

Distortions to Agricultural Incentives in Madagascar

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Agriculture is a key economic sector in Madagascar, but its performance since the 1950s has been insufficient to cope with demographic pressures and contribute to a significant reduction of poverty. Madagascar's agricultural sector accounts for nearly 30 percent of GDP and 40 percent of merchandise export earnings, while providing livelihood to 73 percent of the total population.¹ The incidence of poverty is very high in the rural areas, where it reaches 77 percent. The sector remains vulnerable to external shocks, and variations in producer prices are the main cause of deteriorating living standards, according to 60 percent of the focus groups in a 2001 commune census (Trine 2004). With a population having grown from 4.2 million in 1950 to 18 million in 2004 (INSTAT 2005), the domestic pressures on the agricultural sector have intensified and food insecurity remains a severe problem in Madagascar.

The performance of the agricultural sector is characterized by low productivity and high vulnerability to climatic conditions. In addition, several periods of civil unrest and political uncertainties have disrupted the economy and discouraged investment. Natural conditions for farming are, however, relatively favorable, and Malagasy agriculture is quite diversified relative to other African countries.

Economic and financial policies have not provided much support to the agricultural sector, which reflects in part the very low political weight of the rural and farming population. Key agricultural exports and inputs were taxed, while marketing chains were regulated. The weakness of the industrial sector made exports of agricultural products a key source of foreign currency, despite the volatility of world prices of primary commodities. Imports, mainly composed by manufactured products, were subject to licensing and tariffs.

Ensuring the full potential of the agricultural sector and increasing rural standards of living remain key challenges to Madagascar. After gaining its independence from France in

¹ Madagascar was ranked 146 among 177 countries in 2003 in terms of the UN's human development index, and its GDP per capita was only US\$280 in 2006, equivalent to 77 cents a day (UNDP 2004), World Bank (2002).

1960, Madagascar went through three different economic regimes: the post-independence period where the economy was still linked to the French system (1955-1971), the socialist economy period (1972-1988), and gradual liberalism (1988 to date). During these three episodes, agricultural output per capita declined steadily.

This chapter analyzes government policies and reforms as they affect the agricultural sector from 1955 to 2004, with a view to identifying their contributions to the performance of the sector and to ascertaining current policy challenges and choices that could be useful for policy makers moulding the future of the sector. Direct and indirect distortions are computed for the following selected commodities that represent nearly 70 percent of the country's value added in agriculture (excluding fishery and forestry): rice, maize, cassava, yam, vanilla, coffee, cloves, pepper, cocoa and sugar.

A general finding of the analysis is that producers' incentives have been highly distorted in favor of urban consumers during the state intervention period of the 1970s, and have been significantly reduced for most of the covered commodities as a result of the liberalization policies initiated since the late 1980s, with the exception of vanilla and sugar where domestic market inefficiencies still isolate producers from developments on world markets.

In the chapter we first summarize the historical background and the evolution of policy conducted in Madagascar before independence. Then we look at the history of economic growth and structural changes since the 1960s. The main part then describes the estimates of distortions. Some prospects for reform conclude the analysis.

Policy evolutions before the 1960s

In the early 1950s, like most other French colonies and overseas territories, Madagascar implemented a development plan that strengthened its economy and contributed to its diversification. Madagascar's performance in the 1950s relied heavily on its agricultural sector, and some progress was achieved in extending the value-added chain to food and other agricultural processing. It benefited from its membership in the CFA Franc zone, which facilitated trade access and limited exchange rate exposure, as well as from having relatively good infrastructures and institutions. Outside of coffee, vanilla, and cloves, most agricultural production remained centered on staple food items such as rice. As a result, competitiveness with foreign food products limited increases in most agricultural producer prices, and exports

of cash crops (mainly coffee, vanilla and cloves) remained vulnerable to external shocks in addition to weather.

The satisfactory economic performance over the period 1950-60 was accompanied by a 26 percent increase in population. This population boom, to 5.3 millions inhabitants in 1960, reflected an average annual growth rate of 2.3 percent, in contrast to an estimated 1 percent over the period 1920-50. It resulted in a higher share of youth (46 percent of the population was than 20 years of age), as well as geographical and rural/urban disparities that started to exacerbate poverty issues. On the one hand, school enrollment increased substantially (by 80 percent), and the schooling rate reached 45 percent, exceeding the performance of most developing countries at the time. On the other hand, nonagricultural employment remained broadly stagnant over the decade, except for an increase in civil servants, and nothing had been done to improve agricultural employment (no professional training was provided and most agricultural school graduates joined the civil service). Moreover, the deficiency of animal protein and lipid intake was not addressed, even though the caloric intake by inhabitants increased by 7 percent over the period. Agricultural income remained very low at about US\$202 per person per year including home consumption.

The agricultural sector was the dominant economic and export activity in the 1950s. Production grew by nearly 4 percent on average per year, despite the negative impact of a cyclone in 1959 that reduced output by 8 percent in that year. Cattle herding had a much less satisfactory performance and grew by only 7 percent over the period.² At the end of the 1950s, agricultural production was quite diversified and relatively resilient to external shocks. Rice, the staple food product for the Malagasy population, accounted for 43 percent of total production value, followed by coffee (14 percent), sugar cane (6 percent), cassava (5 percent), potatoes, vanilla and cloves (3 percent each), and various lesser products.

Economic activities in the mining, energy and industry sectors outperformed agricultural production in the 1950s and grew by more than 130 percent, but they remained relatively small as they were equivalent to less than 15 percent of agricultural value added in 1960. Most of the growth in the industrial sector, moreover, resulted from food processing activities, including rice milling, sugar refining and soft drinks production, as well as sisal, tobacco and cotton processing.

² Beef accounted for nearly 50 percent of herding sector revenue, followed by poultry (25 percent), pork (15 percent), and fishing and others (10 percent). Poultry and fresh water fishing contributed the most to growth of the sector in the 1950s.

Imports in the 1950s grew at a similar rate as exports, and the exports to imports ratio remained stable at around 70 percent. However, imports of capital and transformation goods were fairly constant over the period, while imports of food products and other consumption goods increased by 45 percent. This reflected an increase in nonagricultural wages of nearly 150 percent over the period while import prices increased by much less, which allowed urban workers to prefer imported products and maintain downward pressure on domestic food prices (rural producer prices increased by only 30 percent over the decade).

In 1960, 93 percent of Madagascar exports were agricultural products (accounting for 20 percent of agricultural production valued at producer prices). The share of these exports going to the Franc zone, where some products benefited from preferential conditions, fell from nearly 90 percent in 1950 to about 75 percent in 1960. Although export volume growth was greater than production growth up to 1958, it was also more sensitive to external shocks.

Growth and structural changes since the 1960s

Madagascar's economic development and policy making since the 1960s has been strongly influenced by succeeding schools of economic development thought (from colonialism to socialism to liberalism), and a succession of political shocks.³ The economic takeoff of the Malagasy economy that was initiated in the 1950s continued in the 1960s after independence from France in 1960. Increasing state intervention after 1972 resulted in the implementation of a socialist model and a decline of productive activities. The departure from the Franc Zone in 1974 and the pegging of the Malagasy franc to a currency basket, as well as the implementation of foreign exchange restrictions, contributed also to economic underperformance. They resulted in an overvalued exchange rate for most of the period up to 1994, when the currency was allowed to float freely and was devalued by more than 60 percent (Appendix Figure 1).

In the 1980s, stabilization and structural adjustment programs were implemented to reduce economic distortions and restore macroeconomic equilibria, following the failure of the economic development policies of the 1970s. However, the turnaround of economic activities was modest, highlighting the partial and gradual character of the undertaken reforms. Reforms focused on exchange rate and international trade liberalization, price

³ As Minten (2006) points out, it is striking that the three periods of growth (late 60s, late 80s, and late 90s) were each interrupted by social and political crisis.

deregulation, and state withdrawal from economic and commercial activities. Quantitative restrictions and tariffs, nevertheless, remained high with an important negative impact on external trade, illustrating the country's inward looking development strategies inherited from the 1970s into the 1980s (Pryor 1990). Progress was interrupted by a political crisis in 1991 and the withdrawal of the donor community until 1996. GDP per capita declined by 2.7 percent per year, on average, reaching its lowest level in 1996 (about US\$ 200 in real terms, compared with US\$340 in 1971, and inflation reached 23 percent during the period 1991-96 (Appendix Table 1 and Appendix Figure 2).

A renewed track record of broadly satisfactory economic performance under new adjustment programs since 1997 was temporarily set back by a new political crisis in 2002. This highlights the persistent lack of resilience of the political system and the need for further reforms. These reforms include those related to the set-up of a secure and a reliable institutional environment and the pursuit of progress towards market-oriented economy.

The agricultural sector has performed poorly over the past decades. Madagascar exports less and imports more agricultural products now than previously. Staple productivity has stagnated at low levels. While the availability of agricultural infrastructure and services has improved marginally, it is still at a low level. Recent improvements in access to output and input markets and in transportation have proven insufficient for a significant turnaround of agricultural activities. In the past, the agricultural sector suffered from discriminatory policies. The structural adjustment policies since the mid-1980s have improved the market framework by removing most of the market distortions through a devaluation of the Malagasy franc, a reduction in import barriers, market liberalization and privatization of public enterprises. But these changes have not been enough to stimulate growth in rural areas. The reduction in public investments and the declining efficiency of these funds, the lack of an emerging private sector, the worsening terms of trade in rural areas, the degradation of the natural resources base and the large risks have led to little supply response in agriculture (Minten 2006). These constraints have led to low adoption of modern agricultural technologies and an agricultural system with low land and labor productivity.

There is little doubt that agriculture can contribute to poverty reduction through multiplier and participation effects (Christiaensen et al. 2005), but the design of a proper policy mix to ensure sustainable development and higher productivity of the sector has remained unsatisfactory. The complexity of the problems to address, from macroeconomic issues to microeconomic and institutional ones, include lack of infrastructures, poor

institutional capacity, lack of proper economic incentives, and market failures in input and output markets have compounded the problems in designing effective poverty reduction strategies rooted in rural sector development. Removing distortions to agricultural incentives will have to be accompanied by the implementation of strong sectoral policies and the emergence of frameworks conducive to private sector development, including institutional reforms (provision of training and education, instauration of trust and transparency, and improvement of credit access), research and extension in staple foods, decreasing over-reliance on rice, and security and development of road and irrigation infrastructures (Minten 2006).

The transition period of the 1960s

The influence of the French remained strong in economic and financial activities after Madagascar gained its independence in 1960. Agricultural production and marketing, as well as policies, remained broadly the same. Small traders organized the marketing of rice with the parastatal Office of Rice Marketing and Stabilization (BCSR—*Bureau de commercialisation et de stabilisation du riz*) during the first Republic (1960-1972). The BCSR fixed minimum and maximum prices, provided credit to farmers, and organized rural associations. Agricultural policies aimed at increasing land under cultivation through large irrigation schemes (such as Lake Alaotra, Marovoay, and the Mangoky Delta) and agricultural extension activities complemented these irrigation efforts by promoting the use of modern inputs and technology, as well as introducing improved equipment for rice cultivation.

The socialist experiments of the 1970s

The focus of economic policy turned in the early 1970s to an increasing intervention of the state in productive and commercial activities. The government of General Ramanantsoa initiated this process in 1972 through nationalizing several large companies, starting to regulate and control numerous prices, and imposing state monopoly on various products, including rice. Madagascar departed from the Zone Franc in 1974 and pegged the Malagasy franc to a basket of foreign currencies. The government of Didier Ratsiraka, who assumed power in 1975, pushed further these socialist trends. Convinced that a lack of investment was at the root of the lack of economic performance, it initiated a large and unsustainable

investment program (investment-to-the-hilt) that relied on foreign financing and money creation in the late 1970s (Pryor 1990).

Madagascar's agricultural sector was significantly reorganized in the 1970s through increasing state intervention and implementing rural development policies rooted in socialism. The new socialist government in 1972 got rid of the private marketing sector that was perceived as being predatory. Up to the early 1980s, agricultural policies were anchored around state control of prices and marketing, taxation of export crops, and protection of the industrial sector and urban consumers. Shortly after assuming power, the government of Didier Ratsiraka decreed that holdings in excess of 500 hectares would be turned over to landless families, and it is reported that 500,000 hectares of land had already been processed under the program by the end of 1975 (Library of Congress 1994).

