

V.R.F. Series

No.409

Mar. 2006

**Export-oriented Manufacturing Industry in Madagascar:
Roles in Poverty Reduction**

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Visiting Research Fellow Monograph Series

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ACKNOWLEDGMENTS

I am profoundly grateful to my counterpart and friend Dr. Tatsufumi YAMAGATA for inviting me to the Institute of Developing Economies as a project-linked Visiting Research Fellow. At the professional level, his knowledge-sharing and advices are outstanding. At the friendship level, his supports and understandings are immeasurable. I am indebted to my friend Takahiro FUKUNISHI for introducing me to the IDE.

I would like to gratefully thank Dr. Masahisa FUJITA and Mr. Akifumi KUCHIKI for putting trust in me and receiving me at the IDE, and for providing pertinent guidelines regarding my researches. I express my gratitude to the team of researchers on Africa led by Mr. Shinichi TAKEUCHI, to other IDE-Visiting Research Fellows and to all IDE researchers with whom I had the opportunity to interact for the exchanges of views.

I am very much grateful to the IDE-staff members at the International Exchange Division for their unlimited supports: Mr. Takayuki SANADA, Mr. Yuzuru MORIWAKI, Mrs. Naomi HARADA and Mr. Ke DING.

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CHAPTER I: INTRODUCTION

The overwhelming extent of poverty worldwide has awaked awareness of the international community. At the eve of the third millennium and despite the substantial economic development witnessed in some regions of the world, nearly half of the world population still lives with less than two dollars per day and a fifth with less than one dollar per day, the usual threshold of absolute poverty. The United Nations has decided to play a leading role and to make a decisive step towards fighting poverty. Accordingly, a – even the – main component of the Millennium Development Goals (henceforth MDGs), a strong and comprehensive plan of actions for the new millennium declared in 2000, includes halving the proportion of world's population living in extreme poverty between 1990 and 2015.

Various policies are being considered towards such ambitious goal. A fundamental policy lies in the fostering of economic development, and particularly of pro-poor economic growth. Numerous economic policies have been conceived, designed and implemented in developing countries; an crucial foundation of such policies reside in the strategy towards the rest of the world, *i.e.* towards international trade and foreign investments.

Openness of developing countries to international trade and international investment has always been a topic of controversy among economists and policy makers. The intense debate lies in the expected effects of such policy on domestic welfare. On one hand, economic theorists led by Ricardo suggest that openness allows specialization according to the country's comparative advantage; the mechanism brings about more efficient allocation of resources and ultimately a higher level of welfare for all participating countries. On the other hand, openness-antagonists inspired by Prebisch stress that the weak competitiveness of developing countries does not permit optimistic involvement in international market. An appropriately designed protectionism is called for. Moreover, the existing comparative advantage as well as the current level of competitiveness will confine developing countries to a specialization in primary products, cornering to the “immiserizing growth” without industrialization.

However, the observed facts from the 1980s have proven that openness to international trade and international investment has outperformed closed policy. Developing countries that have genuinely implemented openness policy have exhibited remarkable economic development. This group includes particularly the First Tier Newly Industrialized Economies in East and Southeast Asia (Korea, Taiwan, Hong Kong, Singapore). The Second Tier NIEs (Malaysia, Indonesia, Thailand, Philippines) have followed the path of the latter subsequently. In contrast, developing countries that had recourse to close policy ended up with mitigated economic performance. Sub-Saharan African countries and some Latin American countries fall in this group.

Hence, acknowledging the supremacy of open policy economists and policy makers have move the debate to the search of policy measures that would enhance participation in

international trade and inflow of foreign investments. One important measure towards such objectives is the promotion of export-oriented manufacturing industry; the sector would attract substantial foreign investments and would expand the country's exports onto international markets. This strategy has served a pillar to the export-led growth strategy of the First and Second Tier Newly Industrialized Economies of East and Southeast Asia. More importantly, the export-oriented manufacturing industry would not only be a lever for economic development but would also play a major role in poverty alleviation, a major objective of the MDGs above-mentioned.

