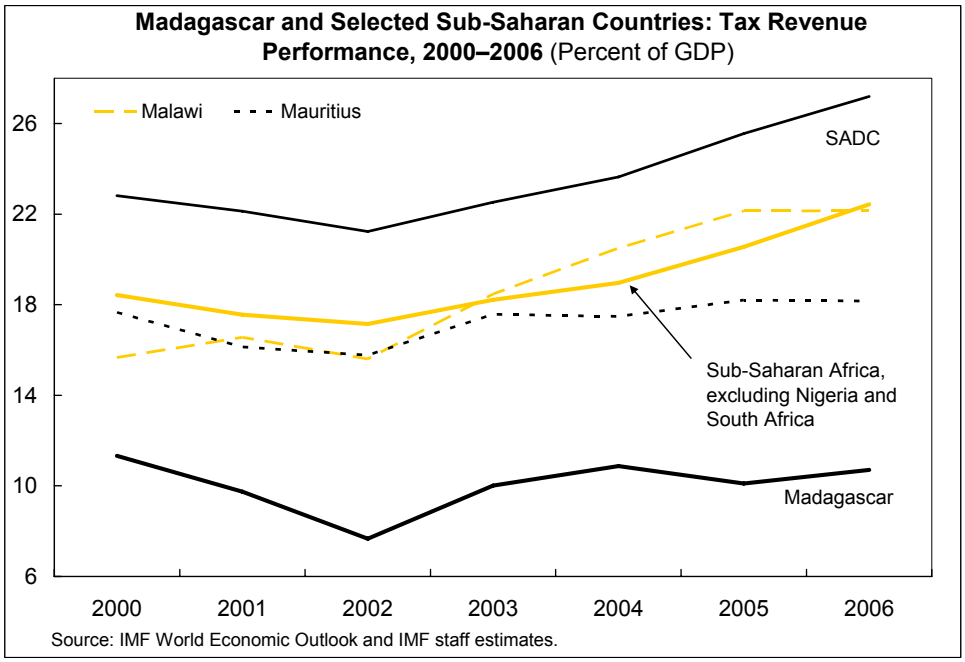
Madagascar: Central Governement Tax Revenue
(Percent of GDP)

	2000	2001	2002	2003	2004	2005	2006
Tax revenue	11.3	9.7	7.7	10.0	10.9	10.1	10.7
Taxes on Income, Profits and Capital gains	1.7	1.9	1.7	1.6	1.9	2.1	2.6
Corporate income tax (IBS)	0.9	1.0	0.7	0.8	0.9	1.2	1.3
Personal income tax	0.6	0.7	0.7	0.7	0.8	0.7	0.8
Nonwage income (IRNS)	0.1	0.1	0.1	0.1	0.1	0.2	0.1
Wage income (IRSA)	0.5	0.6	0.6	0.5	0.6	0.6	0.6
Synthetic tax (IS)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tax on financial income (IRCM)	0.2	0.2	0.2	0.1	0.2	0.2	0.5
Property tax	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Taxes on goods and services	7.8	6.3	4.9	6.7	7.4	6.7	6.7
VAT	4.7	4.2	3.0	4.2	4.4	3.9	3.7
Domestic goods and services[1]	2.0	1.8	1.5	1.9	2.1	1.8	1.5
Imports	2.7	2.4	1.5	2.3	2.3	2.1	2.2
Transaction tax (TST)	0.0	0.0	0.0	0.0	0.1	0.1	0.1
Excise taxes	0.8	0.5	0.5	0.7	0.6	0.5	0.5
Domestic goods	0.6	0.4	0.3	0.5	0.5	0.4	0.5
Imports	0.2	0.2	0.1	0.2	0.1	0.1	0.0
Fees	0.7	0.5	0.4	0.6	0.5	0.4	0.4
Taxes on petroleum products	1.5	0.9	0.8	1.1	1.7	1.5	1.9
VAT	...	...	...	...	...	...	1.1
Excise tax (TPP)	...	...	...	...	...	...	0.8
Other	0.1	0.1	0.1	0.1	0.1	0.1	0.1
International trade taxes	1.7	1.4	1.1	1.5	1.5	1.2	1.3
Custom duties	1.5	1.3	1.0	1.4	1.4	1.1	1.2
Transfer tax	0.1	0.1	0.1	0.1	0.1	0.1	0.1

Source: Ministry of Finance and Budget; and Fund staff estimates.

[1] VAT and Transaction tax before 2004.

5. **Yet, Madagascar's revenue performance counts among the weakest in the world, in spite of statutory rates, which are close to those observed in the rest of Africa**. Revenue performance has stagnated since 2000 in Madagascar while it has on average significantly improved in sub-Saharan Africa. Tax revenue performance collapsed in 2002 as a result of the political crisis. It subsequently seesawed on account of various tax policy measures including a temporary capital goods import tax exoneration scheme during September 2003–August 2005, the elimination of the 50 percent investment deduction in the 2004 Budget, and the increase in excise taxes on petroleum products and imposition of interest payment on public debt instruments in the 2006 Budget. It has not yet recovered to its 2000 level.



Madagascar and Africa: Statutory Tax Rates, 2006.
(Percent)

	Corporate income statutory tax rate	VAT	Unweighted average tariff
Madagascar	30.0	18.0	13.5
Average [1]	30.2	16.5	14.8
SADC	28.1	15.6	12.7
COMESA	27.6	16.0	14.3

Source: Price Waterhouse Coopers and The World Bank: 'Paying Taxes, The Global Picture', 2006; and Fund staff estimate.

[1] 46 African countries.

6. **Econometric estimates indicate that current tax revenue performance is about 5 percent of GDP lower than tax revenue potential**. Lacking a clear prescription from theory, a common approach to assessing whether the level of tax revenue in a developing country is appropriate is to compare it with the tax burden of a representative group of both developing and developed countries, taking into account some of these countries' characteristics (Tanzi and Zee, 2000). Variables often used include per capita income, the share of agriculture in GDP and the openness of the economy. Using these variables allows explaining a fair proportion of the variation of tax performance in 30 countries. The results of the cross country regression analysis show that the current tax revenue performance in

Madagascar is about 5 percent of GDP lower than its tax revenue potential (Annex Table), which is similar to the tax revenue underperformance estimated by Kopits et al. (2003) using the same methodology.

Madagascar and Selected Countries: Tax Performance Determinants

Dependant variable: Tax revenue, percent of GDP, 2005	
Explanatory variables [1]	
Agriculture value added, percent of GDP	-0.103 *
	(0.062)
Imports of goods and services, percent of GDP	0.122 **
	(0.045)
Real GDP per capita, 2000 U.S. dollars [2]	0.0005 **
	(0.0001)
Constant	11.590 **
	(2.570)
Adjusted R-squared	0.51
Observations [3]	30

[1] Standard error in parenthesis. ** denotes statistical significance at the 1% level and * at the 10% level.
[2] Converted using market exchange rates.
[3] See Annex Table.

7. **Tax revenue underperformance stems from income taxes, taxes on international trade, and excise taxes**. The information in the following table provides some indication of where the pattern of receipts in Madagascar differs from that in comparator countries—and hence some hint as to the areas in which receipts might be enhanced. Three features stand out:

- *Relatively low receipts from income taxes, both personal and corporate*. Having said that, however, a modest increase in corporate income tax revenue occurred recently, possibly reflecting the impact of policy measures taken to broaden the tax base of the common corporate tax regime (¶4).

- *A relatively low reliance on trade tax revenues,[3] reflecting recent unilateral and regional measures of trade liberalization*. Although a welcome feature in structural terms, it does pose a challenge for revenue performance. This is likely to be reinforced in the coming years by the implementation of a policy of internal free trade

[3] This is overstated, however, to the extent that the differential excises that persist in Madagascar (¶16) are economically equivalent to tariffs.

within the Southern African Development Community (SADC) by 2008. However, given that imports from other SADC member countries are fairly limited, a much bigger effect should be expected if SADC adopts a common external tariff that is lower than the current average tariff. Looking further forward, other measures of trade liberalization, including the implementation of the Economic Partnership Agreement with the European Union, will further reduce revenues from this source. Beyond these trends toward lower customs revenues, there is substantial scope for improving revenue collection at the border through a program of ongoing customs administration reforms, as serious shortfalls in customs valuation and clearance procedures appear to have permitted about 20 percent of imports to depart from established procedures in 2006.

- Fairly high receipts from the VAT (which reflect in part a VAT rate above the regional norm), but a weaker yield from the excises.

Madagascar and Low Income Countries: Composition of Tax Revenue.
(Percent of GDP) [1]

	Year	Tax Revenue	Taxes on Income, Profits and Capital Gains			Property Taxes	Domestic Taxes on G. and S.				International Trade Taxes			
				Of which:				Of which:				Of which:		
								Sales Tax				Custom Duties		
			Total	Individual	Corporate		Total	or VAT	Excises	Other	Total	Import.	Export.	Other
Madagascar	2005-06	10.4	2.4	0.8	1.6	0.1	6.7	5.1	1.5	0.1	1.2	1.1	0.0	0.1
		(100)	(23)	(8)	(15)	(1)	(64)	(49)	(14)	(1)	(12)	(11)	(0)	(1)
Low income countrries [2]	2000-01	13.7	3.9	1.9	2.0	0.2	5.9	3.5	2.0	0.4	3.7	2.4	0.2	1.1
		(100)	(28)	(14)	(15)	(1)	(43)	(26)	(15)	(3)	(27)	(18)	(1)	(8)
Difference		-3.3	-1.5	-1.1	-0.4	-0.1	0.8	1.6	-0.5	-0.3	-2.5	-1.3	-0.2	-1.0

Source: Ministry of Finance and Budget; and Fund staff.

[1] Figures in parentheses are percentages of total tax revenue.
[2] 26 countries, Keen and Simone (2004), Table 3, p. 311.

8. **The size of the informal sector does not appear to explain the relatively weak revenue performance: recent estimates put the informal sector in Madagascar at around 39 percent of gross national income, which is large but around the average for developing countries (Schneider, 2005).** Rather the combination of about average statutory tax rates and low revenue performance points to the narrowness of the tax base, which stems from generous tax exemptions and low tax compliance because of the complexity of the tax system and weaknesses in tax administration. The next section reviews the main shortcomings of the tax system behind revenue under-performance and proposes priorities for reform.

C. Tax Policy Reform Priorities

Towards a reformed and universal corporate income tax regime

9. **The corporate income tax yield has been low because of the complexity of the tax code, exemptions, and weaknesses in tax administration**.

- *A first source of complexity is the juxtaposition of a general corporate income tax regime and a special tax regime for Export Processing Zone (EPZ) companies*. EPZ companies benefit from exemptions of custom duties and VAT on imports, tax holidays for up to 15 years, a reduced statutory rate of 10 percent, and a 75 percent tax credit for investment. EPZ status is available to enterprises in a wide range of activities, conditional on their exporting at least 95 percent (by value) of their output. Unusually, qualifying enterprises are not agglomerated into a few securitized areas: each qualifying enterprise—around 259 were registered in 2006, of which 184 reported positive turnover—is a zone in itself. Although the fiscal cost of the EPZ regime appears low because most of EPZ companies generate low profit margins,[4] it constitutes a potential source of revenue leakage as it creates incentives to channel transactions subject to the common regime to the more advantageous special regime. The tax and customs administration and EPZ companies need to allocate resources for preventing much abuse.