This redistribution of land, which aimed at creating collective forms of farm management (cooperatives and state farms), was accompanied by state intervention in all activities of the agricultural sector. The Ministry of Agricultural Production oversaw the activities of more than seventy parastatal agencies in the areas of land development, agricultural extension, and research activities. Moreover, the collection, transformation, and marketing (domestic and external) of key agricultural products were put under state control. Domestic agricultural prices were subsidized and kept low to favor urban consumers, which resulted in domestic production declines and higher imports, such as for rice. Taxes and economic barriers were put in place in order to allow each Fokontany (local government) to benefit from agricultural production and to control product movements.

While an objective of the interventions was to stabilize the prices of export crops (vanilla, coffee, and clove), it ended up penalizing producers of these crops. Coffee and vanilla/clove producers, for example, only received 40 percent and 25 percent of world prices, respectively. Yet, from 1974 to 1987, more than half of Madagascar exports were concentrated on coffee and vanilla (around 30 percent are from coffee). Because of its potential and through the levying of export taxes, the agricultural sector was contributing to the financing of the budget, including the public investment program aimed to develop industrial activities.

The inefficient system of agricultural supply and marketing that resulted from state intervention in the 1970s became a major factor inhibiting agricultural development. From 1973 to 1977, one major parastatal agency, the Association for the National Interest in Agricultural Products (Société d'Intérêt National des Produits Agricoles—SINPA) had a

monopoly in collecting, importing, processing, and distributing a number of commodities, most notably rice. Corruption leading to shortages of rice in a number of areas resulted in social unrest in 1977, and the government was forced to take over direct responsibility for rice marketing. In 1982, SINPA maintained a large share in the distribution system for agricultural commodities, and it subcontracted many smaller parastatal agencies to handle distribution in certain areas. In the cash crop and export sector, the state took over the main export crops through stabilization boards for clove, coffee and vanilla (CAVAGI), and pepper. Public enterprises were in charge of collecting and marketing the crops, fixing prices at each stage of the marketing chain and leaving the producer price mostly as a residual.

The economic policies of the 1970s led to recession and higher inflation, as well as a severe decline in per capita agricultural output. These outcomes were exacerbated by high volatility and a declining trend in world agricultural prices. GDP per capita declined by an annual average of 1.6 percent in the 1970s; the agricultural production index, on a per capita basis, started to decline in 1975 and was only one third of its 1975 level by 2005; and the large investment program resulted in a balance of payment crisis. Given the policy biases against agriculture, peasants started to focus on food security and household self-sufficiency: they developed staple food crops and increasingly ignored cash crops, such that a system of non-monetary and highly vulnerable autarchy started to develop in the rural sector.

The gradual adoption of liberalism since the 1980s

The failure of the socialist development policies in the 1970s and the increasing inability of the government to subsidize prices led the Ratsiraka regime to enact a series of structural adjustment reforms during the 1980s. These included the removal of government subsidies on the consumer price of rice in 1984 and the disbanding of the state marketing monopoly controlled by SINPA in 1985. “At the beginning of the reforms, floor and ceiling prices for agricultural products were maintained. In June 1985, a government decree fixed the floor price of paddy rice, but removed the ceiling price. In reality, the government effectively controlled domestic rice trade up to 1986” (Minten 2000, p.7). The Malagasy government also liberalized agricultural exports gradually. The elimination of export taxes on non-traditional products in 1985 was extended to all exports, with the exception of coffee, clove and vanilla, in 1987. Export taxes on coffee and clove were removed in 1988, and on vanilla in 1997. The currency was devalued by 55 percent in real terms in 1987, and a liberalized import system (SILI) implemented one year later, stopping the intervention of the state in the

allocation of foreign exchange. Currency devaluation in 1994 was accompanied by the official liberalization of the foreign exchange market.

The commercialization of rice and other commodities continued, however, to decrease in the second half of the 1980s. The gradual implementation of structural reforms and remaining bottlenecks, such as inappropriate transportation infrastructures, were undermining the new policy stance. Rice growers responded by moderately expanding production by 9 percent during the latter half of the 1980s, and rice imports declined dramatically by 70 percent between 1985 and 1989. However, the Ratsiraka regime failed to restore self-sufficiency in rice production, and rice imports rose again in 1990. In 1992, rice production occupied about two-thirds of the cultivated area and produced 40 percent of total agricultural income, including livestock, fishing and forestry.

Other food crops witnessed small increases in production from 1985 to 1992. Cassava, the second major food crop in terms of area planted (almost everywhere on the island) and probably in quantity consumed, increased in production from 2.14 million tons in 1985 to 2.32 million tons in 1992. During this same period, corn production increased from 140,000 tons to 165,000 tons, sweet potato production increased from 450,000 tons to 487,000 tons, and bananas dropped slightly from 255,000 tons to 220,000 tons.

Several export crops are also important to Madagascar's economy. Coffee prices witnessed a boom during the 1980s, making coffee the leading export crop of the decade. Prices within the coffee market gradually declined during the remainder of the 1980s, although they rebounded in 1992. Cotton traditionally has been the second major export crop, but most output during the early 1980s was absorbed by the local textile industry. Although cotton output rose from 27,000 tons in 1987 to 46,000 tons in 1988, once again raising the possibility of significant export earnings, the combination of drought and a faltering agricultural extension service in the southwest contributed to a gradual decline in output to only 20,000 tons in 1992.

Two other export crops--cloves and vanilla--have also declined in importance from the 1980s to the 1990s. Indonesia, the primary importer of Malagasy cloves, temporarily halted purchases in 1983 as a result of sufficient domestic production, and left Madagascar with a huge surplus. A collapse in international prices for cloves in 1987, compounded by uncertain future markets and the normal cyclical nature of the crop, has led to a gradual decline in production from a high of 14,600 tons in 1991 to 7,500 tons in 1993. Similarly, the still state-regulated vanilla industry (state-regulated prices for coffee and cloves were

abolished in 1988-89) found itself under considerable financial pressure after 1987 because Indonesia reentered the international market as a major producer and synthetic competitors emerged in the two major markets of the United States and France. As a result, vanilla production declined from a high of 1,500 tons in 1988 and 1989 to only 700 tons in 1993.

Agriculture and cattle-raising are closely linked within the farming system.⁴ More than half the farms raise bovine cattle. Livestock production was, however, limited in part because of traditional patterns of livestock ownership that have hampered commercialization. Its rate of growth was around 1 percent yearly (Ministry of Agriculture 2006). Beef exports in the early 1990s decreased because of poor government marketing practices, rundown slaughtering facilities, and inadequate veterinary services. All but 1 percent of cattle are zebu. The FAO estimates that Madagascar in 1991 had 10.3 million cattle, 1.7 million sheep and goats and 21 million chickens.

Trade policy

Madagascar participates actively in the multilateral trading system. It became a member of the WTO in November 1995. The country also is involved in regional trade agreement with the IOC (created in 1984), the RIFF (launched in 1992), the COMESA (from 1995), the AGOA (from January 2001), and the SADC (only in 2005).⁵ Many of Madagascar's exports to the EU enjoy non-reciprocal preferential treatment in the form of exemption from import duties. Madagascar also benefits from preferential tariff treatment granted by Australia, Canada, the EU, Japan, New Zealand, and the United States under the Generalized System of Preferences (WTO 2001).

Following Madagascar's liberalization of its trade regime in the early 1990s, its present trade policy framework has been based on tariffs (WTO 2001). Extra-regional tariffs are still restrictive. The simple average of applied MFN import duties is 16.2 percent in 2001. Tariffs on agricultural sector alone are 17.7 percent on average. Import duties and taxes continue to constitute a significant source of government revenue (Appendix Table 2). An import tax of 2 percent and a custom stamp duty of 1 percent also apply to imports. An excise duty ranging to over 100 percent is levied on petroleum, alcoholic and non-alcoholic

⁴ Livestock represents about 35 percent of agricultural GDP. Over 40 percent of total land is used for pasture. Cattle-raising is at the heart of the rural economy in much of the western and southern Madagascar.

⁵ COMESA: Common Market for Eastern and Southern Africa, AGOA: African Growth and Opportunity Act, SADC: Southern African Development Community, IOC: Indian Ocean Commission, RIFF: Regional Integration Facilitation Forum, which basically replaced Cross Border Initiative

beverages and tobacco products. A value-added tax of 18 percent is also collected on sales of goods and services except for pharmaceuticals, medical equipment, news print books and brochures.

Madagascar has bound customs tariffs at 30 percent. MFN customs tariff rates have been organized from 13 bands to four bands ranging from zero to 30 percent. The government wishes to simplify the tariff structure to one rate but an impact study is yet to be undertaken to examine the need to smooth adjustment for sensitive products and sectors. In order to secure custom duties revenue, the Malagasy authorities has contracted with a pre-shipment inspection company for all imports worth US\$1,000 or more. All quantitative restrictions on imports have been eliminated, except for prohibitions or prior authorization requirements maintained under international conventions for health, phytosanitary or security reasons or on products deemed strategic by the government, such as the case for vanilla and precious stones (WTO 2001).

With its difficulties in balancing budgets, the country cannot afford the provision of farm price support programs, or matching developed countries with export subsidies (FAO 2003). Elimination of export taxes, liquidation of marketing boards and abolition of monopolies held or exclusive rights exercised by state-owned companies were a good step forward, though agricultural incentives have shown only very moderate improvement. That is because, among other reasons, the vacuum left by the boards has not been filled and the country's capacity to respond to new opportunities has been very limited (WTO 2001). Nonetheless, with the move to more open trade policy, Madagascar has increased its trade volume in recent years, with textile and tourism the most rapidly expanding exports.

Rural poverty evolution since the 1960s

Unsatisfactory economic and financial performance since the 1960s has contributed to a lack of overall progress in poverty reduction. The 1984-85 agricultural censuses estimates that at that time, 8.7 million people lived in rural areas and that 65 percent of the active population within these areas lived at the subsistence level. Based on the INSTAT's 2001 household survey, almost 70 percent of the population in Madagascar was poor, with about 90 percent of the poorest quintile living in rural areas and engaged in farming. The data also point to wide variations among provinces. Significant correlates of poverty are household residence in rural areas (which reduces consumption by 30 percent) and the occupation of the head of the household as a small-scale farmer. Across time (the first national household survey was done

in 1993), rural areas have been shown to be consistently worse off than urban areas. Poverty in the primary sector worsened between 1993 and 2001 by almost 9 percent, while it was reduced in the secondary and tertiary sectors. Poverty levels have remained very high over the years and were still estimated in 2004 at about 77 percent in rural areas, compared with 54 percent in urban areas. Poverty reduction in urban areas was mainly driven by export processing zones and tertiary sector developments (Minten, Randrianarisoa and Randrianarison 2003).

Direct and indirect distortions to agricultural incentives

In this section, the effect of the three different phases of policy reform on farmers' incentives is quantified. The main focus of the present study's methodology (Anderson et al. 2008) is on government-imposed distortions that create a gap between domestic prices and what they would be under free markets. Since it is not possible to understand the characteristics of agricultural development with a sectoral view alone, the project's methodology not only estimates the effects of direct agricultural policy measures (including distortions in the foreign exchange market), but it also generates estimates of distortions in non-agricultural sectors for comparative evaluation. More specifically, we compute Nominal Rates of Assistance (NRAs) for farmers and an NRA for nonagricultural tradables, for comparison with that for agricultural tradables via the calculation of a Relative Rate of Assistance (RRA).

As mentioned above, the immediate post-independence period was recorded as the most favorable time for farmers. Government attitude toward primary agriculture were more neutral. Data for estimating NRAs are available for only four farm products (rice, sugar, cassava and yam) for the period prior to 1966, but their weighted average was 1 percent in 1955-59 and -20 percent in 1960-65 (Figure 1 and Appendix Table 4(a)). The country was then a net exporter of rice and sugar.

In the early 1970s, the socialist structure that was set up allowed government to extract rents by indirect taxation, so even though agricultural producers were exempt from income taxes, uses of various forms of government "hand-on" policies such as export taxes, licensing, and marketing boards eroded farmers' revenues and favored corruption and rent-

seeking for political elites.⁶ Export duties were one of the principal sources of government revenue in the early 1980s, providing 30 percent of total revenue in 1983.

The impact of those policies on farmer incentives is clear from Figure 1. Producer prices were not allowed to rise with international prices in 1973-74, causing the NRA to fall from close to zero in the early 1970s to -50 percent. As international prices returned to normal, the prices of importables rose again but those of exportables fell even further and their NRA averaged between -60 and -75 percent in the latter 1970s and 1980s. Even when the reforms started to impact, they continued to favor import-competing farmers over those producing exported goods.