The present analysis aims at investigating this role of export-oriented manufacturing industry, *i.e.* contribution to poverty reduction, in a particular developing country, Madagascar. The study draws upon existing literature and is structured in two main levels: "indirect effects" or macro and "direct effects" or micro. Each level is sub-divided in two horizons: "past and present" or observed facts, and "future" or simulation. Hence, Chapter 2 will explain the observed role of the industry on poverty reduction through its macroeconomic effects. Chapter 3 will present expected macroeconomic effects from a simulation exercise. Chapter 4 will put forward observed microeconomic contribution of the industry onto poverty alleviation. Chapter 5 will show results of simulation at a microeconomic level. Concluding remarks are given in Chapter 6.

CHAPTER II: MACROECONOMIC ROLE OF THE EXPORT-ORIENTED MANUFACTURING INDUSTRY

A sound poverty alleviation policy should be based on robust economic development leading to creation of wealth, combined with an appropriate distribution of the additional wealth to the poor.¹ In the present chapter and the subsequent chapter, we argue that export oriented manufacturing industry inherently creates wealth and induces economic development through its interaction with other sectors at the macroeconomic level. In Chapter 4 and 5, we will show that additional wealth created directly or indirectly from this specific industry benefits the poor.

Prior to the main core of the analysis, in order to understand the grounds of the study we present an overview of the Malagasy economy at the macro level as well as an overview of the extent of poverty in Madagascar.

II. 1. Selected macroeconomic indicators

After its independence in 1960, Madagascar has opted for an import substitution policy expecting to protect domestic producers; in the late 1970s, a massive investment plan named “investing to the limit” was implemented. Those measures were expected to bring about soaring of the domestic production. However, the expected results did not occur; economic growth continues to stagnate partly because of the distorted allocation of resources from the import substitution policy and balance of payments deteriorates as a result of the massive imports of capital goods required for the investing to the limit policy. As had been occurring in most African countries at that time, Madagascar has embarked in the so-called Structural Adjustment Programme jointly implemented with the Bretton Woods Institutions. The program advocates an open trade policy instead of the import substitution strategy, a framework leading subsequently to the promotion of the export-oriented manufacturing industry and the EPZs.

Major macroeconomic indicators are provided here-after in order to allow an understanding of the circumstance in which the study is conducted. Madagascar is populated by 17 million inhabitants, growing at an annual rate of 2.74%. The labor force totals 7.3 million people and unemployment rate is 5.9%. Total GDP amounts to 5.4 billion USD, growing at an annual rate of 5.3% and GDP per capita at the purchasing power parity level is 800 USD. The total production is made up of 30% of agriculture, 15% industry and 55%

¹ A poverty reduction policy based on redistribution of the existing wealth in favor of the poor can also be considered; however, the currently existing wealth in least developed countries is too limited to allow a substantial and sustainable poverty reduction

services. Trade as share of GDP stands at 34%. Share of manufacturing in total exports has expanded from 18% in 1980 to 25% in 1990 and 50% in 2000. Inflation is 14% and government expenditure is 11% of GDP. Private investment as share of GDP reaches 6% and net inflows of FDI stand at 13 million USD.

II. 2. Overview of poverty

Following Foster, Greer and Thorbecke (1984), and employing a comprehensive household survey, Paternostro *et al.* (2001) defined poverty line in Madagascar as the value of total consumption sufficient to purchase both a reference of 2,100 calories daily food basket and a minimum of non-food needs. They refer to this limit as upper poverty line. A lower poverty line corresponds to only the value of total consumption of 2,100 calories.² Since the extreme poor households have to allocate resources to non-food expenditures including clothing and shelter, their daily actual consumption falls below the required 2,100 calories. Since the households survey used as reference was first conducted in 1993, for the sake of comparison the monetary values of the poverty lines are given in Malagasy Francs in that year and corresponds to 313,945 FMG and 259,654 FMG, respectively for the upper and lower poverty lines. Using those indicators, Paternostro (2001) and Dorosh *et al.* (2003) assess the evolution of poverty in Madagascar (Tab.1).

Headcount of poverty is overwhelming in Madagascar; above two thirds of the population is living below poverty line. In 2001, the situation came back to its level in 1993 after deterioration in the second half of the 1990s. Poverty in other provinces is more accentuated than in the capital, Antananarivo; and clear difference appears between rural and urban area, with poverty headcount of 77% and 44% respectively.