- *Other sources of complication include the many exemptions in the tax code, the constant changes in the tax legislation, and the intricacy of depreciation provisions*. In addition to special regimes applicable to EPZ companies, oil companies and large mining projects (¶20), the tax code includes special treatments applied to leasing and micro-credit activities (Appendix III.1). These special regimes trigger a continuum of requests for special treatment from tax payers subject to the common regime. These requests result in frequent changes to the tax code, which have rendered it more and more complex to administer both for tax officials and tax payers. The system of depreciation allowances identified in the regulations is complex: over 30 asset classes are distinguished in the regulations, with straight line depreciation for each, but with optional accelerated depreciation for some.

- *Tax administration officials are spread too thin at the Directorate of Large Enterprises*. The Directorate of Large Enterprises (DFGE) account for about 80 percent of the domestic tax revenue collected but is only staffed by 20 out of the 190 tax inspectors of the Tax Directorate. This allows only very limited fiscal control (100 companies of the 1200 enterprises managed by the DFGE in 2006,

[4] Keen et al. (2007) estimated the fiscal cost of the EPZ regime at about 0.1 percent of GDP in 2006.

World Bank, [2007]), and results in over-allocation of scarce administrative resources to relatively low-yielding activities.

10. **In order to simplify the corporate income tax system, the priority is to reintegrate EPZ companies into a common and more attractive corporate income tax regime**. The EPZ provisions are overly-generous and the common regime is becoming increasingly unattractive as countries have been reducing statutory corporate income tax rates all over the world (Keen and Simone [2004]), including in the SADC and the COMESA where the statutory corporate income tax is now lower on average than in Madagascar (¶5). One option would be to adopt a two-pronged approach of simultaneously phasing out the EPZ regime and increasing the attractiveness of the common regime. First, while no new EPZ firms should be created, it is important that the benefits enjoyed by established EPZ firms be respected, in order to preserve the credibility of government policy announcements. This includes the standard benefits of EPZ (duty relief and VAT zero-rating)—which should in principle apply to all exporters. In addition, firms that have already entered tax holiday periods would continue to enjoy such holidays. However, the reduced rate of corporate income tax rate should not be allowed to continue indefinitely at 10 percent. Second, changing the parameters of the common regime is an essential element of the approach. This would entail a statutory rate that, in combination with a simple regime of accelerated depreciation, is low enough to remain attractive by international standards.

11. **Adopting a common, streamlined tax code applicable to all enterprises is the direction in which more and more countries are following, in order to attract investment**. It is consistent with current initiatives toward tax coordination within SADC, which recognize—as does for example the Code of conduct on business taxation adopted within the European Union (a non-binding agreement to freeze and roll back tax incentives), and similar initiatives in Central America and other parts of the world—the attractiveness of collective action to address the risk of ruinous competition in offering tax incentives.[5] Such a strategy is one now being followed by several countries eager to establish a strong reputation for their openness to business (Box III.1). This reflects in part awareness that special treatments have simply not had the beneficial effects on investment, or the spillovers to the domestic economy that had been hoped for. It also reflects an increasing recognition that, as

[5] SADC's Finance and Investment Protocol, which member states began to ratify in October 2006, provides guidelines to address the growing concern that a proliferation of selective, discretionary tax incentives within the region's member states could trigger an unsustainable race to the bottom with degrading effects on members' income tax systems. Hence, the Protocol states that "State Parties shall endeavor to achieve a common approach to the treatment and application of tax incentives and will, amongst other things, ensure that tax incentives are provided for only in tax legislation" (Article 4 of Annex 3). While the current language points to only moral suasion through the political process, Article 2 of Annex 3 in fact binds member states to report and record fully all existing tax expenditures.

competitive pressures lead to a reduction in statutory tax rates around the world (both import duties and business taxation), it becomes increasingly pointless to award any preferential treatment. It is better to offer companies low tax rates on a broad basis, thus safeguarding tax revenues.

Box III. 1. Eliminating Special Treatment and Reducing Rates: Examples of Recent Tax Reforms

Egypt passed a new income tax law in mid-2005 that reduced the top marginal tax rates on income and profits from 32 to 20 percent for individuals and from 40 to 20 percent for corporations and partnerships (rates for petroleum, the Suez Canal authority, and the central bank were left at 40 percent). This reform also increased the exemption threshold, liberalized depreciation, broadened the tax base by eliminating deductions, and provided for the phasing out of tax holidays while grandfathering current beneficiaries. Importantly, these reforms have been accompanied by extensive and continuing reforms of tax administration, including the introduction of self-assessment and a reform of the tax treatment of SMEs.

In **Mauritius**, the 2006 budget speech announced a package of reforms that included the integration of EPZ and non-EPZ sectors and the removal of all existing provisions relating to tax credits and tax holidays. At the same time, the corporate tax rate was reduced from 25 to 22.5 percent with a view to further reducing it to 15 percent by 2009 (with the intention of also taxing personal income at the same flat rate). Under the reform package, depreciation will be shifted from straight line to declining balance for all assets, except non-hotel buildings, and the ceiling for fully expensed equipment or machinery in the first year will be raised.

The **Slovak Republic** adopted in 2004 a single rate of 19 percent tax for both corporate and personal income. The reduction in the corporation tax, previously at 25 percent, was combined with more rapid depreciation, more generous carry forward rules, the elimination of tax holidays for new enterprises and tighter rules for provisioning and reserves.

Toward a simplified and fairer personal income tax regime

12. **Design flaws have affected the yield of the personal income tax**. The most important structural problems are the undervaluation of fringe benefits and the inconsistency between the tax income brackets of the two main personal income taxes. The treatment of fringe benefits in the personal and corporate income tax codes is asymmetric. In particular, the implied valuation of access to a car is extremely low (in the order of US$5 or 8 per month), and only half of the value of housing is actually added to personal income. Moreover, domestic service is valued by reference to the beneficiary's income rather than its cost. Meanwhile, the employer is able to deduct 100 percent of these costs against the corporate tax. The structures of tax rates under the wage income tax (IRSA) and the nonwage income tax (IRNS) lack any coherence or correspondence between the schedules: the structure of (annual) tax brackets under IRNS and (monthly) tax brackets under IRSA is such

that the same earned taxable income attracts less tax under the IRSA than under the IRNS, except for the highest income.

Madagascar: Personal Income Tax Brackets

Tax on Wage Income (IRSA)		Tax on Nonwage Income (IRNS)	
Taxable income MGA per month	Tax payable	Taxable income MGA per year	Tax payable
Less than 50,000	MGA 300	Less than 200,000	MGA 2000
50,001-100,000	5.0%	200,001-500,000	5.0%
100,001-300,000	15.0%	500,001-4,000,000	15.0%
More than 300,001	30.0%	More than 4,000,001	30.0%
Memorandum item:			
Minimum wage	MGA 57,000		

Source: Ministry of finance and budget.

13. **Priorities to improve revenue performance of the personal income tax system, and streamline it, include taxing fringe benefits at market value and harmonizing the income brackets of the taxes on wage and non-wage income**. Fringe benefits should be taxed at their market value. This may in some cases be difficult to observe, but not in those most important in Madagascar: the costs of company cars, housing costs and domestic service are all being deducted by employers. A first step toward modernizing the personal tax system is to establish a common rate structure between the IRSA and IRNS. In order to simplify the administration of the system, the number of rates should be reduced, with a higher minimum rate than at present, and an increase in the exempt amount (relative to that under the current IRSA) to protect the poorest tax payers. In order to strengthen the fairness of the tax system, tax enforcement on the self-employed should be improved. In the medium term, salary and nonsalary income should be taxed in aggregate rather than separately.

Further streamlining taxes on consumption

VAT

14. **Although the VAT generates about half of tax revenue, its productivity is comparatively low**. The VAT in Madagascar has many features of a modern system. It has only a single rate. There is only one single threshold for VAT registration valid for both individuals and corporations. The list of exemptions is fairly limited but was expanded in the 2007 Budget. The strong performance of VAT revenue owes more to a relatively high rate than to the productivity of the tax, i.e., the amount of revenue collected per percentage of the tax rate, which is relatively low. The threshold for VAT registration is low by international standards, however, which is burdensome both for the administration and in

terms of compliance: it forces the tax administration to manage an excessively large number of VAT tax payers, with relatively low liability, and to divert its scarce resources from the timely handling of the largest tax payers' VAT credits, which hurts the credibility of the VAT. Moreover, the high and consistent level of accumulated VAT credits in the trade sector, which mainly consists of selling imported goods at a profit (and hence with positive value added), is suspicious, and indicates that insufficient attention is paid to controlling VAT filings.

Madagascar and Selected African Countries: VAT Revenue Productivity [1]

	Applicable year	Current Standard VAT Rate (Percent)	Threshold for VAT Registration (U.S. dollars)	Total VAT revenue (Percent of consumption)	Total VAT revenue (Percent of GDP)	Revenue Productivity [2] Based on Consumption	Revenue Productivity [2] Based on GDP
South Africa [3]	2004	14.0	48,689	7.4	6.5	0.53	0.46
Mauritius [3, 4]	2004	15.0	97,543	9.3	6.8	0.62	0.45
Ghana [4]	2004	12.5	10,952	6.1	5.6	0.49	0.45
Botswana [3]	2004	10.0	45,953	9.2	4.5	0.92	0.45
Namibia [3]	2004	15.0	32,460	6.2	5.0	0.42	0.33
Kenya [3]	2005	16.0	23,334	5.4	5.1	0.34	0.32
Zambia	2004	17.5	61,216	6.7	5.3	0.38	0.30
Malawi [3]	2001	17.5	15,259	5.3	5.2	0.30	0.30
Mozambique	2004	17.0	4,091	5.6	4.7	0.33	0.28
Rwanda [4]	2005	18.0	27,118	4.9	4.8	0.27	0.27
Tanzania [3]	2005	20.0	33,088	5.7	5.2	0.28	0.26
Madagascar	**2006**	**18.0**	**25,000**	**5.4**	**4.9**	**0.30**	**0.27**
Uganda [3]	2004	18.0	27,413	4.7	4.1	0.26	0.23
Unweighted average		16.0	34,778	6.3	5.2	0.42	0.34

Sources: IMF, Country documents ; *World Economic Outlook* (IMF); *African Tax System* (IBFD); *Corporate Taxes 2003-2004, Worldwide Summaries* (PricewaterhouseCoopers); and Fund staff estimates.

[1] Central government.

[2] Revenue productivity = Total VAT revenue as percentage of consumption or GDP, divided by the VAT standard rate.

[3] The data reported as Fiscal Year in the country documents, however, for comparison purposes, the data was converted into Calendar Year.

[4] Budgetary central government.

Madagascar: Accumulated VAT Credits, 2006.