The overall impact of agricultural policies on the NRA for the 70 percent of products covered was that by the latter 1980s, when international food prices were exceptionally low, the degree of taxing of farmers had returned to the level of the latter 1960s (around -25 percent), and thereafter it became even closer to zero. By the turn of the century it was virtually zero, although the anti-trade bias within the sector remained as the NRA for exportables in 2000-03 was still -30 percent while the NRA for import-competing farm product was 7 percent. Even within each of those two sub-sectors there is still considerable variance in NRAs, so we turn to examine the situation for individual crops before comparing the overall agricultural situation with that of producers in non-farm activities.

Food crops

Rice

Rice is the staple food, and paddy rice is the country's most important food crop. It is grown by about 70 percent of the population on 3 million acres, about 50 percent of the total area under cultivation. Smallholders dominate production, and it is estimated that 80 percent of production is consumed on the farms. The Malagasy consumption of rice per capita is about 120-140kg/year. Rice productivity has been low and stagnant with yields of around 2 tons per hectare for the last forty years while other countries like Indonesia and Vietnam have managed to increase their rice yield three- or four-fold (Appendix Figure 3). Rice production grew by less than one percent per year during the 1970-79 periods, despite the expansion of

⁶ The majority of agricultural activities were being run on a small-scale basis as part of the informal sector. As such they are not taxed in terms of revenue, but nor do they receive any form of social security from the government.

the cultivated paddy area by more than 3 percent per year.⁷ Land tenure problems, poor control of water and lack of agricultural inputs are still obstacles affecting rice cultivation.

The share of rice available for marketing in the rapidly growing urban areas declined from more than 15 percent of the total crop in the early 1970s to nearly 10 percent during the latter part of the decade (Minten and Dorosh 2005). As a result, Madagascar became a net importer of rice beginning in 1972 (Appendix Figure 4). By 1982 it was importing nearly 200,000 tons per year, equal to about 10 percent of the total domestic crop and roughly to the demand from urban customers. Net buyers of rice still make up a large part of population, and sales of local rice are concentrated in the hands of a minority of agricultural producers.

Government policies led to this poor performance in the rice sector. Even though Malagasy rice has low production costs due to low labor costs and little use of inputs, its competitiveness at the international level is lost in the value chain due to the large marketing costs caused by remoteness, transport costs and the multiple actors involved in that chain (Razafimandimby 1999). The lack of maintenance of the fragile transportation infrastructure in the late 1970s and early 1980s was a major contributing factor to the decline in Madagascar's marketed agricultural production. The needed government support in terms of farm credit and agricultural inputs were small or absent in many areas, and credit flows were skewed toward the estates and wealthier smallholders (Pryor 1990).

The trends in the NRA for rice can be seen in Table 1. The minimum pricing scheme established by the government through the parastatal agency SINPA basically subsidized imports at the expense of export crops. The resulting low producer price and the neglect by the government in terms of inputs discouraged production. Discrepancy between world and official domestic price was exacerbated by the way the government controlled the quantity of rice imports and regulated rice domestic marketing, particularly during late 1970s and early 1980s. Domestic producer prices for paddy were set without reference to border prices and were kept substantially below import parity levels (Dorosh, Bernier and Sarris 1990). This continues to be the case as, according to Minten, Randrianarisoa and Randrianarison (2003), the determining factors of the pricing of rice in Madagascar are the time of harvest, storage costs, the distance to the urban centers, access to roads, the availability of imported rice, the level of richness of each locality, and the climatic condition and natural disasters.

⁷ In the early 2000s, rice accounted for about 50 percent of the value added in agriculture and 45 percent of the calories consumed by an average Malagasy person (Dorosh et al. 2005).

Liberalization of domestic marketing of rice from 1988 reduced the distortions to farmers. Since 2000, the tariff and domestic taxes applied to rice imports have meant that the NRA for rice is now slightly positive (7 percent in 2000-03). Rice continues to be a political crop though, and the government continues to intervene, particularly with making the unpredictable changes to the import tariff and in the allowed volume of imports by private actors (notwithstanding the formal removal of government controls along the value chain). This fact seems to have favored corruption and rent seeking. Dorosh and Minten (2005), in their study on the rice crisis that occurred in 2004, note that transparent and pre-announced tariff reductions could instead be used to mitigate the effects of increases in the price of imported rice on poor consumers, even if it results in small losses of tariff revenues.

Cassava

Cassava leaves and tubers are edibles. Annual production is about 2.5 millions tons, of which about 15,000 tons are used in four industries for making tapioca and candy. The industries are in Anjiro, Marovitsika, Vodiala and Moramanga. Cassava is very cheap during the rice harvest season. Cassava has been used mainly for animal feed but it is very important as it serves as a buffer crop during lean seasons. Dried cassava is mostly consumed in the southern part of the country. This study only looks at green cassava, due to unavailability of detailed data. The southern part of Madagascar used to export cassava to neighboring islands but increasing freight and shipping costs have made it unprofitable to export. Even though cassava exports from Madagascar were quite high in the 1960s, they have kept falling since the mid-1970s. In addition, port infrastructures are poor, and storage capacity is insufficient near the harbor of Tulear. Incentives were reduced further because of competition with French subsidized cassava. Hence in this study we classify cassava as nontradable, and the NRA on output is assumed to be zero.

Maize and yams (sweet potatoes)

Similar to cassava, sweet potatoes are classified as nontradable and therefore their nominal rates of assistance and consumer tax equivalent are assumed to be zero. The trade status of maize has changed over time. It was an exportable commodity from 1955 to 1972 and then switched regularly from being exportable and nontradable. Imports have increased since 2000. Positive support from the government has mostly been recorded for maize growers through the covered years in which it is imported.

Export crops

Vanilla

Vanilla is a strategic product for Madagascar, as its export has been an important source of foreign exchange.⁸ On average, vanilla has contributed to more than 30 percent of agricultural exports during the last decade. Good climatic condition, a low cost of labor and very high quality make Malagasy vanilla highly competitive and confer the country with a strong comparative advantage in vanilla production.

A vanilla stabilization fund was created in 1962 and a cartel was formed with Comoros and Reunion to strengthen the region's market power. The stabilization fund (CAVAGI) stabilized the price received by producers and financed stockholding costs with contributions taken from export proceeds, after payment of an export tax. The intervention in the 1960s sought to bring stability and equity in the distribution of gains from the vanilla trade (Cadot, Dutoit and de Melo 2006) but the cartel accumulated stocks of vanilla in order to raise international prices and to over-exploit monopoly rents. During the 1970s, intervention got worse and further rents were appropriated. Benefits were then diverted to a limited number of traders. Production was regulated with farmers needing a license (valid for 3 years) for growing. Also, a license (yearly renewable) had to be issued by the Ministry of Trade for vanilla preparation (processors/stockers). Export taxation became massive with some farmers receiving less than 8 percent of vanilla's FOB price (Cadot, Dutoit and de Melo 2006). A specific export tax of 35US\$/kg was supplemented with an export duty of 15 percent (1985) and an export surcharge of 11 percent.

In addition to distortions already introduced with taxes and marketing controls, de Melo, Olarreaga and Takacs (2001) conclude in their study that the vanilla market authorities of Madagascar overestimated the country's degree of market power, which opened the door for competition by Indonesia (Appendix Figure 5). The international price rise continued initially but the cartel's high prices discouraged demand, which in turn reduced revenue. In addition, the cost of keeping the piling inventories escalated beyond what could be financed out of CAVAGI's revenue. In the end, three-quarters of the stock of inventories, which by 1990 exceeded four years' volume of exports under good times, were ultimately burnt, an

⁸ Vanilla is an orchidaceous plant that has 15 years of life. Harvesting takes place four years after planting. Obtaining 1kg of dry vanilla requires 5kg of green vanilla. The process involves curing, drying and packing.

extraordinary waste given the high unit value of vanilla and the extreme poverty of the farmers whose output was thus destroyed (Cadot, Dutoit and de Melo 2006).

Since independence, the NRA for Vanilla has fluctuated between -40 percent and -60 percent, which implies heavy direct taxation of the producers. The situation got worse after the explicit introduction of an export tax in the mid-1970s and also due to the misalignment of the foreign exchange market. The NRA on output averaged about -70 percent then, and in the 1980s it averaged -80 percent (Table 1). The vanilla export tax and most other forms of government intervention were completely removed in 1997,⁹ causing the NRA to become much closer to zero since the mid-1990s, but the sector is still not recovering. Sharp price fluctuations during 2000-03, which resulted partially from speculation from large wholesalers/exporters in Madagascar, have not helped. In 1999, the price of a kilo of vanilla was US\$50, while it was US\$475 in 2004 but then dropped to US\$35 in 2005/06. The farmgate prices for vanilla in 2006/07 reached as low as US\$15/kg. A possible explanation of the negative situation affecting growers is that the sector is still controlled by a small number of traders and processors, who have amassed most of the benefits of the reform. Cadot, Dutoit and de Melo (2006) tried to see how much the reforms achieved by themselves by looking at a model where they recreate the old policy environment under current market conditions. They found meager improvement in farmers' projected income and that the source of the distortions left are from the malfunctioning of the market and imperfect information among farmers and traders. Moreover, there are now substitutes for natural vanilla, which means there is more competition among suppliers in international markets and oligopsony among buyers (Rakotoarisoa and Shapouri 2001).

Coffee, Cloves, Cocoa and Pepper

Coffee, cloves, pepper and cocoa represented, respectively, 20 percent, 14 percent, 6 percent and 5 percent of agricultural exports during 1995-2005. Annual production growth has been relatively sluggish, partially due to climatic conditions, while the value of exports has fluctuated sharply as a result of world commodity price changes. Green coffee represented around 40 percent of agricultural export earnings during 1995-99, when favorable international prices accompanied liberalization.

⁹ The state role now is confined to sanitary/quality inspection and to setting the date and place of vanilla marketing each year. Certification attesting to the vanilla's quality and wholesomeness is necessary before it can be exported, to prevent excessive amounts of immature vanilla beans being offered for sale (WTO 2001). The EU's Stabex fund (export stabilization fund) continues to finance efforts aimed at quality improvements.

Like vanilla, coffee and cloves were regulated and were subject to licensing. The marketing board purchased a large part of the crop to market directly, and it fixed the price for all export transactions. They were also subject to export taxes and export duties from the early 1970s. As shown in Table 1, NRAs on output for these four export crops followed almost the same patterns as for vanilla, and have been negative since independence. This suggests that Madagascar's pricing and exchange rate policies discriminated against these export crops. The NRA on coffee, for example, averaged around -65 percent from the mid-1970s to 1987. But after the deregulation of trade in 1988 those NRAs fell to much lower levels.

Industrial crops: sugar cane

The sugar industry was one of the most important food processing activities in Madagascar. It accounted for 60 percent of the value of food processing output in 1986. Developing agro-industry was one of the goals of the government after independence. Sugar cane farmers were thus not discriminated against like other farmers. The NRA, even though fluctuating a lot along with international price movements, has averaged approximately zero since the 1960s (Table 1). Sugar cane growers do often face long delays in receiving payment for their crop after it is delivered to the state processing factory, however.¹⁰

SIRAMA and SNCBE, the two state-owned sugar companies,¹¹ were extensively rehabilitated in 1985 and combined in 1987. In terms of domestic retailing, prices for sugar put into the domestic market were fixed by the Ministry of Trade until liberalization in 1989, after which wholesalers and retailers were free to fix their own margins.

Since 1991, Madagascar had become a net importer of processed sugar, although exports rebounded in 1999. There is an export quota (for 7,258 tons to the United States and 10,760 metric tons to the European Community as of 2001) which is generally filled. Although most of the sugar production is destined to the domestic market, the preferential market access granted to the country helps the company survive. With various functioning

¹⁰ Payment to growers is basically done in three parts. The first is 25 percent, paid at the time of delivery at firm gate. The price is fixed by a joint commission represented by the company, the Centre Malgache de la Cane et du Sucre (CMCS), an entity responsible for the supervision and regulation of the sugar industry value chain, and the growers. The Queensland formula is used to calculate the pre-campaign price. For the second and third parts of the payment, the other 75 percent is paid but at revised post-campaign prices (CMCS).