Table 1: Incidence of Poverty

	1993	1997	1999	2001
National	70.4	73.7	71.7	69.6
Urban	44.2	57.3	46.2	44.1
Rural	76.7	78.2	78.9	77.1
Antananarivo	63.4	61.8	57.1	48.3
Urban	35.7	45.3	36.6	28.3
Rural	72.4	68.3	65.5	56.7

Source: Dorosh *et al.* (2003)

² See also World Bank (1996)

II. 3. Theoretical framework

Following other countries and expecting substantial outcomes from export-oriented manufacturing industries, policy makers in developing countries have frequently granted special treatment to those industries, usually clustered in and named as Export Processing Zones (EPZs henceforth). The first EPZ was established in Ireland in 1959, according to the World Bank (1992). Number of countries setting up EPZs soared from 25 countries in 1975 to 73 in 1996 and 116 in 2002. In Madagascar the EPZs system was introduced in 1990, while in 1965 in Mexico, in 1966 in Taiwan, 1968 in Dominican Republic, in 1970 in South Korea, in 1971 in Mauritius and Malaysia, in 1972 in the Philippines and Costa Rica, in 1974 in Senegal, in 1976 in Jamaica, El Salvador and Honduras, in 1983 in Bangladesh, in 1990 in Kenya and Cameroon, in 1993 in Zimbabwe, in 1995 in Togo, and in 1996 in Namibia.

From an economic theory perspective, few approaches can be adopted to analyze the roles of EPZs in macroeconomic development. Based on the neo-classical theory, EPZs would negatively affect domestic welfare since provision of favorable treatment to EPZs' firms would distort away from the existing comparative advantage and would lead to inefficient use of resources (Hamada, 1974).

In contrast, Warr (1989) argues that the neo-classical analysis has been based on Heckscher-Ohlin model of production, assuming that capital is internationally immobile. Therefore, the framework mistakenly omits to take into account the international mobility of capital which is the central functioning of EPZs. Hence, the above conclusion of the neo-classical literature is debatable since the reasoning fails to consider the actual pattern of operation of EPZs. It is noted that the Rybczynski Theorem of the Heckscher-Ohlin model of international trade takes into consideration the mobility of production factors such as capital and labor; hence, the theorem allows analyzing the functioning of EPZs within the framework of neo-classical theory. EPZs would consequently be a second-best policy option.

According to the endogenous growth theory, macroeconomic contributions of EPZs also occur through the effects on productivity. Channels of such effects are externalities, technology transfer, spillover and building of human capital. However, it would be more appropriate to go beyond the endogenous growth theory framework that adopts a short or medium horizon, and study the effects of EPZs and export-oriented manufacturing industries in the long-run that would be of higher importance for developing countries. In the long-run, as most economists nowadays tend to focus on and to agree with, economic growth is seen as being determined by the productivity of capital as in the AK model. It would be more insightful to investigate macroeconomic effects of EPZs under such framework.

Based on those theoretical backgrounds and drawing upon practical economic facts, macroeconomic roles of export oriented manufacturing industry are centered around the following points: employment creation, export expansion and diversification, backward linkages, FDI inflow and building of human capital. From its contribution to economic

development through those channels, the industry generates additional wealth into the country and plays a potential role in poverty alleviation.³

II. 4. Employment creation

From 1975 to 2002, total employment in EPZs worldwide grew from less than one million to over thirteen millions, excluding China. In Madagascar, while textile industries account for almost all EPZs production,⁴ employment in this sector rose from 42,000 in 1995 to 46,000 in 1997 and 191,000 workers in 2001.

For comparative purposes, employments in EPZs in various countries are given in Table 2. The countries are ranked according to the importance of EPZs in total employment, at the year of the availability of the data. As the last column of the table shows, Madagascar ranks second after Mauritius. The share is by far larger than that of other developing countries, putting forward the pertinent importance of the macroeconomic role of export-oriented manufacturing industries in terms of employment creation in Madagascar. Moreover, the

Table 2: Employment in EPZs

Country	Year	Number of workers in EPZs	Percentage in total employment
Mauritius	1995	80,466	17.10
Madagascar	2001	191,000	10.00
Dominican Republic	1996	164,639	4.92
Costa Rica	1996	47,972	3.59
Honduras	1996	61,162	2.92
Mexico	1997	898,786	2.38
Malaysia	1996	196,774	2.32
El Salvador	1996	50,000	2.10
Jamaica	1994	14,148	1.11
Sri Lanka	1990	60,000	0.88
Taiwan	1997	57,016	0.60
Philippines	1997	183,709	0.59
Togo	1996	4,000	0.23
South Korea	1991	21,910	0.20
Bangladesh	1996	37,533	0.06

Sources: Madani (1999), World Bank (1994), ILO (various issues)

³ Conditional to the appropriate distribution of the additional wealth to the poor, to be analyzed below.