Sector	August		December	
	MGA billion	Percent	MGA billion	Percent
Industry	27.1	37.1	35.3	42.4
Trade	16.7	22.9	16.8	20.2
Petroleum sector	4.6	6.3	7.1	8.6
Construction	8.2	11.3	6.5	7.8
Mining	4.5	6.1	5.1	6.2
Transport	2.0	2.8	2.2	2.7
Banking	2.3	3.2	2.2	2.7
Telecommunication	0.0	0.0	2.0	2.4
Services	2.9	3.9	2.0	2.4
Fishing and Cattle Breeding	2.3	3.2	1.6	2.0
Real estate	1.4	1.9	1.3	1.6
Agriculture	0.7	1.0	0.7	0.8
Hotels	0.0	0.0	0.2	0.3
Tourism	0.1	0.1	0.1	0.1
Inssurance	0.0	0.0	0.0	0.0
Total	73.0	100.0	83.2	100.0
Percent of GDP	0.6		0.7	
Of which:				
Reimbursable credits to exporters	26.1	35.8	14.6	17.6

Source: Ministry of finance and budget.

15. **Priorities to increase VAT productivity include raising the VAT registration threshold, clearing the backlog of VAT credits and submitting agricultural inputs to VAT**. Raising the VAT threshold will allow the tax administration to concentrate its efforts on tax payers who represent the highest revenue potential (Montagnat-Rentier et al., 2006). In addition, the government should clear the backlog of accumulated VAT credits to be reimbursed to exporters prior to 2006 (MGA 12.7 billion) and refund, within 60 days, VAT credit to exporters and to oil distributors for oil supplied to international carriers. In the medium term, the tax administration should implement a risk-based VAT repayment system, giving prompt refunds to tax payers with a good tax compliance track record and limiting comprehensive controls to those with a poor or unknown profile. Moreover, the government should also pay in a timely fashion its counterpart VAT on externally financed capital expenditure in order to allow construction companies to reduce their stock of accumulated VAT credits. Only if the government undertakes to fulfill its responsibilities by paying VAT and reimbursing valid VAT credits on time, can the VAT be truly neutral for producers. Another priority to increase VAT productivity is submitting agricultural inputs to VAT. This would allow taxing an important part of the informal sector with limited adverse distributional impact, as the farmers purchasing tractors or other agricultural inputs such as fertilizers are most likely to count among the better off.

Excises

16. **A too wide range of commodities is subject to excises, and the differential rate structure on domestic and imported goods constitute implicit tariff protection**. Excises[6]—all ad valorem, other than specific[7] taxes on petroleum products (the *Taxe sur les produits petroliers*, TPP)—are levied on a wide range of commodities. Around 80 percent of all revenue from the non-oil excises comes from alcohol and tobacco, in line with the primary purpose of excise taxes which is raising revenues by taxing at particularly high rates products that have a relatively price inelastic demand and/or generate significant adverse externalities. However, excise taxes are also levied on food products such as sugar and flour, which clearly do not fall in that category. Another peculiarity of excises is that, in many cases, higher rates are applied to imported goods than to domestic goods. This is contrary to rules of the World Trade Organization,[8] which call for protection implicit in the differential excise rate structure to be made explicit in the tariff code. Vehicle license fees were

[6] As recommended by Kopits et al (2003), the redevances have now been fully integrated into the excise system.

[7] An 'ad valorem' tax is one specified as a proportion of the selling price, and a 'specific' tax one specified as a fixed monetary amount per unit of the product.

[8] Of which Madagascar is a member.

abolished in 2006. The level of oil taxation (including excises and VAT) is about average by international standards, while the level of tobacco taxation is relatively high.

Madagascar and Selected Countries: Oil Price Levels and Taxation

		Diesel		Gasoline		Kerosene	
		Retail price	Taxes	Retail price	Taxes	Retail price	Taxes
		US$ c/l	percent of retail price	US$ c/l	percent of retail price	US$ c/l	percent of retail price
Zambia	Apr, 06	130.7	27.9	152.0	41.0	111.9	7.7
Malawi	May, 06	113.7	56.1	112.5	56.8	91.6	50.5
Tanzania	Apr, 06	96.0	45.3	100.6	38.0	87.5	31.6
Madagascar	**Dec, 06**	**94.5**	**27.1**	**108.8**	**38.1**	**73.6**	**1.1**
South Africa	Apr, 06	94.3	35.3	100.4	36.1	70.9	1.2
Kenya	Mar, 06	89.7	15.9	103.8	26.6	74.5	13.4
Ghana	Apr, 06	83.2	37.5	91.8	47.5	69.2	31.4
India	June, 06	70.6	35.9	103.6	55.1	19.6	11.4
Philippines	Apr, 06	65.7	15.0	73.2	25.9	70.1	15.0
Bangladesh	June, 06	65.5	35.6	91.1	25.0	65.5	35.6
China	end-2005	44.5	2.7	50.2	5.1	...	...
Average		86.2	30.4	98.9	35.9	73.5	19.9

Source: Malagasy authorities, Fund staff estimates.

Madagascar and Selected Countries:
Tax Rates on Cigarettes

	Tax Rate [1]
Botswana	32.5
Kenya	16.6
Lesotho	45.1
Madagascar	**159.3**
Malawi	30
Mauritius	143.2
Mozambique	56.3
Namibia	49
South Africa	48.3
Swaziland	71
Tanzania	19.9
Uganda	61.3
Zambia	75
Zimbabwe	41.4

Source: Ministry of finance and budget;
and Cnossen (2006), p.65

[1] Excise plus VAT, in percent of retail price.

Madagascar: Excise Tax Rates, 2006
(Percent)

Product	Domestic	Imported
Beer	53	69
Champagne	170	225
Cigarettes	135	230
Cosmetics	20	20
Flour	10	10
Fortified wine	154	205
Gemstones	50	50
Mineral water, ethyl alcool	180	180
Mobile phone services	5	5
Pay TV	10	10
Perfumes	100	100
Precious stones and jewelry	50	50
Spirits	170	205
Sugar	10	10
Tobacco products	44, 116, 135	80, 230
Water and soft drinks	20	20
Whiskey	282	326
Wine and Cider	40	69

Source: Ministry of finance and budget.

17. **Priorities for raising excise revenue performance include scaling down the number of products subject to excises, equalizing the rates on domestic and imported goods, and taxing vehicles**. All excises other than those on alcoholic drink, tobacco products, oil and mobile phones[9] should be eliminated. The hidden protection still provided in the excise structure should be suppressed by raising the rates applied to local products towards those levied on imports. Vehicle license fees should be reintroduced.

Reforming other taxes

18. **There is scope to eliminate nuisance taxes**. Some taxes are very complex but yield very little revenue. Such is the case of the Professional Tax (*Taxe professionnelle,* TP). The TP is a tax collected by the tax administration and the revenue is transferred to sub national authorities. Its revenue amounted to MGA 13 billion (0.1 percent of GDP) in 2006. It is levied on each entity of a corporation and varies according to the activity of the entity, the size of the town where it is located, and the rental value of the its fixed assets. Calculation of the TP is extremely complex: its description fills 45 pages of the Tax Code (compared to 10 pages for the VAT, which accounted for MGA 574 billion, or 4.9 percent of GDP) in 2006. If the TP were eliminated, it would need to be replaced by a budgetary transfer from the central government to sub national authorities. Madagascar also imposes a wide range of stamp duties, registration duties and taxes on insurance, which on aggregate raise no more than 0.1 percent of GDP. The review with a view to wholesale deletion of these taxes after careful review would clearly free administrative resources in corporations and the tax administration for more productive uses.

19. **In the medium term, there is scope to simplify the tax regime for small and medium sized enterprises (SMEs)**. Despite its simplification in the 2007 Budget, the tax system for SMEs remains complex (Appendix III.1). Below a turnover of MGA 20 million, individual persons are subject to the Synthetic Tax (IS), which is charged at 6 percent of turnover. Between MGA 20 million and 50 million, they have to pay the IRNS, the TP and the Transaction Tax (TST, 5 percent on turnover). Below a turnover of MGA 20 million, corporations are subject to the IBS and the TP, and, between MGA 20 million and 50 million, to the IBS plus the TST. Moreover, because most of the SMEs do not have reliable accounts, the TST, and most likely also the IS, are in practice not determined on the basis of the turnover but, instead, are negotiated with the tax administration, and thus are prone to abuses. To simplify the tax system for SMEs, the use of patent fees for the smallest

[9] Although not generating significant adverse externalities, cell phone use is commonly submitted to excise taxes in cash strapped low income countries.

traders could be explored. This would ease pressures on the tax administration and free resources for improving the treatment of large tax payers.

Reviewing the mining and petroleum codes

20. **Arrangements for the tax treatment of large mining and oil operations should be reviewed**. There is considerable interest in the mining and oil exploration possibilities available in Madagascar. This is one of the few areas in which, over the coming years, substantial additional revenues are evidently possible. Two large mining projects, of which the construction costs amount to about 60 percent of GDP, are underway: one to mine ilmenite, and the other to extract nickel and cobalt, starting in 2009/10. Oil projects are still in the exploration phase. The general framework for the tax treatment of mining is provided by the 1999 Mining Code, supplemented by the 2001 Law establishing a special regime for large mining projects. This law was amended in 2005. The fiscal regime of oil exploration is governed by the 1996 Petroleum Code. Since the main provisions of these tax regimes were adopted some time ago, the authorities should review whether their substance is not overly generous by international standards.

D. Conclusions

21. Madagascar's very low revenue level in spite of about average statutory tax rates points to the narrow tax base as the main explanation for the very weak revenue performance. Such narrowness stems from the coexistence of a streamlined and highly preferential tax regime for EPZ companies, along side a complex and uncompetitive tax regime for all other companies. Such a tax system has understandably generated a continuous demand for fiscal exemptions from tax payers subject to the common regime, which in turn has eroded the tax base. Such erosion has hindered the ability of the government to address the issues which are at the top of the list of investors' concerns, i.e., the lack of macroeconomic stability, the poor quality of the physical and legal infrastructure, and the low skill level of the labor force (Sha et al., 2005). The way out of this vicious circle is to put in place one simple, fair and competitive corporate income tax regime applicable to all companies, eliminate nuisance taxes such as the *Taxe Professionnelle* for all companies, and provide efficient duty draw back and VAT refunds to *all* companies. Such a simplification of the tax system would complement ongoing long overdue tax administration reforms for improving the treatment of large tax payers.

22. Other priorities include modernizing the personal income tax regime, streamlining the number of products subject to excise taxes, eliminating the tariff hidden in excises by raising the rates on domestic products to those on imports, and reviewing the mining and petroleum codes. Madagascar's mining and oil resources constitute both an opportunity and a challenge. The abundant natural resources present in Madagascar have the potential to generate high income for the government, investors and the Malagasy people alike. But very few low income countries have succeeded in transforming such potential into improved living

standards for the population at large. One element of success is to ensure a fair deal between the investors that extract the natural resources and the country, such that the national treasury transparently and appropriately shares in the benefits and risks of the extraction and transformation of natural resources. In light of the accelerated growth expected in the MAP from the mining and oil sectors, the authorities should review their mining and petroleum codes to make sure that a good balance is achieved between the interests of investors and those of the Malagasy people, and implement transparent procedures to collect and allocate revenue from natural resources.

References

Cnossen, Sijbren (2006), Excise Tax Policy and Administration in Southern African Countries (Unisa Press: University of South Africa).

International Monetary Fund, 2005, Republic of Madagascar: Ex Post Assessment of Longer-Term Program Engagement, Country Report No. 05/363.