¹¹ Siramamy Malagasy and Sucrerie de Nosy Be et de la Cote Est were nationalized in 1976.

difficulties facing the state sugar company, production has lately been in deficit. The country can barely fill the quota to the EU and has stopped exporting to the US. And with the favored export price under preferential access given by the EU to ACP countries starting to be reduced (it is due to expire in 2009), even that trade is vulnerable.

By 2001, privatization of the state monopoly was supposed to occur as part of market led reforms (to date it is still under debate). Instead, technical assistance for management has been sought. Despite the fact that sugar imports are subject to an import tax (35 percent) and VAT (20 percent), inefficiencies associated with low capacity utilization and low sugarcane yields continue to keep the industry uncompetitive internationally. Domestic distribution of sugar also is inefficient, with only five firms licensed to wholesale sugar in the domestic market.

The nonagricultural sector

Madagascar's manufacturing sector is dominated by food processing and beverages, agribusiness, light manufacturing, construction, soaps and detergents, packaging, textiles and footwear. The regime of choice since independence was as import-substituting industrialization trade policy regime. In addition, allocation of public investment was inclined toward this sector. Then toward the mid-1990s, Madagascar eliminated all types of currency rationing in trade and quantitative restrictions on imports apart from those arising from the application of international conventions and those maintained for health and security reasons. Export restrictions in almost all areas have also been eliminated, as have foreign exchange controls. The average MFN tariff for the manufacturing sector (Major Division 3 under ISIC Rev.2) around 2000 was 16.2 percent (WTO 2001).

Since the start of the reform process, the Government has progressively encouraged the emergence of a private sector. Manufacturing activities are increasingly concentrated in the export-processing zones (EPZs), where textiles and clothing constitute a major sub-sector.¹² According to the World Bank report assessing Madagascar's Investment climate in

¹² Due to low domestic demand and savings, the government adopted a growth strategy based on exports in 1989. Export Processing Zones were then established, offering various tax benefits and exemptions in order to attract foreign investors and multinationals. The benefits include waived corporate income tax, zero import duties and taxes and free access and movement in foreign exchange (Razafindrakoto and Roubaud 1997, Minten et al. 2006). In addition, EPZ firms enjoy the preferential market access provided by the United States and the EU.

2005, even though firms rank corruption and tax rates lower than in other African countries, a poor business environment affects the whole private sector, and price controls and inflation are major constraints. Non-EPZ firms suffer from low productivity relative to fully foreign EPZs which are the most productive in the country (World Bank 2005).

As for the mining sector, after being nationalized since 1975 and then opened to foreign investment for prospecting in 1985, private investment and exploitation has been encouraged since 1990. The result is so far unsatisfactory as the sector is still underdeveloped despite its potential.

The services sector contributes to around 57 percent to the country's GDP in 2004, with tourism the largest component. Financial and telecommunication services underwent liberalization and privatization and some satisfactory performance and progress is now occurring. Improvements of the transportation system remain on the list of objectives of the economic reform program of the Malagasy government.

To compare the rates of assistance to non-agricultural sectors with those for agriculture, we first assume there are no distortions to non-covered farm products except those operating via the exchange rate system, so the weighted average NRA for covered and non-covered farm products is somewhat less negative than for covered products alone (top rows of Table 2). But since nontradable farm products are assumed to have zero NRAs, the weighted average NRA for just the tradable parts of agriculture – because of the dominance of exportables – are very negative. The NRAs for non-agricultural tradables, by contrast, are positive. They are calculated using mainly import tariffs for import-competing sectors and export subsidies/taxes for exportables, in addition to the exchange rate distortions. Even though non-tariff barriers – which were very common during the 1970s – are not taken into account due to data unavailability, the NRAs still suggest heavy assistance to non-farm tradables throughout the period. Hence the relative rate of assistance (RRA) is even more negative than the NRA for agriculture (Figure 2 and middle rows of Table 2).

The bottom rows of Table 2 show what the key distortion indicators would be had the analysis not taken into account the distortions in the market for foreign currencies. The differences are not very great, suggesting they alone were not a very significant contributor to the strong anti-agricultural bias that has prevailed in Madagascar until recently.¹³

¹³ This is true also in other Africa countries that were using the CFA currency, such as Cameroon and Senegal. See Bamou and Masters (2007) and Masters (2007).

Conclusions and prospects for further policy reform

The pattern of distortions to agricultural incentives clearly has depended very much on the government in power and on its policies. The first president after independence, Tsiranana, managed to maintain the traditional market structures as well as an acceptable balance between agriculture and the rest of the economy. Agricultural production rose then at a modest rate. The RRA was no worse than -30 percent in those years. The functioning production and transport infrastructure from early independence contributed to the relative well-being of farmers during the first republic too.

President Ratsiraka with his socialist regime turned the intersectoral terms of trade much more against agricultural producers, and caused a disintegration of the market. Agriculture faced stronger production disincentives as indicated by the RRA plummeting to -60 percent by the early 1980s. The establishment of a state-owned marketing system to purchase crops and supply farmers with agricultural inputs and consumer goods did not function adequately either. The resulting shortage of foodstuffs that created a parallel market benefited the estates and richer smallholders who had better access to transportation, and therefore widened income differentials within the rural area. Heavy taxation, a cumbersome foreign exchange allocation system and overvalued exchange rates also affected exports negatively. Agricultural production stagnated and imports of staple food became a necessity. In the meantime, Malagasy farmers remained reticent in expressing their discontent with government policies which continued to be urban-oriented.

Distortions were gradually reduced, but not fully eliminated, as part of the market liberalization drive in the late 1980s. Rural areas still have the highest incidence of poverty, however, and the policy reversal did not have much of a positive impact on production, nor has it ensured sustainable growth and development. Yet despite the persistence of distortions, producers seem to now receive a higher proportion of international prices at least in periods of low international prices.

Progress towards more market-oriented agriculture has been insufficient to completely reverse the past's disincentives for farmers for three main reasons. First, the reforms were gradual, partial and incomplete. Second, political crises and civil unrest have

led to “stop-go” reforms. And third, assistance was not used effectively. As well, rural development projects have been poorly conceived and implemented, and mistrust between public actors and private actors remains (Bene and Beyries 2002).

The phasing out of trade policy biases to agricultural incentives needs to be combined with domestic policies aimed at improving farmers’ incentives and income. Indeed, international prices are still far from being the main determining factor in returns to farmers. Baffes and Gardner (2003), in their multi-country analysis, note for the case of Madagascar that world price transmission to average producer prices has been low or non-existent and that a merely moderate improvement in market integration took place following the reforms.

The current evidence is that the rural sector is still fragmented and badly organized. The essential bonds between production, transformation and marketing are weak. The Malagasy rural economy remains a mainly subsistence economy. Market failures due to huge transportation costs and intermediation margins are still present. Downstream operators (collectors, wholesalers, retailers, importers) who are using their monopsonist power also speculate with key primary products. In addition, a minority having important political weight and use it in rent-seeking from the government. There is thus a vicious circle, where producer prices are low, therefore farmers have low purchasing power to acquire a good standard of living (education, drinking water, electricity, energy, health services). Their low living standard in turn reduces farmers’ human capital and productivity which are key factors for increasing production and farmers’ incomes.

Current domestic policy objectives outlined in the National Program for Agriculture, Farming, Fishing and Agricultural Processing Industries¹⁴ promise good prospects for Malagasy agriculture. Also, President Ravalomanana’s Vision, “Madagascar Naturally”, promises, by 2020, the image of a country with an agricultural vocation, with market-oriented production and with a diversified agro-industry satisfying domestic food needs and exports and the promotion of service sectors (agricultural credit, research and extension, tourism, etc.).¹⁵ In that plan a policy bias against agriculture through price distortions should no longer be a major dampener to producer incentives, and most of the so-called “behind the border”

¹⁴ Repoblikan’I Madagascar (2005).

¹⁵ The results sought by the Malagasy authorities are to increase exports by the increase in the agricultural production (rice, maize, cassava...) of 100 percent in 5 years and 200 percent in 10 years, increase in agricultural exports (vanilla, clove, shrimps...) of 100 percent in 5 years and 150 percent in 10 years, of canned fruits, sugar and sweeteners, rum... of 50 percent in 5 years and 150 percent in 10 years, and the development of the non-food agro-industrial production (essential oils, textile matters...) of 50 percent in 5 years and 200 percent in 10 years. At the same time, products where the country has a comparative advantage will be identified in order to take advantage of regional market agreement. See Repoblikan’I Madagascar (2005).

measures are well laid in the Madagascar Action Plan for Rural Development (even if their implementation and feasibility remain a challenge). They include greater land security, rural credit access, irrigation infrastructure plus the promotion of market oriented activities.

The future of Madagascar is firmly intertwined with agriculture and agro-industry. Increasing consumer demand in developed economies for organic food may provide an export opportunity for the country. Minten et al. (2005) show that farmers' participation in contract farming with global retailers also promises to be able to contribute to poverty reduction, including via the development of niche markets abroad.

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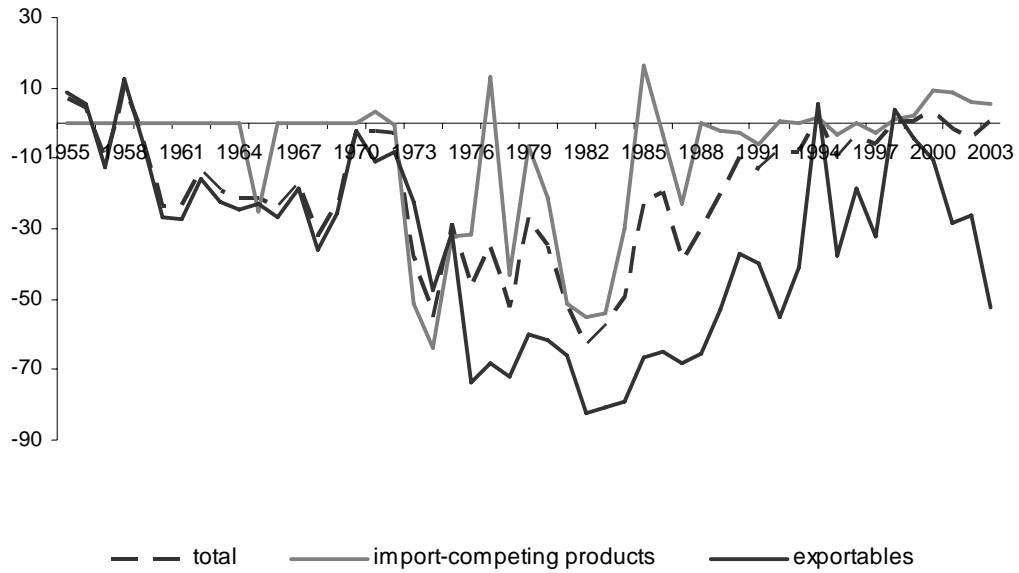
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Figure 1: Nominal rates of assistance to exportables, import-competing and all^a agricultural products, Madagascar, 1955 to 2003

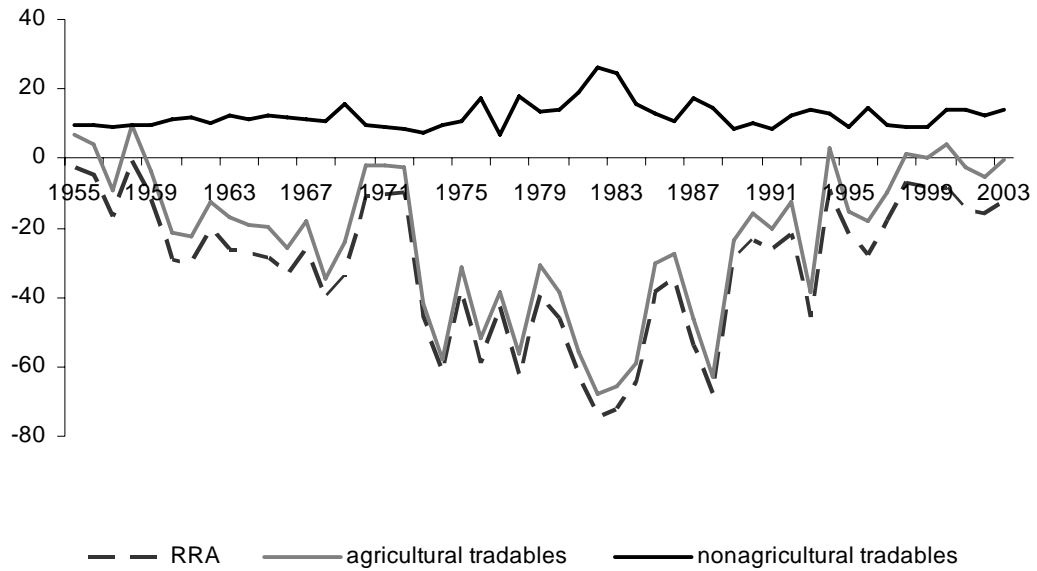
(percent)



Source: Author's spreadsheet

a. The total NRA can be above or below the exportable and import-competing averages because assistance to nontradables and non-product specific assistance is also included.