⁴ Textile industries accounted for 90% of EPZs total production in 2001.

growth rate of EPZs employment was also amongst the highest in Madagascar; the share of employment in EPZs in total employment expanded from 3% in 1995 to 10% in 2001. EPZs accounted for 34% of job creation between 1995 and 2001. Job creation is considered as a main expectation of policy makers when setting up EPZs; indeed, from the table below it can be assessed that the export-oriented manufacturing industries in Madagascar are living up to this expectation. The role they are playing in this regards is much greater than in other developing countries, both in absolute terms, *i.e.* number of workers and mainly in relative terms, *i.e.* the share in total employment.

In addition to direct employment, export-oriented manufacturing industries also induce indirect creation of employment through its interactions with other sectors in the economy. Such interactions include purchase from direct domestic suppliers (reviewed below as backward linkage), use of domestic services such as transport, finance, electricity etc. The ratio of indirectly to directly created in EPZs in Madagascar stands at a high level of 0.7. For comparison the figure is 0.4 for Cameroon; the EPZs employs directly 2567 workers and induce 1027 indirect employment creation.

II. 5. Export expansion and diversification

As their name indicates, a major expected contribution of Export Processing Zones is the expansion of diversification of the country's exports. Promotion of export-oriented manufacturing industries is aimed at gearing the participation of developing countries into the international market; exports would be boosted and the resulting foreign exchange revenues would allow larger imports of capital and intermediate goods for the domestic economy.

As Table 3 shows, total exports of Madagascar have markedly expanded from US\$ 373.3 million in 1991 to US\$ 1,111.7 million in 2001, a high growth rate of 197%. EPZs firms have accounted for the biggest part of that expansion; EPZs exports have soared from a negligible amount of US\$ 17.8 million in 1991 to a great amount of US\$ 467.3 million in 2001, a striking growth rate of 2,525%. Export-oriented manufacturing industries have been the pillar of the expansion of Malagasy exports over a decade; the share of EPZs exports in total exports has rapidly and continuously growing, from 4.8% in 1991 to 42.0% in 2001. For comparison, the ratio increased from 5.3% to 82.1% in Dominican Republic, from 62.8% to 72.8% in Mauritius, and from 37.2% to 40.9% in Mexico respectively at the beginning and at the end of the 1990s.

The most important effect of exports-expanding role of EPZs firms lies inherently in the enhancement of foreign currency earning of the base country. Such role is particularly crucial for developing countries since they are often faced with the insufficiency of foreign currency for imports of capital and intermediate goods, a bottleneck for the economic development. Table 4 presents the gross foreign currency earning from EPZs firms in selected countries.

Regarding diversification of exports, Table 5 presents the evolution of the components of the total Malagasy exports from 1991 to 2001. Exports have become remarkably diversified, through the increasing importance of manufactured exports. While the structure of exports has been dominated by agricultural products in the early 1990s, manufactured exports have caught up and are even overtaking the latter. Such phenomenon originated mainly from the contribution of export-oriented manufacturing industries frequently clustered in EPZs.

Table 3: Exports expansion in Madagascar: (US\$ million)

Year	Total exports	EPZs exports	Ratio EPZs/Total
1991	373.3	17.8	4.8
1992	395.3	24.9	6.3
1993	418.0	54.8	13.1
1994	545.6	98.8	18.1
1995	620.5	115.4	18.5
1996	682.8	169.4	24.8
1997	695.1	206.6	29.7
1998	761.2	248.4	32.6
1999	795.0	294.4	37.0
2000	945.1	369.7	39.1
2001	1111.7	467.3	42.0

Sources: International Trade Center (CIF data)