Keen, Michael and Simone, Alejandro; 2004; "Tax policy in developing countries: Some lessons from the 1990s, and some challenges ahead," pp.302-352 in Gupta, Sanjeev; Clements, Ben; and Inchauste, Gabriela (eds): *Helping Countries Develop: The Role of the Fiscal Policy* (International Monetary Fund: Washington DC), 2004.

Keen, Michael; Jousten, Alain; Josz, Christian; and Grote, Martin; 2007; Madagascar: Vers un système fiscal simple, équitable et propice à la croissance, Technical Assistance Report, Fiscal Affairs Department, International Monetary Fund, Washington DC.

Kopits, George; Baldini, Alfredo; Schneider, Jean-Luc; and Tomaz, Joao A.; 2003; Madagascar: Vers la rationalisation du système fiscal, Technical Assistance Report, Fiscal Affairs Department, International Monetary Fund, Washington DC.

Montagnat-Rentier Gilles; Fossa t, Patrick; Vandenberghe, Pierre; and Parent, Gilles; June 2006; Madagascar: Réforme de l'administration fiscale et douanière; Technical Assistance Report, Fiscal Affairs Department, International Monetary Fund, Washington DC.

Price Waterhouse Coopers, The World Bank, 2006, *Paying Taxes: The Global Picture*.

Sha, Manju Kedia; Habyarimana, James; Cotton, Linda; and Rossignol, Ivan; 2005; World Bank, 2005, Madagascar: Investment Climate Assessment, Technical Report, Africa Private Sector Group, World Bank, Washington DC.

Schneider, Freidrich (2005), The size of the shadow economies of 145 countries all over the world: First results for the period 1999 to 2003, Discussion paper No, 1431(IZA: University of Bonn).

Tanzi, Vito, and Zee, Howell H., 2000, Tax Policy for Emerging Markets: Developing Countries, Working Paper/00/35, International Monetary Fund, Washington DC.

World Bank, 2007, Madagascar: Revue de Dépenses Publiques, Partie I: Macroéconomie et Finances Publiques, AFTPR, Région Afrique, Rapport No.: 38687–MG.

Annex Table. Madagascar and Selected Countries: Tax Revenue, Imports, Agriculture, Real GDP per Capita, and Tax Revenue Potential, 2005
(Percent of GDP, unless otherwise indicated) [1]

	Percent of GDP				Percent of GDP	
	Tax revenue (a)	Imports of goods and services	Agriculture, value added	Real GDP per capita (2000 U.S. dollars) [2]	Tax revenue potential [3] (b)	Tax revenue minus Tax revenue potential (a) - (b)
South Africa	25.1	28.4	2.4	3,432	16.5	8.6
Turkey	24.5	34.0	11.9	3,390	16.2	8.3
Estonia *	30.8	84.0	4.3	5,328	24.1	6.7
Malawi	22.1	63.7	32.6	148	16.1	6.0
Rwanda	13.6	31.0	40.9	258	11.3	2.3
Uruguay *	18.5	28.5	11.4	5,926	16.9	1.6
Bolivia *	15.1	26.5	15.7	1,039	13.7	1.4
Comoros	11.6	34.7	51.0	378	10.8	0.8
Kyrgyz Republic	16.3	56.8	30.5	319	15.6	0.7
Dominican Republic	16.8	38.8	13.1	2,514	16.2	0.6
Ethiopia	12.6	38.4	40.7	142	12.2	0.4
Côte d'Ivoire	14.5	42.4	26.4	573	14.3	0.2
Colombia *	13.9	22.1	12.6	2,099	14.1	-0.1
Tanzania	11.4	33.9	42.4	332	11.5	-0.2
Guinea-Bissau	11.5	50.7	59.3	133	11.8	-0.2
Peru *	13.3	17.9	10.1	2,206	13.9	-0.6
Denmark *	31.1	40.8	2.3	30,735	31.7	-0.7
Armenia *	14.0	42.1	24.7	986	14.7	-0.7
Australia *	24.1	20.8	3.0	22,083	24.9	-0.7
Sri Lanka	14.2	43.1	16.8	1,004	15.6	-1.4
Chile *	15.7	31.5	5.8	5,462	17.6	-1.8
Guinea	11.8	30.4	13.7	390	14.1	-2.3
Argentina *	14.2	18.4	10.4	7,483	16.5	-2.3
Pakistan	9.5	23.1	21.6	596	12.5	-3.0
Lithuania *	17.0	59.2	5.9	4,481	20.5	-3.4
Rep. of Azerbaijan *	16.0	72.7	12.3	945	19.7	-3.7
Thailand *	15.9	65.8	10.1	2,356	19.8	-3.9
Madagascar	**10.1**	**40.1**	**15.5**	**242**	**15.0**	**-4.9**
El Salvador *	11.0	45.2	9.5	2,106	17.2	-6.2
Tajikistan *	9.8	70.0	21.6	223	18.0	-8.2

Sources: National authorities; World Development Indicators, World Bank; and IMF staff estimates.

[1] A * denotes data is as of 2004.

[2] Converted using market exchange rates.

[3] Calculated using results of regression in paragraph 6.

APPENDIX III.1—MADAGASCAR: SUMMARY OF THE TAX SYSTEM, 2007

Tax	Type and scope of tax	Exemptions	Tax rate
1. Tax on income and profits			
1.1. Corporate income tax (*Impôt sur les bénéfices des sociétés*) (IBS)	The IBS is paid by companies regardless of their form and purpose. All legal entities are subject to the IBS. The IBS is paid before May 1 or October 1 or within two months of the end of the fiscal year. Unregistered persons are required to make an advance payment in Customs of 5% of the c.i.f. value credited against the IBS.	-Exempt: public entities, partnerships, and not-for-profit associations and organizations. -For qualifying companies receiving at least 60% of whose turnover comes from leasing, a two year holiday followed by IBS rate of 10% in 3rd year, 20% in 4th and droit commun from the 5th -5 year holiday for microfinance, with 50 percent reduction for mutual companies in 6th year. -Exemption from the IBS and the minimum levy for newly created companies (100% for the first two fiscal years and 50% during the third) until 12/31/06.	Rate: 30%. Minimum levy - MGA 100,000 + 5% of turnover (agricultural, industrial, mining, hospitality, tourism, and transport activities); –MGA 320,000 + 5% of turnover for other activities.
1.2. Tax on nonwage income (*Impôt sur les revenus non salariaux*) (IRNS).	Levied on net income from noncommercial professions. Affects primarily the liberal professions and office holders. Bimonthly estimated payments. Unregistered companies are required to make an advance payment in Customs of 5% of the c.i.f. value credited against the IRNS.	No exemptions.	Progressive rate by annual tranche in MGA - Up to 200,000 MGA 2000 - 200,001 to 500,000 5 % - 500,001 to 4,000,000 15 % - Over 4,000,001 30 %
1.3. Personal income tax (*Impôt sur les revenus des personnes physiques*) (IRSA).	Withheld at source by employers on wages and salaries. Application of a system of reductions for family obligations and a fixed deduction.	Exempt: family allowances, military and civilian disability pensions, veterans' pensions, compensation of the staff of diplomatic missions and international organizations, etc.	Progressive rate by monthly tranche in MGA -0 to 50,000 MGA 300 -50,001 to 100,000 5 % -100,001 to 300,000 15 % -Over 300,000 30 % Allowance for expenses: 30 % of gross income, ceiling of MGA 120,000 a month.
1.4. Global tax (*Impôt synthétique*) (IS).	Paid by individuals or individual companies with a turnover of between MGA 400,000 and MGA 20 million. The global tax is representative and exempts from the TP, the IRNS and the TST	If turnover is ≤ MGA 400 000 a year for persons not exercising an activity subject to the TP. Wholesalers and semi wholesalers are exempt from the IS.	6% of the presumptive base. Minimum of MGA 16,000
1.5. Tax on investment income (*Impôts sur les revenus de capitaux mobiliers*) (IRCM).	Levied on the payment of distributions by limited companies to their shareholders. Withheld at source by distributing companies.	Repayments of capital, current account transactions, credit unions, and mutual savings associations, etc.	15% for companies, individuals
1.6. Tax on transfers abroad (*Taxe forfaitaire sur les transferts*) (TFT)	Levied on transfers made to individuals abroad who are not subject to income tax or the professional tax in Madagascar	Study grants, transfers of sums originating from the sale of an asset located in Madagascar, sums on which the IRCM has been paid, the reimbursement of sums representing documented	10% of the amount of the transactions, deducted at source.

Tax	Type and scope of tax	Exemptions	Tax rate
		expenditures, etc.	
1.7. Real estate capital gains tax (*Impôt sur les plus-values immobilières*) (IPVI).	Levied on sales of property or property rights by individuals.	-Sale of property or property rights by central or local governments. -Capital gains on the sale of property listed among the assets of companies.	Less than MGA 2 million 5% MGA 2 to 4 million 10% MGA 4 to 6 million 15% MGA 6 to 8 million 20% More than MGA 8 million 25%
2. Taxes on goods and services			
2.1. Value added tax (VAT)	VAT liability threshold standardized at turnover of MGA 50 million regardless of the legal status of the company or individual. Refundable on sales and on the provision of services within Madagascar, and on imports. Monthly return required if turnover is higher than MGA 200 million and quarterly return for all other companies.	Exempt: pharmaceutical products, agricultural inputs, health services, etc.	Single rate of 18% Rate of 0% for exports
2.2. Transactions tax (*Taxe sur les transactions*) (TST)	Nonrefundable tax paid by individual companies with an annual turnover of between MGA 20 million and MGA 50 million. Possible to opt to be subject to VAT with the obligation to keep accounts.		5%
2.3. Excise tax (*Droits d'accises*) (DA)	Tax on certain imported or domestic products or services provided in Madagascar (tobaccos, beverages, mineral products, cosmetics and perfumes, vanillin, mobile telephone use, and paid satellite TV, etc.)	Exempt: alcohol products used in the preparation of medicines, unprocessed mining products, friction matches.	Rate and tariff of 5% to 326%.
3. Registration and stamp duties			
Registration duties	Levied on transactions relating to movable and immovable (rentals, sales, gifts) property.		Real property 6% + 2% Goodwill 6%+ 2% Vehicles 2% to 4% Securities 2% Commercial lease: 2% Perpetual lease: 1%
Land registration tax (*Taxe de publicité foncière*)	Levied on the entry of transfers of property in the land register.		Rate of 1%: in case of straight partition. Rate of 2%: other
Tax on insurance policies (*Taxe sur les assurances*)	Levied on insurance agreements and contracts.	Exempt: reinsurance contracts, social insurance, etc.	Rate of 4% to 20% depending on the nature of the risk covered by the insurance contract.
Stamp tax (*Droit de timbre*)	Levied on legal documents, correspondence to the government, invoices settled in cash, and official documents. Payment made by means of revenue stamp. Turnover threshold reduced to MGA 10 million for the option of payment of the stamp duty by filing consolidated returns.		-Document dimension stamp: MGA 200 to 400 -Ad valorem stamp: MGA 1 per tranche of MGA 200 -Receipt stamp: 5% -Passport stamp: MGA 10,000 to 52,000

Tax	Type and scope of tax	Exemptions	Tax rate
4. Taxes on goods and activities			
4.1. Professional tax (*Taxe professionnelle*). (TP)	Payable by companies which engage in a professional activity in Madagascar.	Employees, farmers, restaurants, and school canteens, etc.	Application of a tariff determined on the basis of a classification of companies according to their activities, turnover, etc. Exemption from proportional fee (*droit proportionnel*—DP) for individuals and legal entities engaged in an activity new to Madagascar for the first year of the activity.
4.2. Tax on income from property (developed and undeveloped)	Tax on developed property (*impôt foncier sur les propriétés bâties*—IFPB): paid by individuals who own or actually occupy real estate.	Exemptions: property used for religious or educational purposes or by charities; property belonging to the government. Five-year exemption for new buildings.	2% to 5% adopted by the local authorities. Lump-sum IFPB for buildings constructed with local authority permission. Lump-sum amount set after discussion by municipal council.
5. Duties and taxes on foreign trade			
5.1 Import duty.	Levied on the c.i.f. value of imports	Class 1 products (zero rate) in the Common External Tariff (CET). Elimination of duty under the COI, COMESA and SADC agreements subject to reciprocity and alignment of tariffs among member countries.	0%: fertilizers, agricultural equipment 5%: raw materials, inputs 10%: capital goods 20%: consumer goods
5.2. Petroleum tax.	Levied on petroleum products cleared for consumption. Specific basis (volume)	Oil products intended for the fueling of ships and aircraft for international transport.	Variable per liter tariff depending on the nature of the product
5.3. Commodity tax (*transit charge*)	Levied on the quantities of commodities imported by the port authorities.		Variable specific rates depending on the purpose and nature of the product.