Figure 2: Nominal rates of assistance to all nonagricultural tradables, all agricultural tradable industries, and relative rates of assistance^a, Madagascar, 1955 to 2003 (percent)



Source: Author's spreadsheet

a. The RRA is defined as $100 * [(100 + \text{NRA}_{\text{ag}}^t) / (100 + \text{NRA}_{\text{nonag}}^t) - 1]$, where NRA_{ag}^t and $\text{NRA}_{\text{nonag}}^t$ are the percentage NRAs for the tradable parts of the agricultural and nonagricultural sectors, respectively.

	1966-69	1970-74	1975-79	1980-84	1985-89	1990
Exportables^{a, b}	-26.6	-18.1	-60.9	-73.9	-63.6	-3
Vanilla	-52.3	-39.0	-56.9	-76.4	-85.2	-7
Cocoa	-31.6	-30.3	-71.0	-68.4	-60.5	-2
Pepper	-33.9	-4.1	-39.1	-46.7	-80.0	-3
Clove	-44.7	-18.1	-80.6	-91.7	-84.9	-6
Coffee	-26.6	-15.3	-63.0	-73.5	-58.5	-2
Import-competing products^{a, b}	na	-28.0	-20.1	-42.2	-3.0	-
Nontradables^a	0.0	0.0	0.0	0.0	-0.2	-
Yam	0.0	0.0	0.0	0.0	0.0	-
Cassava	0.0	0.0	0.0	0.0	0.0	-
Mixed trade status^a						
Rice	-22.6	-21.5	-20.1	-42.2	-2.7	-
Maize	-27.6	2.7	17.7	-4.1	-6.6	2
Sugar	-1.9	-1.0	-2.5	-1.1	-0.4	-
Total of covered products^a	-24.0	-20.0	-37.8	-51.4	-26.2	-
Dispersion of covered products ^c	23.3	23.3	35.6	37.2	39.8	3
% coverage (at undistorted prices)	44	54	71	75	68	

Source: Author's spreadsheet

a. Weighted averages, with weights based on the unassisted value of production.

b. Mixed trade status products included in exportable or import-competing groups depending upon their trade status in the particular year.

c. Dispersion is a simple 5-year average of the annual standard deviation around the weighted mean of NRAs of covered products.

d Nontradables sweet potato and cassava have zero NRAs throughout.

e. Data for vanilla, pepper and cloves are missing for 2002 and 2004.

	1966-69	1970-74	1975-79	1980-84	1985-89
Covered products	-24.0	-20.0	-37.8	-51.4	-26.2
Non-covered products	-1.4	-0.3	-1.0	-1.1	-1.6
All agricultural products	-11.9	-13.5	-27.1	-38.8	-18.2
Trade bias index ^a	-0.40	0.14	-0.47	-0.53	-0.62
<i>Assistance to just tradables:</i>					
All agricultural tradables	-25.6	-21.3	-41.6	-57.5	-38.1
All non-agricultural tradables	12.4	8.7	13.3	20.0	12.7
Relative rate of assistance, RRA^d	-33.8	-27.6	-48.2	-64.2	-44.8
MEMO, ignoring exchange rate distortions:					
NRA, all agric. products	-10.1	-13.6	-26.9	-37.7	-17.6
Trade bias index ^c	-0.34	0.17	-0.38	-0.31	-0.58
RRA (relative rate of assistance) ^d	-29.1	-27.6	-46.4	-60.4	-42.6

Source: Author's spreadsheet

a. Trade bias index is $TBI = (1 + NRA_{ag_x}/100)/(1 + NRA_{ag_m}/100) - 1$, where NRA_{ag_m} and NRA_{ag_x} are the average percentage NRAs for the import-competing and exportable parts of the agricultural sector.

b. The RRA is defined as $100 * [(100 + NRA_{ag}^t)/(100 + NRA_{nonag}^t) - 1]$, where NRA_{ag}^t and NRA_{nonag}^t are the percentage NRAs for the tradables parts of the agricultural and non-agricultural sectors, respectively.

APPENDIX: Key quantity and price data, assumptions and sources

Value added data

Value added share data is derived from total factor (limited to land and labor) costs in the 1999 Social Accounting Matrix (INSTAT). Details of value added contribution are reported only for rice, cassava, vanilla, and coffee, where their value added share is respectively 38 percent, 17 percent, 2 percent and 2 percent. The rest of the commodities are classified with other crops. In terms of production value evaluated at producer prices or border prices, the yearly variation in prices entails a variation in production value share of each product. In addition, published statistics are only for the main 18 agricultural products; therefore, it is difficult to assess the contribution share to total primary production value at border price for each commodity. Beef cattle are very important for the Malagasy agricultural sector. It serves as an input and represents a non negligible share in the population consumption expenditure. Since no value chain study has been conducted for the sector so far, beef is therefore not considered separately in this study.

Quantity data

Production volume data are mainly drawn from FAOSTAT (2006) for years 1966 to 2002. They usually match with those from INSTAT (National Statistics Institute) or from MAEP (Ministry of Agriculture) from which data for year 1955 -1960 and 2003 to 2005 are either taken or derived. Production volume data for Pepper and Cloves for 2003-05 were assumed to be the same as those for year 2004. Published data on Vanilla production volume are for dried and cured vanilla. The conversion factor taken from Dorosh et al. (1990) - which is the same as what operators in the sector suggested -- was used to derive green vanilla production volume.

It is important to note that the last rural survey that gives information on production volume, area used, rural population, fertilizer use etc. was in 2004 but it was not officially published yet at the time we collected data. The earliest available rural survey before that was conducted 20 years ago - in 1984- which suggests that data from either FAOSTAT, INSTAT, or Ministry of Agriculture are based on projection and estimation and these three institutions work closely. Another fact to be noted also is that since farmers operate on a small-scale basis, subsistence farming is still widespread, therefore, quantity exchanged on the local market usually remain marginal. Statistics reported on volume of production can then be misrepresented.

Export and import volume data are from Customs reported in the Economic Situation Analysis of INSTAT or from the Ministry of Commerce. Again, they usually match with the FAOSTAT data with which we completed the missing observations.

Apparent consumption data are computed, using Anderson et al. (2008) methodology. Export volume (and feed, seed and waste if available) are subtracted from production, change in stocks and import volume to get the consumption data at the primary level. If the commodity is consumed processed then consumption is gotten using the processed output volume.

Farm-gate producer price data

Farm-gate producer prices are from INSTAT (1961) for 1955 to 1960 and from FAOSTAT (2006) for years 1966 to 2002 for most of the commodities. Producer prices for sugar are from CMCS (Malagasy Center for Sugar Cane and Refined Sugar). The rest of series is taken from Ministry of Agriculture with a few exceptions where data is drawn from various papers. Dorosh et al. (1990) and Razafimandimby (2001) conducted a similar type of study from which we could draw producer prices and they were mostly analogous. Dorosh et al. covered paddy rice, cloves, vanilla and coffee for the period 1972 to 1990 while Razafimandimby covered cloves, vanilla, rice, coffee, and pepper for 1975 to 1986. Price data for rice were completed using data from Dorosh and Minten (2005) and UPDR (2000).

Most of farm gate prices from local sources are the “national average” of those from collectors as they are more or less closer to producer prices, which then inform us of its limitations. Minten (1999) showed that there are significant seasonal, spatial and village level variability in food marketing in Madagascar. Rice prices in rural areas are for example more than twice as high during the lean period than during the harvest period. This significant rural price variation in Madagascar reflects high transportation costs, due to deficient road infrastructure and reversal of flows from rural to urban areas, and high opportunity costs of capital.

Wholesale product price DATA

There was no data as such for wholesale product prices from the official national statistics of the Ministry of Agriculture. They were from assumptions or derived using margins from secondary papers. As rice has been the most extensively studied relative to other products, it has a more complete data in terms of margins. Data on margins for rice are taken from Dorosh et al. (1990) and UPDR (2000) and for coffee, vanilla and cloves from Dorosh et al. (1990). Intermediation cost data for vanilla for year 2001 was also used from Cadot et al. (2006). Ad valorem equivalent of the available margins were calculated and then their averages were used for years where no data on margins were available. For cassava, margins were taken from Dostie et al. (1999) and they were assumed to be the same throughout the covered years. This is a kind of strong assumption for the case of cassava as in Dostie et al. (1999) it is mentioned that even though Madagascar exported cassava before, the main reason why operators got so discouraged is because of the increase in freight cost.

Intermediate input price data

Organic fertilizers (compost) and traditional manure are commonly used in Madagascar. Imports of fertilizers remain very little and are at about 40,000t per year. “The fertilizer market has been officially liberalized since 1994 but the government has continued its intervention via KRII donations, direct importation and distribution of these fertilizers through the private sector and the ministry of Agriculture itself. The government is unclear at how much it will import, at which price and which mode of distribution. This unclear policy environment creates disincentives for private sector and inhibits the development of a micro-credit system that could support in a sustainable manner the input supply chain” (Minten 2006, p. 5).

Farming is widely non- motorized. Tractors used in Madagascar are at about 3550 units for the last decade while it hovers at around 150,000 units for Vietnam for example. As indicates the table 6 below, imports have remained stable at around 280 tractors for the last

40 years, however 85 percent of increase in imports has been recorded in 2004 when the government adopted the policy of two-year removal of all agricultural production related import tariff in order to boost the economy (Appendix Table 3).

As data on fertilizers, machinery and other agricultural requisites are reported in a non-specific product manner on FAOSTAT, they are not used to adjust the NRA for each commodity under study.

In terms of credit in the rural sector, the various credit programs have been relatively small and have been administered in a manner to favor the estates and richer smallholders. Most of Malagasy farmers therefore have had to rely on informal credit arrangements or loans from various government programs.

Four commercial banks, linked to French interest existed at independence. They were nationalized in 1975 and were split into three to focus on industry, commerce and agriculture. The National Bank for Rural Development was supposed to specialize in loans to agriculture and for rural development but approximately half of its loan have gone to commerce and industry or into financing large agriculture operations such as rice marketing. This scarcity of credit also has led to lack of agricultural inputs.

Border price data

FOB and CIF prices for cloves, pepper are calculated from the value of the country's exports or imports divided by the volume of that trade, with those data extracted from the national customs published by INSTAT. The export unit values for vanilla are from FAOSTAT because the ones from a professional source are way too high. FOB prices for cocoa are from the IFS series, referring to Cocoa from Ghana. A quality adjustment for exports of 20 percent is assumed. Prices of Thailand Rice (5 percent), of Robusta Coffee, of Maize and of Sugar are taken from Global economic monitor database of the World Bank for 1960 to 2005. The series are completed with the local export unit value from customs from 1955.

Exchange rates

Official exchange rates from 1960-2005 are from Global Development Finance & World Development Indicators (See Appendix Table 5). We used the 1960 exchange rate for the five previous years.¹⁶ A difference is observed between the Nominal exchange rate from IMF and from World Development Indicators. The IMF ones were on average lower than from WDI. We used the exchange rates from WDI except for the years 2000 to 2004 where the two sources diverged by 19 percent (so the IMF series are used from year 2000). Parallel exchange rates are the black market exchange rates gotten using the black market rates from 1960 to 1998, as reported in International Currency Analysis (1993 and earlier years) and reproduced as premia in Easterly (2006). We made the assumption that the higher is the black market premium, the higher is the proportion of the foreign currency sold on the parallel market as there was no published information on this.