Table 4: Gross foreign currency earning from EPZs

Country	Years	Gross earning (US\$ million)
Jamaica	1996	235.3
Sri Lanka	1990	437
Bangladesh	1996	310
El Salvador	1991	85
Philippines	1994	1,994.10
Costa Rica	1992	125
Honduras	1991	95
Jordan	1996	444.4

Source: Madani (1999)

Table 5: Exports diversification in Madagascar

	1991	1996	2001
Manufactured Exports	15.5	31.3	48.4
- Clothing	4.8	24.8	43.1
Agricultural Products	77.4	56.8	45
- Spices	23.3	9.4	22.0
- Fishing products	24.4	22.1	17.1
- Coffee	9.6	13.0	0.7

Source: Cling, Razafindrakoto and Roubaud (2004)

The exports diversification brought about by EPZs is highly important for developing countries that are often confined to the exports of very limited scope of primary products. The dependence on a few ranges of export products renders developing countries vulnerable to the level or volatility of the prices of those products. Increasing share of manufactured exports would improve the country's terms of trade and would limit unexpected variation of foreign currency earning.

II. 6. Backward linkages

Backward linkage is defined as the extent to which a specific industry purchase inputs from the domestic and contributes to the dynamism of the local industrialization and subsequently the local economy. EPZs firms in Madagascar import 75% of their intermediate goods and the other 25% domestically. This figure is high relative to some developing countries; for instance, EPZs firms in Malaysia purchase less than 5% of its total inputs in the domestic market, less than 10% for the Philippines between 1972 and 1982, and 5% for Sri Lanka under the system of sub-contracting.

The backward linkage effect can also be analyzed through the ratio of net to gross exports; a higher ratio reflects a more important purchase of intermediate goods from the domestic market. The figure for the case of EPZs in Madagascar stands at 55% in 1998. For Indonesia, South Korea and Taiwan, the ratio stands high between 49% and 63% in the mid-1980s while it was at a mitigated low level for Malaysia, the Philippines and Sri Lanka. For instance, Philippines' net to gross exports ratio was a merely 1.6% in 1987 although in the late 1980s and into the mid-1990s, the ratio has exhibited relatively steady trend and reached 42% in 1994. In Mauritius, the ratio increased from 22% in 1985 to 40% in 1995. Jamaica is considered as a typical case of a lack or weak backward linkage; in 1996, total gross exports of the three EPZs amounted to US\$ 235 million while net exports were merely US\$ 28

million, giving a ratio of 11%. For Bangladesh, the ratio has slightly improved from 11% in the second half of the 1980s to an average of 20% in the first half of the 1990s.

As pointed out by Madani (1999) a dichotomy between the performances of gross and net exports is due to the fact that EPZs firms import a large portion of their raw and intermediate input. Indeed, the statement is confirmed by the observations cited above. Indeed, EPZs in Madagascar exhibit both relatively low level of imported intermediate goods and high level of net/gross exports ratio; the low levels of domestically purchased inputs in the Philippines and Sri Lanka are reflected in the ratio of net/gross exports, as shown above. The low import ratio and high net/gross exports ratio for EPZs in Madagascar are sign of stronger backward linkages of export-oriented firms onto the domestic economy, as compared to the above-selected countries.

A weak backward linkage from EPZs firms in a specific country, relative to other countries can be explained by the absence of industrial base prior to the setting up of EPZs to promote export-oriented manufacturing industries. EPZs firms require high quality domestic suppliers respecting given timeliness. The presence of such prior-domestic firms is often qualified as “absorption capacity”. Korea and Taiwan are considered as having already developed such capacity.

It is noted that the share of domestically purchased intermediate input by EPZs firms is still far below that by domestic firms in Madagascar. The latter induce stronger backward linkages by purchasing domestically 50% of their raw and intermediate inputs. Warr (1989) mentions that multinational companies investing in EPZs may adopt a global a strategy looking for the cheapest reliable international supplier instead of a domestic one. Such strategy might be motivated by the need to preserve the international mobility of their processing operations; strengthening and tightening supplies to domestic sources only would go against such strategy. Moreover, Amirahmadi and Weiping Wu (1995) state that foreign firms tend to exhibit higher propensity to import than domestic firms; limited knowledge of the domestic market and fear of low quality and timeliness would push expatriate managers to purchase from trusted suppliers overseas.