Tax Regime of Export Processing Zone Companies

Taxes	Special Regime
Corporate Income Tax (IBS)	• Exemption : -for 15 years for Promotion-Management Companies which carry out construction, development, management and promotion of Export Processing Zones; -for five years for manufacturing companies ; and -for two years for service companies. • Rate: 10% after exemption period. • Minimum levy: 1.4% of turnover. • Tax credit corresponding to 75% of investment.
Tax on investment income (IRCM)	• Rate : 10%.

Source : Ministry of Finance and Budget ; and Fund staff.

IV. The Measurement and Use of Core Inflation in Madagascar[1]

A. Introduction

1. **The high volatility of Madagascar's inflation rate over the past several decades makes early identification of trends difficult for policy makers.** This paper proposes the development of a measure of "core" inflation for Madagascar to provide an alternative measurement of the underlying rate of inflation by volatile components that are subject to frequent supply shocks from the overall index. This indicator should better identify the current trend in inflation and thereby help policymakers avoid reacting to false signals as they manage monetary and fiscal policies.

2. **Core inflation has numerous meanings, but generally refers to a measure of inflation that excludes food and energy prices because these elements are viewed as volatile and supply-driven.** Core inflation is often used as a policy variable for monetary policy because it is aligned to demand pressures yet remains an unbiased indicator of inflation.[2]

B. Historical Inflation Volatility

3. **It's useful to review past inflation volatility to understand the challenge posed to policymakers.** Madagascar benefited from relative price stability during the first two decades after independence (1960–80). There were two periods of high inflation in the 1980s (Figure IV.1). The first spike followed years of large net bank financing of fiscal deficits, high money growth, persistent terms of trade shocks, and, in 1982, the replacement of the exchange rate peg to the French franc by a crawling peg with frequent adjustments. The second inflationary shock was an official devaluation in 1987, part of a wider liberalization effort supported by the IMF's Structural Adjustment Facility.

4. **Inflation soared again in 1994–96 in response to three shocks:** (i) a large depreciation of the exchange rate (almost 60 percent) after the shift to a floating exchange rate and introduction of an interbank foreign exchange market (MID) in May 1994; (ii) the January 1994 cyclone, which damaged the rice crop and led to a surge in rice prices; and (iii) a rapid expansion of the money supply in 1993–94 to accommodate a significant increase of credit to both government and nongovernment sectors. Inflation rose to over 70 percent at mid-1995 before declining to about 40 percent at year-end and further to 16 percent at the end of 1996, as a result of tightened monetary policy and a sharp reduction in the government budget deficit in 1996.

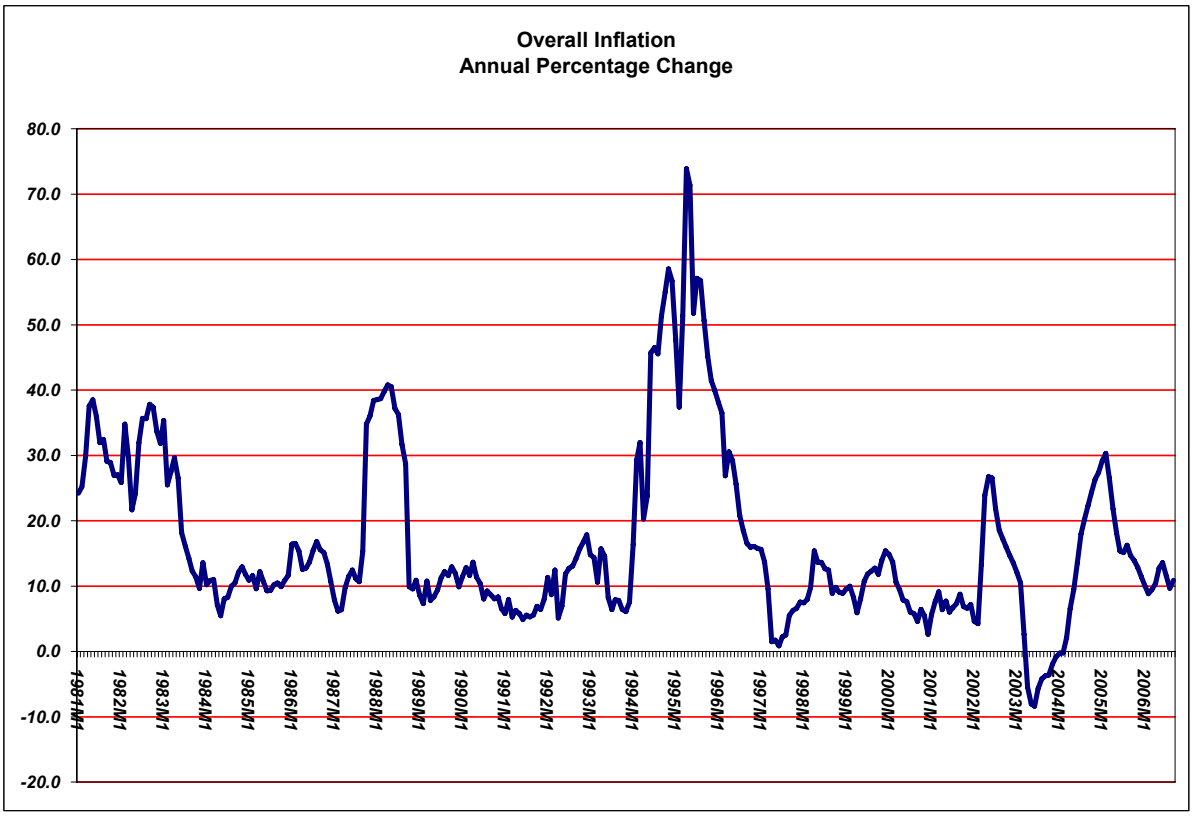
---

[1] Prepared by Mark Ellyne.

[2] Countries like New Zealand, the UK, and Canada use measures of core inflation as an intermediate target in their inflation targeting strategy (Inflation Targeting, 1999).

5. **There have been two inflationary surges since 2000.** The first occurred in 2002 in the aftermath of the 2001 presidential election and the civil disruption that followed, which triggered an oil shortage in much of the industrial area. The second, which began in mid-2004 and peaked in February 2005, was attributed to: (i) the impact of two cyclones in early 2004; (ii) a subsequent 50 percent depreciation in the exchange rate during that time; and (iii) a significant rice shortage. An energy shock at the end of 2005 that continued through mid-2006 led to only a small rise in overall inflation, largely because declining rice prices had an offsetting effect.

Figure IV.1. Madagascar: Historical Inflation Trends



6. **The volatility of Malagasy inflation has frequently made early identification of the inflation trend very difficult.** This volatility arises from: (i) domestic shocks (from monetary and fiscal policies as well as food production and political events); (ii) external shocks (energy prices, the terms of trade, and cyclones); and (iii) the exchange rate. For policymakers trying to control inflation, early identification of a change in trend is crucial. Thus, other measures of inflation that may reduce some of the noise in overall inflation may help identify the current trend.

C. Background on Core Inflation

7. **The most general model of inflation has four components: a long-term persistent trend, which may vary with time; cyclical factors, which may be linked to excess**

demand; periodic seasonality; and transient disturbances, which are often supply-related.

$$\Pi_{overall} = \Pi_{trend} + \Pi_{cyclic\ factors} + \Pi_{seasonal\ factors} + \Pi_{transient\ shocks} + \textit{random error} \quad \text{(Eq. 1)}$$

There have been various interpretations of core inflation.[3] Some viewed core inflation as most closely linked to the trend component. Others interpreted core inflation as the component reflecting expectations of consumers and producers about future inflation, which had no impact on real output in the medium to long term—most closely captured by the trend and the cyclical and seasonal factors. The transient shock component reflects relative price changes and is often described as "noise" blurring the more general trend of inflation over the medium to long term.

8. **Frequently, core inflation is measured as aggregate inflation excluding a variety of items whose price movements are considered to distort the underlying price trend.** Based on this approach, the overall headline inflation rate, usually measured by the Consumer Price Index (CPI), can be decomposed into core inflation, which is associated with expectations and demand pressures, and a transient component consisting of supply shocks.

$$\Pi_{overall} = \Pi_{core} + \Pi_{transient\ supply\ shocks} + \textit{random error} \qquad \text{(Eq. 2)}$$

9. **Central banks typically target and monitor multiple measures of inflation to decide whether additional monetary policy actions may be needed.** For example, an increase in overall inflation resulting from a rise in food prices owing to an adverse weather shock would not necessarily trigger a monetary policy response. Policy makers want to avoid overreacting to supply shocks in either direction. Thus, the use of core inflation as a guide is somewhat like the use of the nominal income rule (targeting money growth in line with nominal GDP growth): it can prevent procyclical tightening when there are adverse price and output shocks.

10. **There are three main approaches to the construction of alternative core inflation measures.** In each case, the 'core' measure should remove highly volatile elements like certain food and energy prices, administered prices, and tax changes.

- Exclusion-based approach – removes the price of fresh foods or other highly volatile food elements, energy, and all administered prices and tax/subsidy changes.
- Volatility-weighted approach – does not exclude any component but reweights all components in inverse proportion to a measure of their volatility.
- Trimmed mean approach – a percentage of the outlier components are trimmed from the consumer price index each period, the outliers varying with each period. (The median is one estimator in this class.)

[3] See Roger (1998) for a good review of the various concepts of core inflation.

11. **Alternative measures of core inflation should be evaluated against the following range of criteria:**

- Are the core inflation data available on a timely basis? They should be available at the same frequency as the overall inflation data and with a relatively short lag.
- Is the core indicator an unbiased measure of overall inflation over the long run? This may refer to a 12 to 24 month period.
- Is the path of the measure less volatile than the overall inflation? The goal of the core measure is to reduce volatility and to more clearly identify the inflation trend.
- Does the measure have predictive ability? Does is anticipate the path of overall inflation?
- Is the measure understood and accepted as credible by the public? Only a credible measure will help guide public expectations.