Production, consumption, input and trade taxes and subsidies

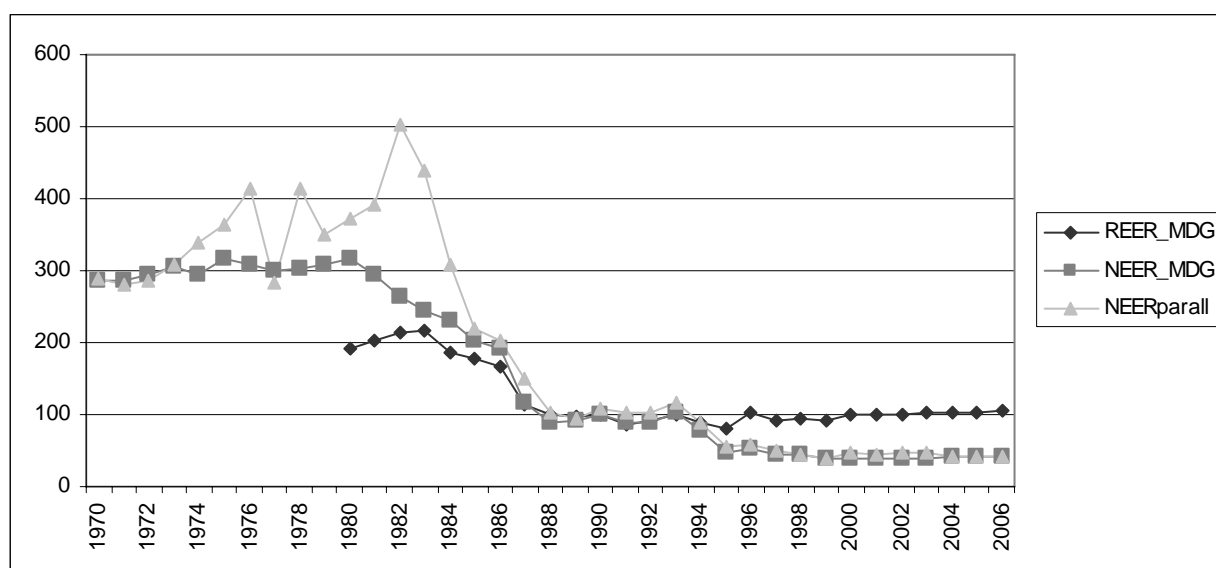
These are from the World Bank (1995) and from the Custom Service of Madagascar (see Appendix Table 2).

¹⁶ Until 1972 the Malagasy currency was the same as that used in a number of former French colonies in Africa.

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- World Bank (1995), “Les faits marquants pendant les années 93-95”, Manuscript, World Bank, Washington DC.

Appendix Figure 1: Nominal effective exchange rate, real effective exchange rate index and parallel exchange rate, Madagascar, 1970 to 2006



Source: IMF for effective rates. The parallel exchange rate is gotten using the black market premia data compiled by Easterly (2006).¹⁷

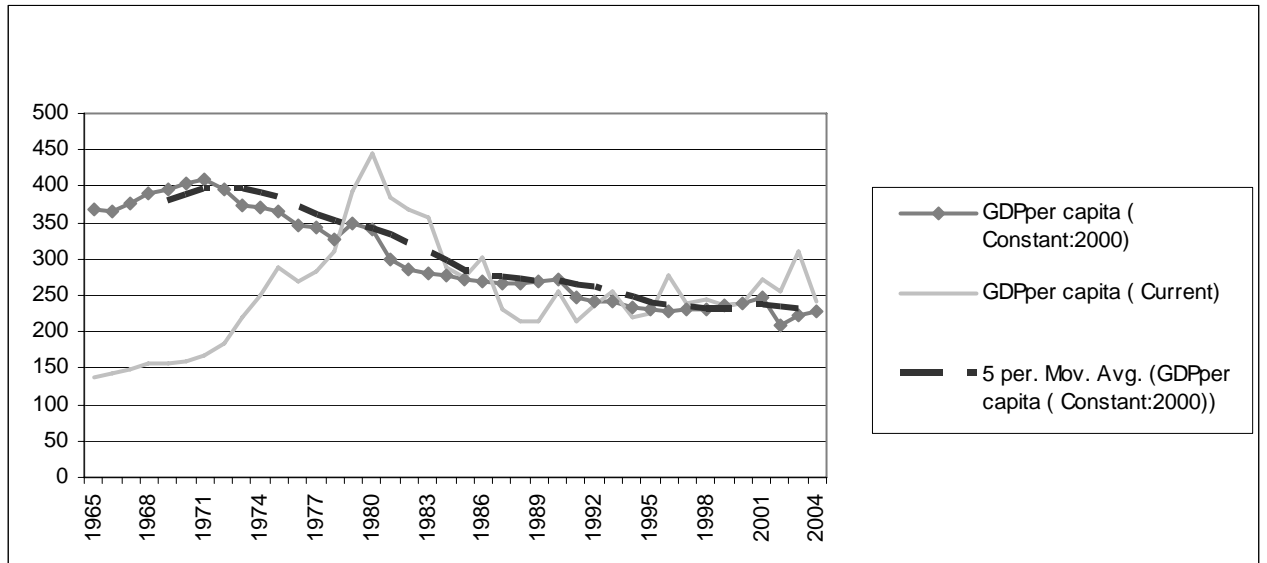
¹⁷ REER is an indicator of international competitiveness. Madagascar is part of the countries where IMF calculated these indices based on CPI. REER is computed as a weighted geometric average of the level of consumer prices in the home country relative to that in its trading partners.

$$E_i = \prod_{j \neq i} \left[\frac{P_i R_i}{P_j R_j} \right]^{w_{ij}}$$

where w_{ij} is the competitiveness weight put by country i on country j , $P_{i,j}$ are CPI, are $R_{i,j}$

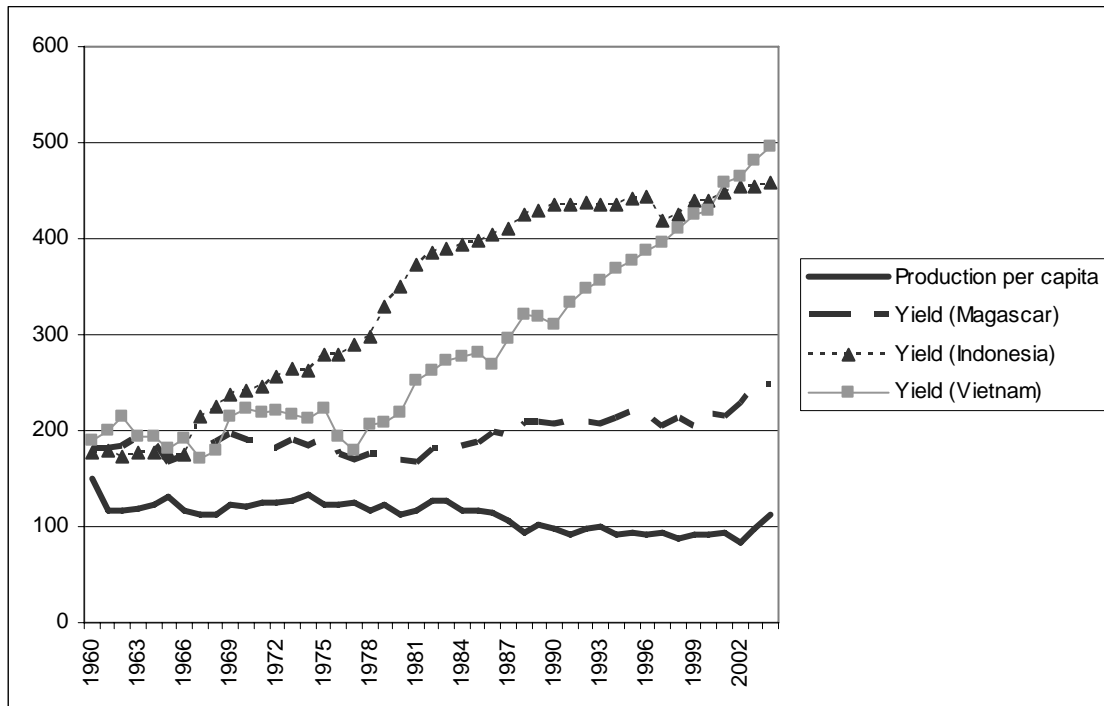
are nominal Effective exchange rate in US dollars. The weighing scheme is based on trade in manufacture, non-oil primary commodities and tourism services if appropriate. [Zanello and Desruelle (1997), pp 13-14]. The principal commercial partners are currently the Euro zone representing 76 percent (Belgium, France, Germany, Ireland, Italy, Luxembourg, Portugal and Spain), USA for 9.3 percent, Japan 11 percent and 3.7 percent for UK. (www.banque-centrale.mg)

Appendix Figure 2: GDP per capita, Madagascar, 1965 to 2004



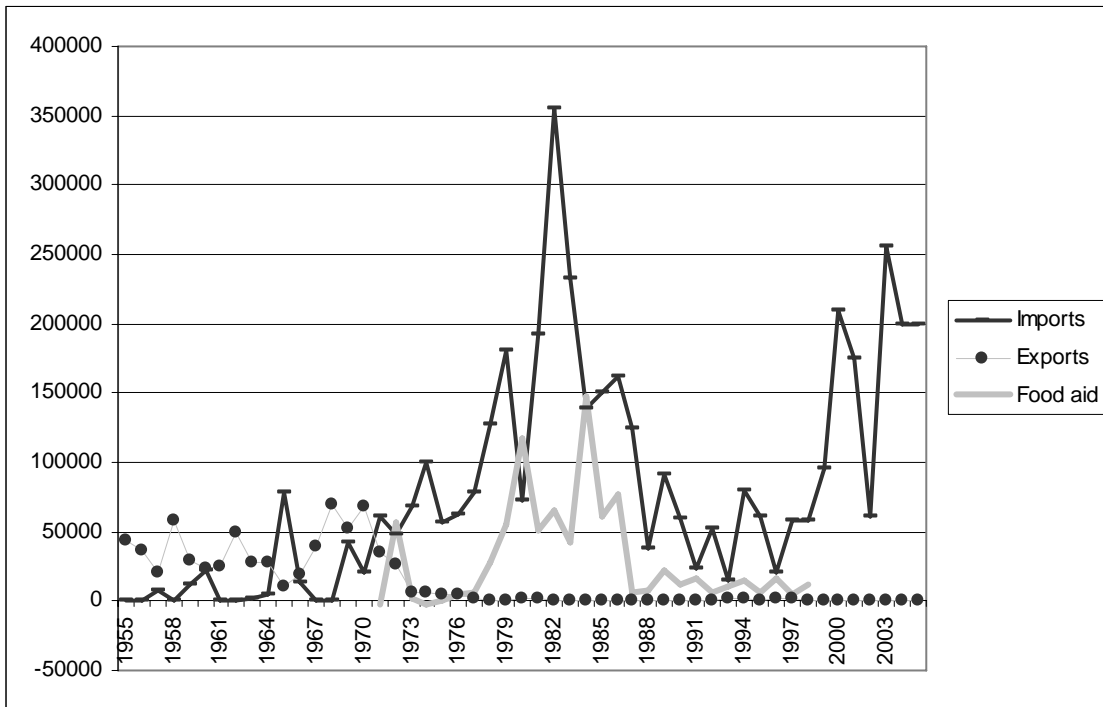
Source: World Bank (2008)

Appendix Figure 3: Rice production per capita (MT) and rice yield (MT/ha), Madagascar, 1960 to 2005