Nevertheless, although momentum from EPZs firm through backward linkages is highly expected in the domestic economy in the medium and long run, a low net/gross export ratio should not be seen per se as a negative outcome. The goals defined by the policy makers when designing the policy to promote export-oriented firms might explain partly the level of the net/gross export ratio. For instance, the volume of trade and the level of activity of the firms may be sufficiently large to provide other benefits such as large employment and technological spillovers that would compensate the weak backward linkages.

II. 7. FDI inflow

Given the low level of domestic saving, policy makers in developing countries have set up various incentive measures, summarized as EPZs measures, in order to attract foreign investments in those zones. FDIs are primarily meant to be an infusion of new capital (machinery and equipments) and of foreign currency; then, they are expected to bring the outcomes of EPZs firms related earlier. Table 6 compares the share of foreign investments in EPZs in selected countries. It appears that foreign investments are substantially present in EPZs of almost all the countries depicted in here. The figures support that the measures implemented towards EPZs have successfully attracted foreign investments; in other words, EPZs efficiently play their role of increasing inflows of foreign investments. For the case of Madagascar, FDIs in EPZs are constituted by French investments (46% of total jobs in EPZs), Mauritian (28%) and other Asian origin (7%). The contribution of export-oriented manufacturing industry in building domestic human capital will be tackled in a subsequent section.

After a “past and present horizon” or the analysis of the observed contributions of EPZs at the macroeconomic level, we will adopt a “future horizon” to present a simulation exercise showing the estimated effects of export-oriented manufacturing industries if they are given exogenous momentum.

Table 6: Share of FDI in EPZs

Country	Year	FDI/Tot. EPZ Inv
Madagascar	1997	89%
Mauritius	1999	45%
India	1983	16.70%
Indonesia	1983	70%
Malaysia	1983	90%
Philippines	1983	49%
Sri Lanka	1982	70%
South Korea	1986	73.90%
Taiwan	1985	85%
Thailand	1983	20%

Sources: Amirahmadi and Wu (1995), MADIO (1999)

CHAPTER III: MACROECONOMIC SIMULATION

The simulation aims at predicting the effects of a continuous expansion or an exogenous shrinkage of the EPZs on the entire economy in Madagascar. The exercise would allow having insights on the importance of the sector in economic development and poverty reduction in medium and long run. The study draws upon Dorosh *et al.* (2003).

III. 1. Methodology

The analysis is based on macroeconomic modeling utilizing two techniques: a Social Accounting Matrix (henceforth SAM) and a Computable General Equilibrium (henceforth CGE) model. The SAM is developed in order to summarize the structure of the Malagasy economy and ultimately to identify the share of assets, production and consumption held by the poor, and to situate the poor regionally and sectorally. A static picture of the economy in 1999 is built. The economy is divided in 14 groups of households of which 4 urban and 10 rural. Among non-agricultural households, distinction is made between poor and non-poor, and among rural households between large and small farmers. Concerning economic activities, 33 sectors are considered constituted by 10 agricultural, 12 industrial and 11 services. The country is divided in four geographic zones.

The CGE considers four sectors that are of high importance in the economy and that are likely to bring about substantial effects on the macro-economy and on poverty reduction: agriculture, road, EPZs and tourism. The model follows Lofgren *et al.* (2001), Dissou (1998) and Dervis *et al.* (1982).

The production function is assumed as a technological type of Leontief in intermediate inputs and constant elasticity of substitution in the production factors. The latter are paid their marginal productivity. Income distributed to households is a proportion of their share of ownership of production factors; they pay taxes and have a fixed propensity to save. Consumption function is also assumed as exhibiting constant elasticity of substitution.

A neo-classical framework is adopted in which prices are adjusting in order to bring about equilibrium in all markets. A floating exchange rate system leads to equilibrium in the foreign exchange market; goods' prices equilibrates goods' markets and wages adjust towards the equilibrium level in the labor market.

The model does not intend to provide a fully dynamic mechanism of the economy. Instead, it provides a comparative analysis of two states of the economy: the original state in 1999 and the new equilibrium level. Hence, the medium time horizon of five years is opted for in order to allow the convergence process to almost fully occur.