D. Construction of a Core Inflation Measure

Proposal for measuring core inflation

12. The reasons for establishing a measure of core inflation are to smooth the inflation path so that it will be easier for policy makers to identify inflation trends and avoid reacting to false signals. Below, we experiment with an exclusion-based measure of core inflation: overall inflation excluding rice and energy inflation.[4]

Identify and remove seasonality from the CPI

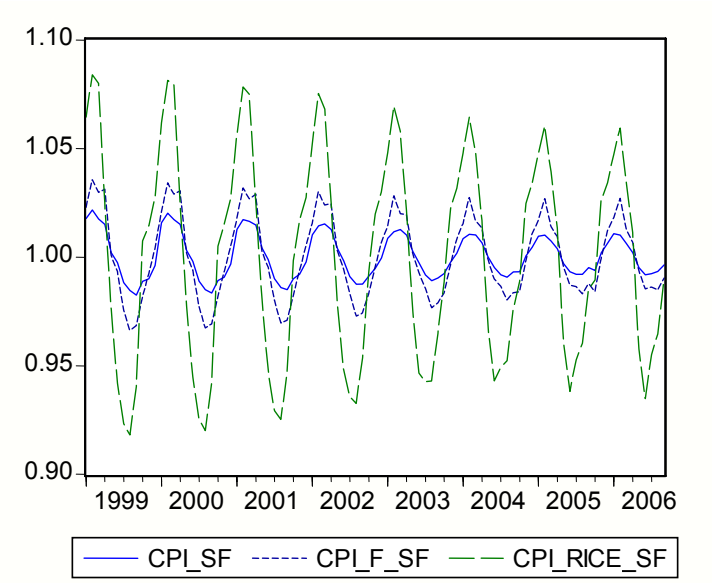
13. **Stable seasonality is an important source of volatility that can easily be removed when calculating core inflation and thereby more clearly identify the underlying monthly change in the CPI.** Technical analysis found stable seasonality in the overall CPI and the food CPI but not in the nonfood CPI (Item 2, Appendix IV.2).[5] Food seasonality appears to be driven by predictable, cyclic patterns in the rice price (Figure IV.2), which can account for swings of up to 12 percent over the course of the year. Thus, monitoring changes

[4] Alternative measures of core inflation should also be considered and tested statistically against previously mentioned criteria (¶11). Some background on the existing measurement system for the CPI is explained in Appendix IV.1.

[5] The US Bureau of Census X12 seasonal adjustment program in EVIEWS was used to identify statistically significant seasonality.

in the CPI is best done on the seasonally adjusted values or using the annual rate of change to avoid distorting the underlying inflation trend.

Figure IV.2. Madagascar: Historical Seasonal Factors, Overall consumer price index and Food and Rice Prices [6]



Identify and remove volatile components of the CPI

14. **The most volatile categories in the CPI can be identified by calculating the standard deviation of the 10 main CPI categories (Table IV.1), which shows that food and transportation have the highest volatility.** The source of the food volatility would appear to be rice, with a much higher volatility, and the transportation volatility would appear to originate from energy prices (Figure IV.3). All subcategories should also be tested to isolate other highly volatile elements.

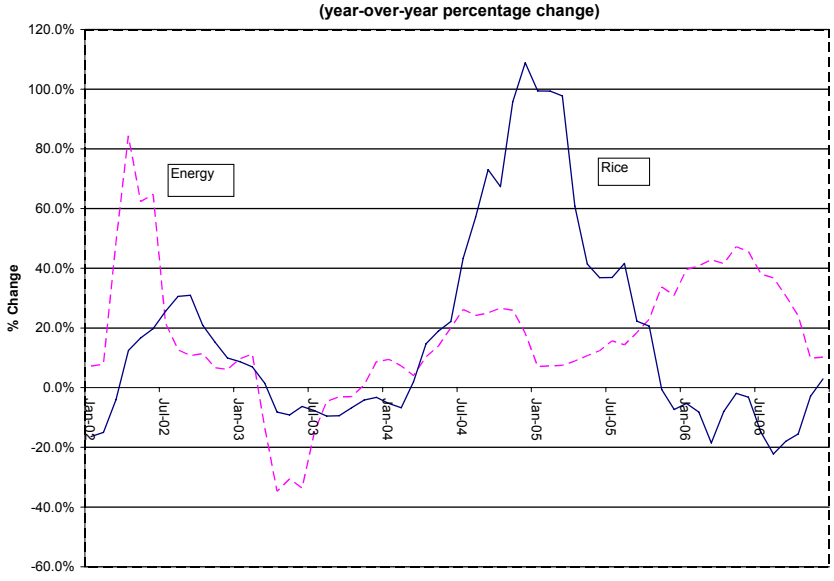
[6] See Item 2, Appendix IV.2, for details.

Table IV.1. Madagascar: Average Annual Inflation and Volatility [1]

	Weight	Average 2000m1-2006m9	Standard deviation
Overall CPI Categories	1.0000	11.0	8.7
Food, drinks and tobacco	0.5007	10.9	14.1
Textiles and clothes	0.0698	5.3	4.8
Housing, water, electricity, gas and other combustibles	0.1824	13.5	7.8
Furniture, household goods,	0.0456	8.6	5.6
Health	0.0261	6.6	5.8
Transportation	0.0804	16.3	19.5
Leisure and cultural events	0.0255	5.0	9.1
Education	0.0372	12.6	6.1
Hotels and restaurants	0.0151	9.5	11.7
Other goods and services	0.0171	12.4	11.2
Alternative Categories			
Food, drinks and tobacco	0.5007	10.9	14.1
Rice	0.1337	12.7	26.2
Non-rice food	0.3670	11.0	11.0
Nonfood	0.4993	10.6	8.5
Energy	0.0880	13.6	18.5
Nonenergy nonfood	0.4113	10.2	8.2
Core CPI		9.1	7.1

[1/] Defined as log of the price level in the current period less the log of the price level 12 months earlier, times 100.

Figure IV.3. Madagascar: Rice and Energy Inflation
(year-over-year percentage change)

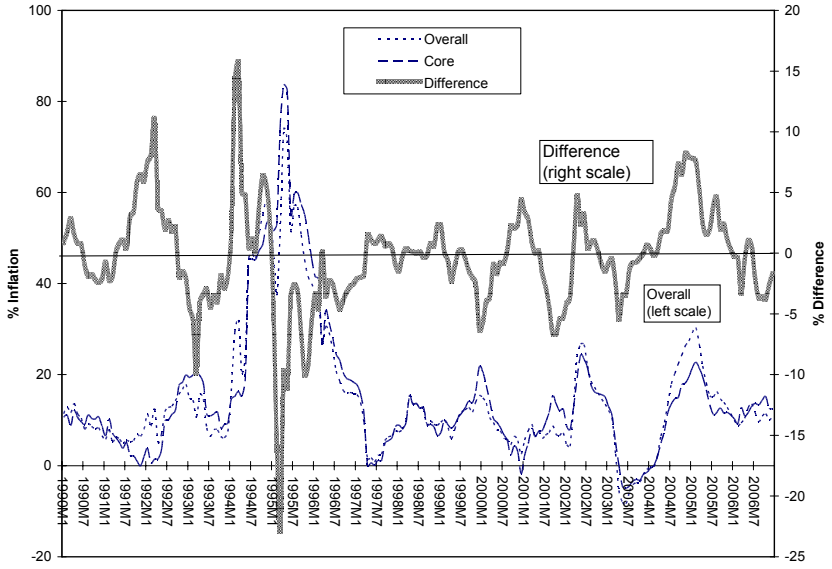


Calculation of core inflation

15. **For this exercise, core inflation (Π_{core}) is a weighted average of the CPI for nonrice food products and nonenergy nonfood products[7] (see components in Table IV.1).** While core inflation tracks the overall inflation rate, as expected, the period differences can reach up to 20 percent (Figure IV.4).

$$\Pi_{core} = (.3670/.7783)^* \Pi_{nonrice\ food} + (.4113/.7783)^* \Pi_{nonenergy\ nonfood} \quad \text{(Eq. 3)}$$

Figure IV.4. Madagascar: Overall and Core Inflation, and Difference



Properties of core inflation

Unbiased

16. **Core inflation should be an unbiased estimator of inflation.** This was tested by regressing core inflation on overall inflation (from 1991 through 2006m9) to obtain the following significant parameters:

$$\Pi_{overall} = .011 + .916^*\Pi_{core} \quad (R^2 = .931) \qquad \text{(Eq. 4)}$$

[7] Administered prices and interest payments would also normally be removed, but the necessary data were not available.

Wald tests indicated that the coefficient on core inflation (.916) was not statistically different from 1, and the intercept (.011) was not statistically different from zero, thus establishing core inflation as an unbiased estimator of overall inflation.[8] An ECM (error correction model) was estimated for this long-run relationship, and estimated an error correction coefficient of –0.11, which implies that it takes up to nine months to fully adjust to shocks (Item 3, Appendix IV.2).

Causality

17. **The Granger causality test between overall and core monthly inflation found that core inflation "Granger-causes" overall inflation but not vice versa (Table IV.2).**[9] This was tested over alternate time periods to ensure consistency.

Table IV.2. Madagascar: Granger Causality Test with 24 Lags, Alternative Periods

	January 1991–September 2006	January 2001–September 2006
H0: Overall consumer price index inflation does not Granger-cause core inflation.	Do not reject	Do not reject
H0: Core inflation does not Granger-cause overall inflation.	Reject at 0%	Reject at 0%

Relationship between core inflation and supply and demand factors

18. **Some statistical testing using correlation and simple regressions were done to estimate the effects of energy and rice prices, monetary growth, and the exchange rate on core inflation (Item 5, Appendix IV.2).** Although core inflation is free of the first-round effects of energy and rice price changes, it captures these effects in the longer run as they filter into the economy. Changes in the exchange rate, money supply and output take time to fully filter into prices.

- Energy price changes impacted core inflation for up to six months, with about 30 percent of the change in energy inflation being transmitted to core inflation.

[8] The two series are cointegrated as the residuals of the equation were found to be stationary using the ADF test.

[9] Because the Granger statistical test does not determine true causality but measures 'time precedence,' the term "Granger-causes" is used instead of "causes". Nevertheless, Granger-causality tends to be a useful concept in considering directionality of action.

- Rice price changes impacted core inflation for roughly up to three months, with about 16 percent of the change in rice inflation finally being transmitted to core inflation.

- Exchange rate changes had their maximum impact on core inflation at about three months but persisted for up to nine months, with about 20 percent of the exchange rate fluctuation ultimately transmitted into core inflation.

- Output growth takes 4–6 months to have its maximum impact on core inflation.