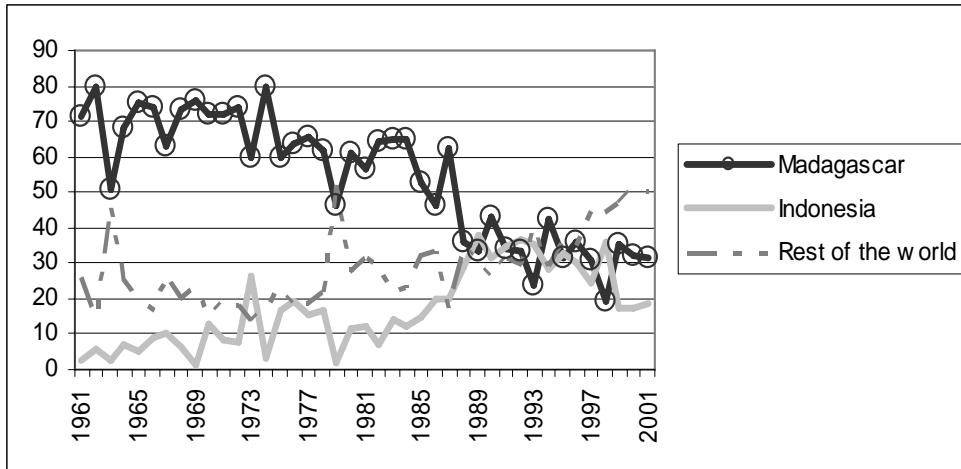
Source: FAOSTAT

Appendix Figure 4: Rice trade and rice aid (MT), Madagascar, 1955 to 2005



Source: INSTAT, FAOSTAT and www.irri.org

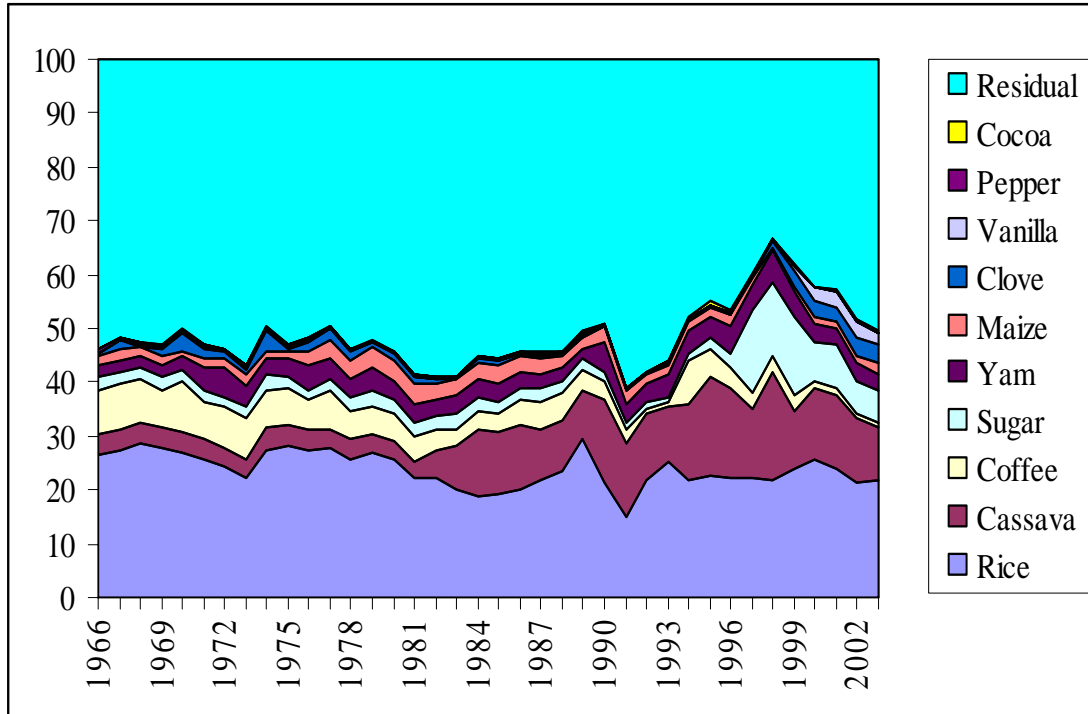
Appendix Figure 5: Country shares of global vanilla exports, 1965 to 2003



Source: Author's construction using FAOSTAT data

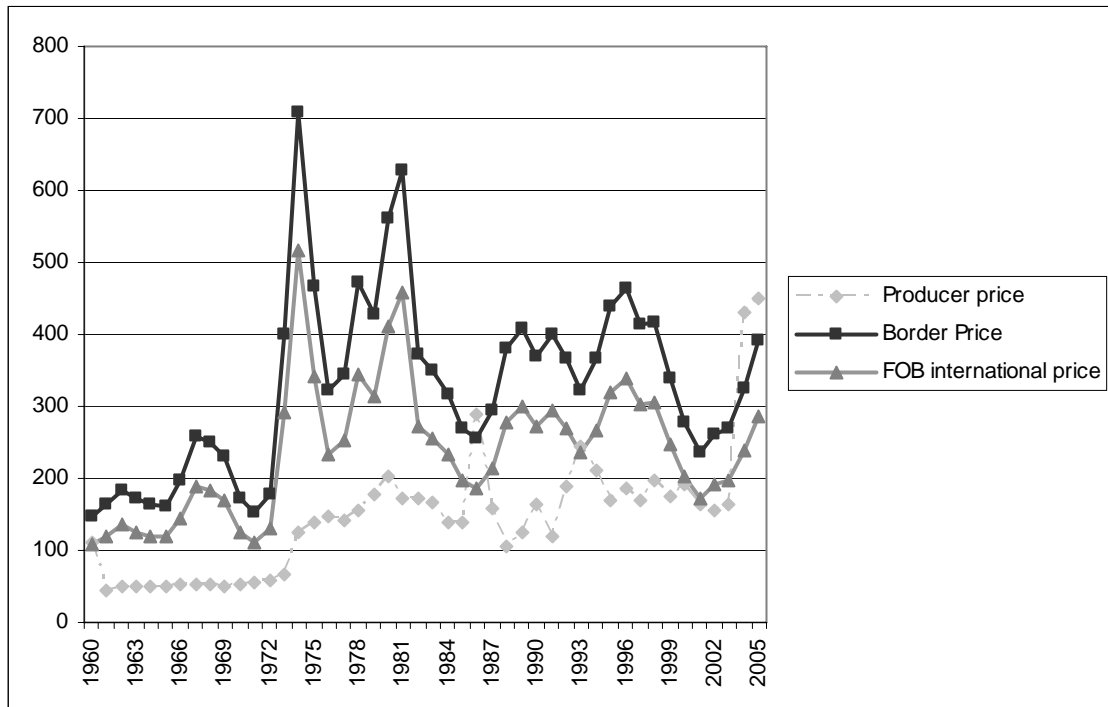
Appendix Figure 6: Product shares of gross value of agricultural production, Madagascar, 1966 to 2003

(percent at distorted prices)



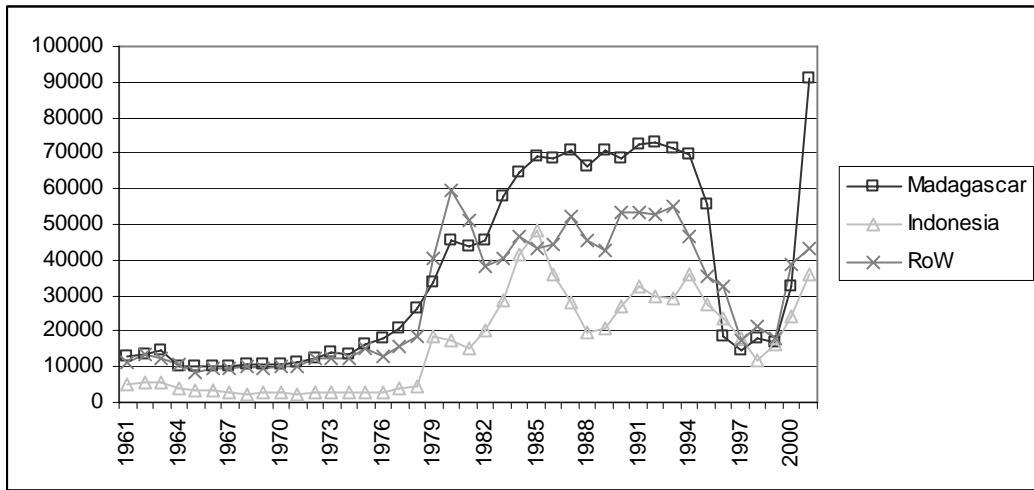
Source: Author's construction using FAOSTAT data

Appendix Figure 7: Rice prices in USD/MT, Madagascar, 1955 to 2005



Source: FAOSTAT, IFS, MINAGRI

Appendix Figure 8: Vanilla export unit values comparison (USD/MT), 1961 to 2001



Source: compiled using FAOSTAT data

Appendix Table 1: GDP per capita, agricultural value added and rural population, Madagascar, 1960 to 2005

Year	GDP per capita (in constant USD, 2000=100)	GDP per capita (in current USD)	Rural Population (percent of total population)	Agricultural VA (percent of total GDP)
1960-70	379	149	88	25
1971-80	362	281	83	30
1981-90	276	289	79	34
1991-2000	236	239	75	29
2001-05	233	270	73	30

Source: World Bank (2006)

Appendix Table 2: Tax revenue by type of instruments, Madagascar, 2002 to 2005

(percent)

	2002	2003	2004	2005
Custom duties	8	7.7	6.6	22.8
Import tax	15.3	15.7	17.4	0
VAT	43.8	45.6	41.8	43.5
PPT+VATPP(1)	24.4	21.4	30.7	31.4
Excise duty	3.8	4.2	2.4	2.1
TSI(2)	4.4	5.1	0.8	0
Other(3)	0.3	0.3	0.3	0.2

Source: Customs (2006)

(1) Value Added Tax on Petroleum products and customs revenue on oil imports

(2) TSI (Statistic Import Duty) was eliminated in 2004

(3) Others are: DN (Droit de Navigation), Scomad(Service de Conditionnement de Madagascar), Fines, RAA(Recettes Accidentelles et Accessoires), IR (Interet de Retard).

Appendix Table 3: Evolution of trade policy instruments and domestic taxes, Madagascar, 1960 to 2005

	1960	1969	1972	1977	1978	1982	1988	1991	1992	1993	1994	1995	1996	1997	
Export taxes				6-15% on FOB price, Establishment of Stabilisation Fund from Export Earnings (FNUP)			Elimination of all export taxes on traditional export crops except for coffee, Vanilla, and Cloves		Elimination of export taxes on Coffee and Cloves			Adoption of ad valorem taxation of 25% as an exit fee for Vanilla		Phase out of all export taxes	
Import taxes				" Re-application" of tariff on imports from ECC according to Convention of Lome II			Reduction of tariff rates categories from 69 to 16, with a rate of 5% to a maximum rate of 80%	Continuation of tariff reform, with a min rate of 5% to a max of 60%	Continuation of tariff reform, with a min rate of 10% to a max of 30%		Decrease in inspection threshold to USD10000	Change in various duties rates (see below*)	Decrease in inspection threshold to USD5000 for imported goods	Decrease in rice import tariff to 10%. Decrease by 80% in import tariff for goods originating from COMESA countries and IOC	Tariff application on imports from PIP** project, Decrease in inspection threshold to USD1000, for imported goods, Further decrease (by 90%) of import
Domestic Indirect taxes	Consumption tax (5-10%, luxury and monopoly)	Unique Transaction tax (12% for general operation)			TUT increased to 10%	TUT:15%		Fusion of TUT and consumption tax into			Creation of VAT:20%	Phase out of VAT reimbursement for companies			
Subsidies			Subsidies on food and fuel			Subsidy on flour		Elimination of food and fuel subsidies				Abolition of flour subsidy and application of VAT on flour(20%)			

Source: World Bank (1995), Local source and own elaborations. * 20% for intermediary inputs and machineries, 30% for consumption goods (shoes, clothes, etc...), 40% for electronic products or alike, 50% for luxury goods (cars,...), 50% for alcoholic beverages and tobacco. *PIP: Public Investment Project. FNUP: Fonds National Unique de Perequation.