III. 2. Results

Two cases are considered: a negative shock and a positive shock to the economy. A negative shock might originate from the phasing out of the Multi-Fiber Agreement or a political crisis pushing investment in EPZs out of Madagascar, among other probable factors. In contrast, a positive shock might originate for instance from additional favorable policy measures granted by the Malagasy government or from improved domestic investment climate, pulling foreign investments into the Malagasy EPZs. Following negative shocks, a hypothetical reduction of 70% in EPZs investments is considered; and from a positive shock, an increase of 50% in EPZs investment is assumed. Effects of such shocks on the economy are summarized in Table 7.

On one hand, concerning the negative shocks, the hypothetical 70% reduction in investment of export-oriented industries would lead to shrinkage of demand for domestic suppliers of intermediate goods by 31.5%, bringing price down by 5.9% and production by 23.5%. Aggregate GDP would decrease by 1.6% and fiscal revenues by 1.2% following the slowing down of sectors interconnected with EPZs, and budget deficit would worsen.

Since EPZs is a pillar of the Malagasy exports, aggregate exports would fall by 11.3%; simultaneously, given the import ratio for intermediate goods, aggregate imports would also diminish. Overall effect on trade deficit would be a worsening of 9.9% launching a depreciation of the exchange rate. This would spur exports from other sectors such as mining, export crops (vanilla, coffee, cloves) and tourism which are expected to grow by 29.8%, 16.5% and 10% respectively.

Most importantly for our point of concern, demand for unskilled workers would contract by 65.4% in EPZs and by 44.3% in the other formal textile industry. Other expanding sectors such as mining and tourism would partly absorb the laid labor; demand for labor in those sectors would rise by 148% and 19% respectively. Urban households would be the most hit in terms of welfare reduction, seeing their income falling by 5.7%, 6.9% and 4% respectively for highly, medium and unqualified workers, while rural farm households would not be hurt.

Table 7: Simulated impacts of shocks in EPZs

	Reduction	Increase
1. Shock in EPZs investment	-70.0%	50.0%
2. Impact on production		
EPZs	-67.5%	40.3%
Formal textiles (intermediate goods)		
Mining	28.5%	-25.4%
3. Impact on producer prices		
EPZs	9.9%	-4.8%
Mining	29.8%	-10.0%
4. Impact on real household consumption		
Urban highly qualified	-6.1%	3.2%
Urban medium qualified	-6.8%	3.6%
Urban unqualified, male headed	-3.7%	1.9%
Urban unqualified, female headed	-4.7%	2.5%
Small cultivators, inner land	0.0%	-0.1%
Large cultivators, inner land	0.0%	-0.1%
Small cultivators, east coast	1.1%	-0.6%
Large cultivators, east coast	2.6%	-1.3%
Small cultivators, south	0.2%	-0.2%
Large cultivators, south	-0.4%	0.2%
Small cultivators, west	0.6%	-0.4%
Large cultivators, west	0.4%	-0.3%
Rural non-agricultural poor	0.6%	-0.4%
Rural non-agricultural non-poor	0.6%	-0.3%
5. Macroeconomic impact		
GDP	-1.6%	0.8%
Total consumption	-1.9%	1.0%
Demand for unskilled urban labor	-3.1%	1.5%
Exports	-11.3%	6.5%
Imports	-8.5%	4.9%
Trade balance	0.0%	0.0%
Real exchange rate	9.9%	-4.8%
6. Government impact		
Revenues	-1.2%	2.0%

Source: Dorosh *et al.* (2003)

On the other hand, an expansion of investment in EPZs by 50% would spur production by 40.3%, enlarging demand addressed to domestic suppliers of intermediate goods for the EPZs. Prices in such sector would rise by 6.6%, providing incentives for an increase of production by 9%. Income and consumption multipliers would push up GDP by 0.8% and fiscal revenues would expand by 2%.

Regarding external sector, aggregate exports would increase by 6.5% while the induced imports of intermediate goods would lead to an expansion of total imports by 4.9%. Subsequently, trade balance would improve and real exchange rate would appreciate. The mechanism would bring about shrinkage of exports in other sectors such as mining, export crops and tourism by 10%, 8% and 5% respectively.