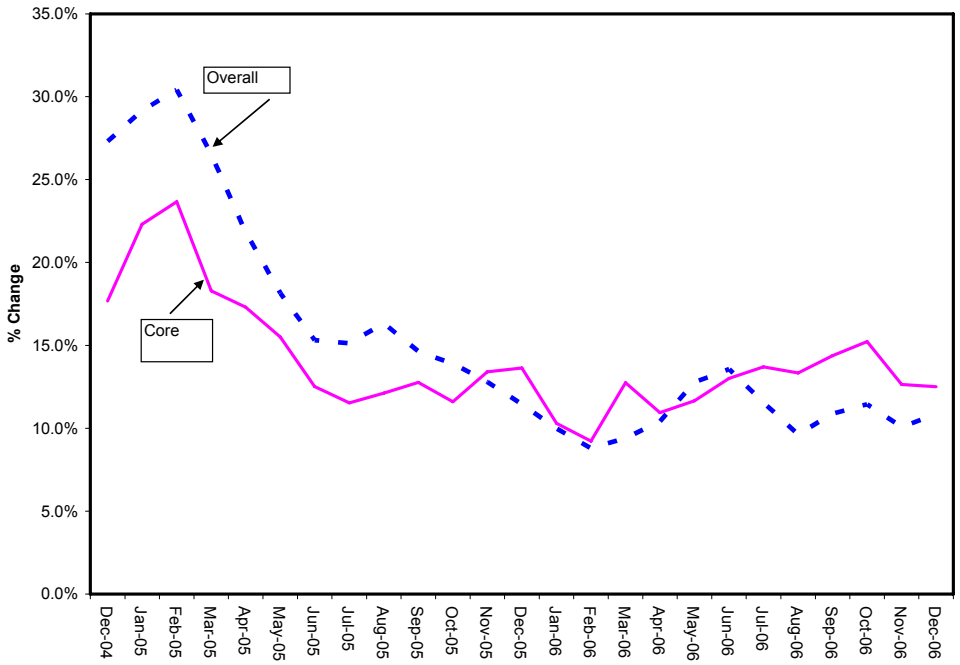
- Broad money growth appears to have its maximum impact on core inflation at around 6 months, with almost 50 percent of the change in money growth transmitted to core inflation.

Divergences

19. **The divergences between core and overall inflation provide the most interesting information.** During most of 2005, high rice prices (Figure IV.3) drove overall inflation higher than core inflation (Figure IV.5) despite some decline in energy prices. However, in the second half of 2006, overall inflation subsided to below the core rate as food prices fell and energy prices stabilized. Because overall inflation benefited from these positive price shocks, it would not have been appropriate to relax monetary policy until the core rate was clearly on a firm decline.

Figure IV.5. Madagascar: Overall Inflation vs. Core Inflation, 2004–06

(year-over-year percent change)



E. Core Inflation and Money Demand

20. **Having established the statistical benefits of the core inflation measure in the prior section, it is also important for policy purposes to verify that the core inflation measure functions well in a demand for money equation.** To this end, three alternative measures of inflation were compared—core, overall, and nonfood inflation—in a simple long-run money demand equation using monthly data from January 1999 through September 2006. [10]

21. **A standard money demand equation was used (Equation 5), with M3 as the intermediate monetary target variable (as previous work has demonstrated broad money to be most robust); real GDP[11]; the monthly treasury bill auction rate (I_tb); and the relevant CPI.**[12] This is similar to the work of Nassar (2005) except that he used the French interest rate as a measure for the price of money.

$$\text{Long-run money demand: } LM3 = \beta_1 * LCPI + \beta_2 * LGDPR - \beta_3 * I\_tb + \text{Constant} + \varepsilon \quad \text{(Eq. 5)}$$

Based on this long-run model, an ECM can be written as:

$$\text{Error Correction Model: } \Delta LM3t = \alpha 1 * \varepsilon_{(t-1)} + \alpha 2_i * \sum \Delta LM3_{(t-i)} + \sum \alpha 3_i * \Delta LCPI_{(t-i)} + \sum \alpha 4_i * \Delta LGDPR_{(t-i)} + \sum \alpha 5_i * \sum \Delta I\_tb_{(t-i)} + \text{Constant} + \text{Seasonal factors} + \text{error} \quad \text{(Eq. 6)}$$

Cointegration analysis

22. **Separate long-run money demand equations were estimated using cointegration equations (CEs) for each of the three inflation measures for the period January 1999 through September 2006 based on the Johansen maximum likelihood cointegration procedure (Item 6, Appendix IV.2).**[13] The core CPI performed best and had the best-behaved residuals. The coefficient on real GDP behaved badly in the equations with overall

---

[10] Although some criticize the use of high-frequency monthly data for such modeling, others, like Bryan and Cecchetti (1994) have successfully employed it. The time period for estimation was chosen based on data limitations and structural changes in the financial sector, in particular, a major shift occurred after the 1994 financial sector liberalization, as evidenced by the shift in real money balances (Item 3, Appendix IV.2)

[11] Annual GDP was interpolated monthly using the cubic spline distribution in EVIEWS; alternative interpolation methods were examined.

[12] Item 1, Appendix IV.2 contains a list of variable definitions.

[13] All variables were found to have first order integration, so that a first difference of their log values made them stationary for cointegration (see Item 6, Appendix IV.2).

and nonfood CPI. However, some experimentation with different time periods suggests there may be some instability in the equation—possibly owing to structural changes over time and volatility created by the high-frequency data. Nevertheless, the estimated vector error correction model with core inflation seems reasonable (equations 7 and 8):

- All signs are correct and magnitudes appropriate;
- The elasticity of money (1.61) is rather high; and
- The coefficient on the error term (–026) indicates an adjustment of 38 periods, about three years.

Eq. 7. M3 = 1.608*LCPI_CORE + .528*LGDPR - .024*I_tb + 3.371 + ε

Eq. 8. ΔLM3t =

- 0.02603728852*(LM3(-1) - 1.607746674*LCPI_CORE(-1) - 0.52813346*LGDPR(-1) + 0.02397343965*ITB(-1) + 3.371091312) + 0.1284186266*D(LM3(-1)) + 0.02266933095*D(LM3(-2)) - 0.1995307975*D(LM3(-3)) + 0.008659468307*D(LCPI_CORE(-1)) - 0.01667417489*D(LCPI_CORE(-2)) - 0.1916719494*D(LCPI_CORE(-3)) + 0.6694231464*D(LGDPR(-1)) - 2.00316082*D(LGDPR(-2)) + 1.937552546*D(LGDPR(-3)) - 0.0003845249901*D(ITB(-1)) + 0.00214613933*D(ITB(-2)) - 0.001740720109*D(ITB(-3)) + 0.009184388483 - 0.006806614364*@SEAS(1) + 0.009289837633*@SEAS(8) + 0.02109985438*@SEAS(10) + 0.01841122586*@SEAS(12)

23. **Some standard statistical tests were performed on the long-run money CE and ECM with CPI_core (Equations 7 and 8), which produced the following interesting conclusions:**[14]

- The coefficient on CPI_core is statistically different from 1.
- The error correction terms in the short-run equations for changes in prices, GDP, and the interest rate are statistically different from 0.
- Because the error correction coefficient on the error from the money equation is not statistically different from 0, money is weakly exogenous.

[14] The goal of this exercise was to determine which measure of inflation performs best in a simple demand for money equation. Further work should be done to perfect the money demand equation.

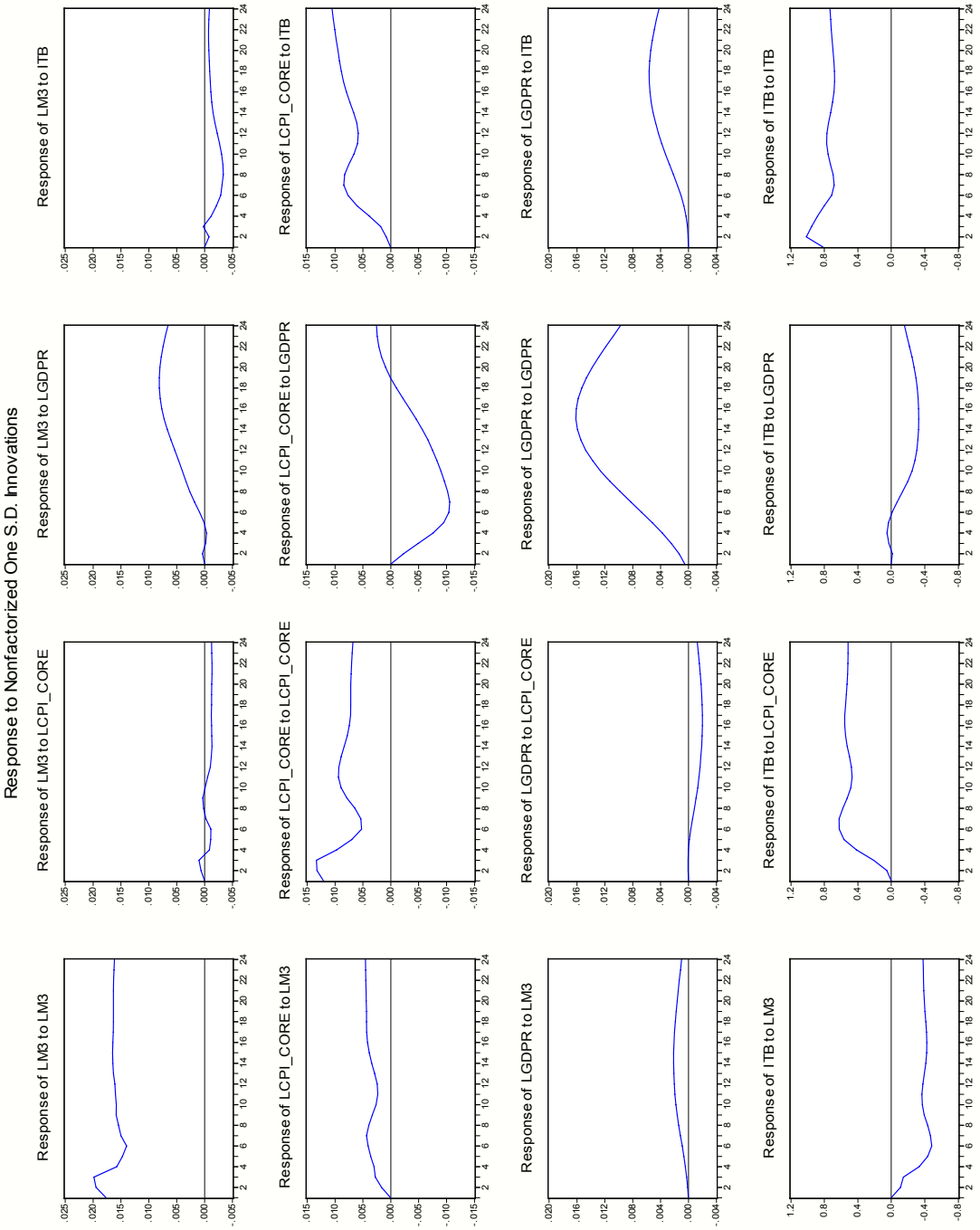
- Given the assumption of weak exogeneity, a Granger causality test was done on the group of three short-run explanatory variables versus ΔLM3. Because it found no significant causality, there is some evidence of a strong exogeneity of money.

Impulse response analysis

24. **Using the vector autoregression (VAR) for the money demand system of equations allows us to examine a shock of one standard deviation to each of the variables.** The first column of graphs in Figure IV.6 shows that a positive shock on money translates into higher inflation fairly rapidly, creates a temporary increase in real output, and leads to a decline in interest rates—all as commonly expected.