Appendix Table 4: Annual distortion estimates, Madagascar, 1955 to 2005
(a) Nominal rates of assistance to covered products (percent)

	Cassava	Clove	Cocoa	Coffee	Maize	Pepper	Rice	Sugar	Vanilla	Yam	All covered
1955	0	na	na	na	na	na	10	0	na	0	7
1956	0	na	na	na	na	na	6	1	na	0	4
1957	0	na	na	na	na	na	-14	0	na	0	-11
1958	0	na	na	na	na	na	14	0	na	0	10
1959	0	na	na	na	na	na	-7	0	na	0	-5
1960	0	na	na	na	na	na	-27	0	-66	0	-23
1961	0	na	na	na	na	na	-27	-2	-62	0	-24
1962	0	na	na	na	na	na	-15	3	-61	0	-13
1963	0	na	na	na	na	na	-21	1	-66	0	-19
1964	0	na	na	na	na	na	-25	0	-53	0	-21
1965	0	na	na	na	na	na	-25	0	-55	0	-21
1966	0	-57	-12	-29	-41	-62	-24	-2	-42	0	-24
1967	0	-54	-20	-20	-25	-48	-5	-2	-57	0	-17
1968	0	-59	-37	-21	0	-41	-40	-2	-52	0	-32
1969	0	-8	-57	-37	-44	16	-21	-2	-57	0	-23
1970	0	8	-29	-15	0	-9	5	-1	-43	0	-2
1971	0	18	-7	-14	13	-19	3	-2	-35	0	-2
1972	0	26	-14	-8	0	6	-1	-1	-34	0	-3
1973	0	-69	-42	-11	0	6	-51	1	-37	0	-38
1974	0	-74	-61	-28	0	-5	-64	-2	-46	0	-55
1975	0	-74	-46	-22	0	-24	-32	-4	-46	0	-28
1976	0	-84	-78	-75	0	-47	-31	-4	-68	0	-47
1977	0	-82	-78	-74	63	-35	13	0	-47	0	-35
1978	0	-85	-85	-76	25	-57	-43	-3	-75	0	-52
1979	0	-78	-69	-68	0	-34	-7	-1	-49	0	-27
1980	0	-85	-58	-60	0	-19	-21	-1	-57	0	-35
1981	0	-91	-58	-58	0	-38	-51	0	-67	0	-52
1982	0	-95	-75	-83	0	-57	-55	-3	-87	0	-63
1983	0	-96	-78	-85	0	-54	-54	-1	-86	0	-58
1984	0	-93	-73	-81	-21	-65	-30	0	-85	0	-49
1985	0	-79	-63	-68	0	-73	16	2	-83	0	-22
1986	0	-80	-58	-59	0	-77	-3	0	-81	0	-20
1987	0	-89	-79	-64	16	-88	-23	-1	-91	0	-39
1988	0	-91	-66	-58	-26	-83	-1	-1	-87	0	-30
1989	0	-86	-36	-44	-23	-78	-2	-1	-85	0	-20
1990	0	-86	-37	-21	40	-71	-3	-1	-84	0	-10
1991	0	-82	-7	-31	53	-27	-6	-1	-89	0	-13
1992	0	-68	-50	-61	14	-16	0	-1	-73	0	-8
1993	0	-45	-52	-69	38	-22	-1	1	-73	0	-8
1994	0	-32	17	38	-2	-15	1	2	-71	0	2
1995	0	-56	0	-31	-30	-50	-4	-1	-69	0	-10
1996	0	-61	-21	-16	0	-49	-2	2	-49	0	-4
1997	0	-74	-35	-20	-41	-78	-3	-1	9	0	-6
1998	0	31	-34	7	0	-70	1	0	-5	0	1
1999	0	24	-24	-4	0	-63	3	-3	-29	0	0
2000	0	-3	-24	-27	40	20	9	-2	-9	0	3
2001	0	-55	1	-18	30	6	9	-1	6	0	-2
2002	0	2	-23	-46	18	-56	6	0	-35	0	-4
2003	0	na	-28	-59	na	na	6	0	na	0	1
2004	0	na	na	na	na	na	11	1	na	0	11
2005	0	na	na	na	na	na	0	-1	na	0	0

Appendix Table 4 (continued): Annual distortion estimates, Madagascar, 1955 to 2003
 (b) Nominal and relative rates of assistance to all^a agricultural products, to exportable^b and import-competing^b agricultural industries, and relative^c to non-agricultural industries (percent)

	Total ag NRA				Ag tradables NRA			Non-ag tradables	
	Covered products		Non-covered products	All products (incl NPS)	Exportables	Import-competing	All		
	Inputs	Outputs						NRA	RRA
1955	0	7	0	2	6	18	7	10	-3
1956	0	4	0	1	4	18	4	10	-5
1957	0	-11	0	-3	-10	18	-9	9	-17
1958	0	10	0	3	9	18	10	10	0
1959	0	-5	0	-1	-4	18	-4	9	-12
1960	0	-23	0	-8	-22	21	-21	11	-29
1961	0	-24	0	-8	-23	21	-22	12	-30
1962	0	-13	0	-5	-13	18	-13	10	-21
1963	0	-19	0	-7	-18	22	-17	12	-26
1964	0	-21	0	-8	-20	20	-19	11	-27
1965	0	-21	0	0	-8	-24	0	12	0
1966	0	-24	-2	-12	-26	22	-26	12	-34
1967	0	-17	-1	-8	-18	20	-18	11	-26
1968	0	-32	-1	-17	-35	20	-35	11	-41
1969	0	-23	-1	-10	-25	26	-24	16	-34
1970	0	-2	0	-1	-3	18	-2	10	-11
1971	0	-2	0	-1	-10	4	-2	9	-10
1972	0	-3	0	-1	-6	0	-3	8	-10
1973	0	-38	-1	-24	-21	-50	-42	8	-46
1974	0	-55	-1	-40	-45	-63	-58	9	-61
1975	0	-28	-1	-19	-30	-32	-31	11	-38
1976	0	-47	-2	-33	-72	-31	-52	17	-59
1977	0	-35	-1	-26	-68	13	-38	7	-42
1978	0	-52	-1	-38	-71	-43	-56	18	-63
1979	0	-27	-1	-19	-59	-6	-31	14	-39
1980	0	-35	-1	-27	-61	-21	-39	14	-46
1981	0	-52	-1	-40	-65	-50	-56	19	-63
1982	0	-63	-2	-47	-81	-54	-68	26	-74
1983	0	-58	-1	-43	-80	-53	-66	25	-72
1984	0	-49	-1	-37	-78	-28	-59	16	-65
1985	0	-22	0	-15	-66	17	-30	13	-38
1986	0	-20	-2	-15	-62	-3	-27	11	-34
1987	0	-39	-2	-27	-67	-22	-46	17	-54
1988	0	-30	-2	-20	-64	26	-63	15	-68
1989	0	-20	-2	-14	-51	-2	-23	8	-29
1990	0	-10	-1	-7	-36	-3	-16	10	-23
1991	0	-13	-1	-9	-38	-6	-20	8	-26
1992	0	-8	-1	-6	-53	1	-13	12	-22
1993	0	-8	-1	-6	-40	23	-38	14	-46
1994	0	2	0	1	5	2	3	13	-9
1995	0	-10	-1	-7	-36	-3	-15	9	-22
1996	0	-4	-1	-3	-19	24	-18	14	-28
1997	0	-6	-2	-5	-31	-2	-10	10	-18
1998	0	1	0	1	1	1	1	9	-7
1999	0	0	0	0	-5	2	0	9	-8
2000	0	3	0	2	-10	9	4	14	-8
2001	0	-2	0	-1	-27	9	-2	14	-15
2002	0	-4	0	-3	-26	6	-5	12	-16
2003	0	1	-1	0	-42	6	0	14	-13

a. NRAs including assistance to nontradables and non-product specific assistance.

b. NRAs including products specific input subsidies.

c. The Relative Rate of Assistance (RRA) is defined as $100 * [(100 + \text{NRA}_{\text{ag}}^t) / (100 + \text{NRA}_{\text{nonag}}^t) - 1]$, where NRA_{ag}^t and $\text{NRA}_{\text{nonag}}^t$ are the percentage NRAs for the tradables parts of the agricultural and non-agricultural sectors, respectively.

Appendix Table 4 (continued): Annual distortion estimates, Madagascar, 1955 to 2003 (c)
 Value shares of primary production of covered^a and non-covered products, (percent)

	Cassa va	Clove	Cocoa	Coffe e	Maize	Peppe r	Rice	Sugar	Vanill a	Yam	Non- covere d
1955	3	na	na	na	na	na	16	1	na	2	77
1956	3	na	na	na	na	na	17	2	na	2	76
1957	3	na	na	na	na	na	22	2	na	1	72
1958	3	na	na	na	na	na	17	2	na	1	76
1959	3	na	na	na	na	na	18	2	na	1	75
1960	3	na	na	na	na	na	24	3	2	1	67
1961	3	na	na	na	na	na	28	2	1	2	63
1962	4	na	na	na	na	na	28	2	1	2	63
1963	3	na	na	na	na	na	28	2	2	2	63
1964	3	na	na	na	na	na	30	2	1	2	62
1965	4	na	na	na	na	na	28	2	2	2	62
1966	3	0	0	9	2	1	26	2	2	1	54
1967	3	6	0	8	2	1	22	2	2	1	54
1968	3	0	0	7	1	0	34	2	1	1	50
1969	3	1	0	7	2	0	24	2	2	1	57
1970	3	3	0	9	1	0	21	2	1	1	58
1971	3	1	0	7	1	1	23	2	2	4	56
1972	3	1	0	8	1	1	24	2	2	5	52
1973	3	3	0	7	1	1	40	2	2	3	38
1974	3	8	0	6	1	0	49	2	1	2	27
1975	4	3	0	9	1	1	41	2	2	3	33
1976	3	9	0	18	1	1	31	1	1	4	32
1977	4	10	0	27	1	1	24	2	1	4	27
1978	3	9	0	18	1	1	36	2	2	3	27
1979	4	3	0	20	1	1	34	3	1	5	28
1980	4	10	0	14	1	0	38	3	2	4	24
1981	3	10	0	11	1	0	43	2	3	3	24
1982	3	10	0	16	1	0	35	2	5	2	26
1983	6	5	0	17	1	0	34	2	6	2	26
1984	11	12	0	15	1	0	23	2	6	2	26
1985	14	4	0	13	1	1	21	3	7	4	32
1986	16	2	0	14	1	1	28	3	3	3	29
1987	9	2	0	13	1	1	26	2	10	2	33
1988	10	4	0	12	1	1	24	3	8	2	35
1989	10	2	0	8	4	1	33	2	7	2	32
1990	20	2	0	5	2	0	28	2	4	7	30
1991	21	3	0	5	3	0	24	2	5	4	33
1992	19	1	0	4	2	0	33	2	4	5	30
1993	15	1	0	4	2	0	39	2	4	6	27
1994	20	1	1	9	2	0	31	2	3	5	27
1995	22	1	1	9	3	0	28	2	3	4	28
1996	22	1	1	6	2	0	31	3	1	6	28
1997	18	1	1	5	3	0	32	3	1	6	30
1998	28	1	1	4	1	0	30	3	1	7	25
1999	15	3	0	4	1	0	33	3	3	6	30
2000	17	4	0	2	1	0	31	3	4	3	33
2001	18	7	0	2	1	0	28	3	5	3	33
2002	16	4	1	2	1	0	27	2	10	3	32
2003	13	na	1	3	na	na	39	4	na	0	41

Source: Author's spreadsheet

a. At farmgate undistorted prices

Appendix Table 5: Exchange rate, Madagascar, 1960 to 2005

	(local currency per US dollar)			
	Official rate	Secondary/parallel market rate	Assumed retention rate ^a	Est. equil. exchange rate ^b
1960	260.1	274.1	0.05	267.5
1961	262.9	280.0	0.05	271.9
1962	250.1	253.4	0.05	251.8
1963	264.9	284.2	0.05	275.0
1964	257.9	269.5	0.05	264.0
1965	268.0	291.0	0.1	280.7
1966	270.1	295.5	0.1	284.1
1967	260.1	274.1	0.1	267.8
1968	258.5	270.7	0.05	264.9
1969	304.8	357.8	0.1	333.9
1970	279.9	282.2	0	281.1
1971	273.6	270.4	0	272.0
1972	246.4	240.8	0	243.6
1973	224.7	226.5	0	225.6
1974	276.8	301.5	0	289.2
1975	246.5	268.4	0	257.5
1976	322.1	434.3	0.2	389.4
1977	232.9	220.7	0	226.8
1978	306.6	416.7	0.2	372.7
1979	241.3	273.7	0.2	260.7
1980	248.0	291.0	0.2	273.8
1981	363.1	485.1	0.2	436.3
1982	665.8	1267.5	0.2	1026.8
1983	773.2	1388.8	0.2	1142.5
1984	771.1	1031.3	0.2	927.2
1985	720.7	784.1	0.1	755.6
1986	716.0	758.1	0.05	738.1
1987	1386.0	1796.7	0.1	1611.9
1988	1636.3	1902.9	0.1	1782.9
1989	1653.1	1704.4	0	1678.8
1990	1600.4	1714.2	0	1657.3
1991	2111.0	2322.1	0	2216.5
1992	2143.9	2358.3	0	2251.1
1993	2201.2	2421.4	0	2311.3
1994	3527.9	3880.8	0	3704.4
1995	4906.2	5397.0	0	5151.6
1996	4585.0	5176.3	0.1	4910.2
1997	5582.1	6120.7	0.1	5878.3
1998	5441.4	5441.4	0	5441.4
1999	6283.8	6283.8	0	6283.8
2000	7783.7	7783.7	0	7783.7
2001	7577.9	7577.9	0	7577.9
2002	7857.9	7857.9	0	7857.9

2003	7121.4	7121.4	0	7121.4
2004	9344.5	9344.5	0	9344.5
2005	10015.1	10015.1	0	10015.1

^a The proportion of foreign currency actually sold by all exporters at the parallel market rate.

^b See Anderson et al. (2008) on the exchange rate methodology used in this study