25. **Shocks to the other variables behave largely as expected: a positive shock to the CPI raises the interest rate and depresses output; it also leads to a slight decline in money.** A positive shock to real output reduces inflation and creates a reinforcing cycle of further growth for just over one year, allowing interest rates to fall. The shock to the interest rate in the last column looks highly stylized and not particularly relevant. The initial increase in the interest rate reduces money and adds to the price level, but the interest declines somewhat over the first six months, triggering a rise in output and further pushing prices up.

Figure IV.6. Madagascar: Impulse Response to Shocks of One Standard Deviation



F. Conclusions

26. **Preliminary results suggest it would be beneficial for the authorities to produce a monthly measure of core inflation.** One such measure was estimated here and seems relevant, although other measures should be tested. Results also suggest that the authorities calculate a monthly seasonally adjusted measure of overall inflation so as to better identify inflation trends and expectations. The launching of a core inflation measure and a seasonally adjusted index should initially be directed to the central bank and the ministry of finance. It might subsequently be made publicly available with a campaign to raise public awareness of the meaning and value of such measures, in order to anchor public expectations to these measures.

27. **The core inflation measure can highlight short-term underlying trends better than overall inflation by removing volatility due to energy and rice price fluctuations.** For example, in the second half of 2006 overall inflation declined from June and was lower than core inflation. This appears to have been the result of favorable price shocks from rice and energy that were camouflaging still-present inflationary pressures. The monitoring of core inflation, however, would suggest that monetary policy should remain tight until the downturn in core inflation is clear. The above analysis also found that a certain share of rice and energy supply shocks work themselves into the underlying inflation rate fairly rapidly—and faster than the effects of exchange rate and monetary movements.

28. **For monetary policy the measure of core inflation worked satisfactorily in identifying a long-run, stable money-demand relationship with M3.** That relationship exhibits a moderately strong exogeneity of money, i.e., a causality from money to prices. The stability of the relationship means that monitoring the path of core inflation is beneficial for monetary policy. In practice, it would seem that policy makers are already implicitly targeting the core rate of inflation because they are not projecting future supply shocks nor would they plan to monetize them.

29. **Many central banks have adopted explicit "inflation targeting" policies to anchor inflation expectations and thereby protect the value of money, make investment decision-making more effective, and dampen economic cycles.** Inflation targeting policies frequently use core inflation as the intermediate or final target. While M3 remains the key intermediate variable for the transmission of inflation in Madagascar, equations using currency in circulation demonstrated interesting results and might be explored further.

References

Armour, Jamie (2006), 'An Evaluation of Core Inflation Measures,' Bank of Canada Working Paper 2006-10.

Bryan, Michael and Cecchetti, Stephen (1994), 'Measuring Core Inflation,' in Monetary Policy, edited by N. Gregory Mankiw, 1994.

Inflation Targeting (1999), edited by B. Bernake, T. Laubach, F. Mishkin, and A. Posen.

Nassar, Koffie (2005), 'Money Demand and Inflation in Madagascar,' *IMF Working Paper* WP/05/236.

Roger, Scott (1998), 'Core Inflation: concepts, uses and measurement,' *Reserve Bank of New Zealand Discussion Paper* G98/9.

Sacerdoti, Emilio and Xiao, Yuan (2001), 'Inflation Dynamics in Madagascar, 1971-2000,' *IMF Working Paper* WP/01/168.

Silver, Mick (2006), 'Core Inflation Measures and Statistical Issues in Choosing Among Them,' *IMF Working Paper* WP/06/97.

APPENDIX IV.1—MADAGASCAR: EXISTING SYSTEM FOR MEASURING PRICES

Monitoring and collecting the data needed to compute the CPI is the responsibility of the National Institute of Statistics (INSTAT), which publishes monthly price movements. The main characteristics of the INSTAT collection and calculation mechanisms can be summarized as follows:

- The CPI is computed from [8190] price surveys in [1213] sales agencies located only in the urban areas of Antananarivo, Antsiranana, Fianarantsoa, Toamasina, and Majunga.
- The survey takes into account probable bargaining and disguised changes in prices.
- The consumption basket is derived from the 1999 Household Survey.
- Survey frequency differs by products: daily for rice; weekly for other mass market food products; monthly for the majority of the non-food products; and quarterly for public services and rent.
- A Laspeyres-type index is used for the computation.
- Presently, the index base is the average price level from January to December 2000.

The monthly CPI suffers from limited geographic coverage; it comprises five major urban centers but no rural areas. Moreover, owing to lack of financial means and technical staff, INSTAT often has problems collecting data.

APPENDIX IV.2—MADAGASCAR: VARIABLE LIST AND STATISTICAL RESULTS

Item 1. Madagascar: Variable List

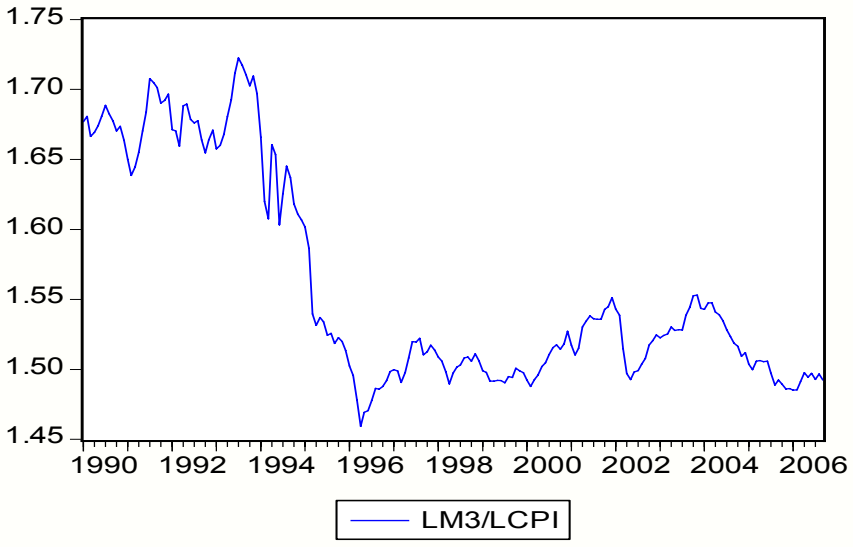
CPI	Overall consumer price index, published by INSTAT
CPI_Food	Consumer price index for food, drinks and tobacco products
CPI_Rice	Consumer price index for rice, domestic and imported
CPI_NF	Consumer price index for nonfood product
CPI_Energy	Consumer price index for petroleum and other energy (including electricity)
CPI_SF	Seasonal factor for CPI
M3	Broad money, includes foreign currency deposits, from BCM
GDPR	Real GDP in 1984 constant prices; distributed monthly using the spline function in EViews.
I_tb	Interest rate on treasury bills, weighted average for all maturities
L	log function operator
Δ	first difference function operator
DL12	difference between log of data for current month and 12 months ago; approximates yearly growth rate

Item 2. Madagascar: Seasonal Tests and Indices

Series	Overall	Food	Rice	Nonfood	Core
Seasonality	Sig. (1%)	Sig. (1%)	Sig. (1%)	Not sig.	Not sig.
Moving seasonality	Sig. (5%)	Sig. (5%)	Sig. (5%)		
Seasonal factors [1]					
January	101.1	101.9	104.7	…	…
February	101.0	102.9	105.9	…	…
March	100.6	101.2	103.1	…	…
April	100.1	100.6	101.0	…	…
May	99.4	99.3	95.6	…	…
June	99.1	98.4	93.3	…	…
July	99.2	98.6	95.6	…	…
August	99.4	99.6	96.7	…	…
September	99.7	99.2	99.3	…	…
October	99.4	98.4	99.0	…	…
November	100.3	100.0	102.7	…	…
December	100.7	101.3	103.5	…	…

[1] Seasonal factor = Actual index/seasonally adjusted index

Item 3. Madagascar: Real Money Balances, 1990 to 2006m9



Item 4. ECM for Equation 4

D(DL12CPI) = **- 0.1105681013***(DL12CPI(-1) - 0.9129786164*DL12CPI_CORE(-1) - 0.01132855274) + 0.3895177938*D(DL12CPI(-1)) - 0.6572492568*D(DL12CPI(-2)) + 0.2693902059*D(DL12CPI(-3)) + 0.3563463352*D(DL12CPI(-4)) - 0.1429138996*D(DL12CPI(-5)) + 0.02742377524*D(DL12CPI_CORE(-1)) + 0.5380288919*D(DL12CPI_CORE(-2)) - 0.2578293294*D(DL12CPI_CORE(-3)) - 0.1996259357*D(DL12CPI_CORE(-4)) + 0.1143228921*D(DL12CPI_CORE(-5)

Item 5. Madagascar: Relationship Between Core Inflation and Key Variables, 1999 to 2006m9

	Maximum Correlation with Core Inflation [1]	Lag Length	Long-run Transmission to Core Inflation [2]
Energy inflation	0.552	1	0.299 (.389)
Rice inflation	0.511	1	0.159 (.267)
Exchange rate change	0.538	3	0.208 (.293)
Real growth	0.552	1	0.262 (.706)
M3 growth	0.395	6	0.463 (.228)

[1] Based on 12 lags of variable correlated core inflation.

[2] This is the sum of the coefficients from a regression on core inflation using a second order polynomial distributed lag (PDL) structure with 9 lags and an end point constraint. Impact on core inflation can be inferred from estimated coefficients of PDI. R^2 is show in parenthesis.

Item 6. Madagascar: Augmented Dickey-Fuller Statistics for Unit Root Tests

		Probability of ADF Statistic		
Variable	Lags	Level	First difference	Level of integration
CPI	2	0.494	0	I(1)
CPI_core	2	0.524	0	I(1)
CPI_nonfood	2	0.627	0	I(1)
M3	2	0.387	0	I(1)
GDPR	2	0.985	0	I(1)
I_tb	4	0.07	0	I(0)/I(1)*
Xrate	2	0.565	0	I(1)

All variables except the interest rate were expressed in log form.
Test of null hypothesis (in level and first difference) that variable has a unit root.
Probability level shown rather than statistic.
*Possibly I(0)

Item 7. Madagascar: Long-run Money Demand Relationship Using M3

(1999-2006m9)	Constant	CPI		GDPR		I_tb		Lag length [1]	Only 1 sig. CE [2]	CE Type [3]	Norm. test [4]	AR 1 test [5]	Heter. test [6]
Overall CPI	0.371	1.756	**	-0.06	ns	-0.035	**	3	yes	c	SP	pass	fail
Core CPI	3.371	1.608	**	0.528	**	-0.024	**	3	yes	c	pass	pass	pass
Nonfood CPI	14.7	1.187	**	2.727	**	-0.0369	**	5	yes	c	SP	pass	fail

Estimated coefficients of cointegrating equation (CE) are significant (**) or not significant (ns).
All CE's were estimated with seasonal dummy variables for months 1, 8,10 and 12, which were the only significant ones for M3.
[1] Lag length estimated on the basis of Schwarz and Hannan-Quinn ciriteria.
[2] Test for only one cointegrating vector based on trace test and maximum eigenvalue.
[3] Type of CE.

	(a)	(b)	(c)	(d)	(e)
Linear data trend	no	no	yes	yes	Quadratic
Test					
intercept	no	yes	yes	yes	yes
trend	no	no	no	yes	yes

[4] Test for normality by testing for skewness and kurtosis. CE passes, fails or has some problems (SP).
[5] Test for no first order autocorrelation.
[6] Test for no heteroscedasticity.