As focus of our analysis, demand for unskilled labor in the EPZs would expand by 35.2% and in other formal domestic textile sector by 28.4%, drawing labor from the mining and tourism sectors. Regarding changes in welfare, urban households would benefit the most since export-oriented manufacturing industries are essentially clustered in urban areas. Consumption of urban highly qualified households would expand by 3.2% while that of unqualified by 1.9% and 2.5%, respectively for male headed and female headed households. In contrast, welfare of cultivators as well as rural non-agricultural households would be reduced by a range of 0.1% and 1.3%.

CHAPTER IV: MICROECONOMIC ROLE OF THE EXPORT ORIENTED MANUFACTURING INDUSTRY

The analysis here focuses on the impacts of export-oriented industry on poverty at the household level. As we indicated earlier, two basic conditions have to be met for a specific sector to contribute to poverty alleviation. First, the sector should create additional wealth into the economy; and second such additional wealth should be appropriately distributed to benefit the poor. In Chapter II and Chapter III, we showed that export-oriented industries bring about additional wealth at the macroeconomic level; in this and the next Chapters, we will delve into the issue whether the wealth newly created in those industries benefits the poor, at the household level.

The approach will be structured as follows. Firstly, the additional wealth from EPZs will benefit the poor if they are dominant in the newly created employment. Secondly, the poor are lifted out of poverty if wages and benefits from the new EPZs works are higher than the previous income and higher than the poverty threshold. Lastly, EPZs play a long-run contribution towards poverty alleviation if the industry is sufficiently competitive and would provide employment to the poor in the long-run.

IV. 1. Employment for the poor

We have seen in Section II.4 that export-oriented manufacturing industries have brought about massive employment creation in Madagascar as well as in other developing countries. In order to analyze whether such new labor demand is directed to the poor, we will analyze the skill requirements for such position or the “entry barrier”, and the observed evolution of employment structure in Madagascar.

Skill requirements for a new employment are related to education level and experience. Table 8 displays among other characteristics the average number of years of schooling of workers and the percentage of workers getting their first job, in different sectors of the economy in Antananarivo in 2001.

EPZs exhibit the lowest average years of workers’ schooling among all formal sectors of the economy. Since poor people are often with lower education level, we can assess that export-oriented manufacturing industry is the sector that has the highest ratio of poor people in its labor force and is the most likely hire them. Moreover, as shown in Table 9 the average years of schooling of EPZs’ workers has decreased from 9.4 years in 1995 to 8.1 years in 2002, while it has remained unchanged or has risen for other sectors. This might be an indication that the requirement regarding education level or the “entry barrier” for EPZs employment has been reduced, and that export-oriented industries have provided employment

Table 8: Characteristics of labor force by institutional sector (Antananarivo, 2001)

	Female	Age	Schooling	First job
Public Administration	0.36	44.4	11.7	59%
Public Enterprises	0.28	40.8	10.2	54%
Private Formal (non-EPZs)	0.3	35.2	9.3	70%
EPZs	0.69	27.4	7.8	80%
Private Informal	0.55	31.3	5.7	72%
Independent	0.53	34.7	6.6	87%

Source: Glick and Roubaud (2004)

Table 9: Evolution of years of schooling of workers (Antananarivo)

	1995	1998	2000	2002
Public Administration	11.0	10.8	11.4	11.5
Public Enterprises	10.6	11.0	11.1	10.1
Private Formal (non-EPZs)	8.6	9.1	9.6	9.6
EPZs	9.4	8.6	8.0	8.1
Private Informal	5.2	5.4	5.3	6.0
Independent	6.6	6.3	6.4	6.7

Source: Glick and Roubaud (2004)

to poorer people.

In order to investigate rigorously those assessments, an econometric analysis is presented in Table 10. The results confirm the finding from the descriptive statistics presented above. After controlling for a great number of factors, it appears robustly that the probability of being employed in EPZs firms is positively related to primary and secondary education level but is negatively related to post secondary education of both male and female. In contrast, further education beyond secondary school increases probabilities of employment in other formal sectors of the economy. The findings imply that employment in EPZs requires lower education level than in the other formal sectors of the economy, and that employment in export-oriented manufacturing industries are more targeted to the poor.

As far as work experience requirement is concerned, we can see from Table 8 that EPZs firms exhibit the highest percentage of workers without prior work experience among formal sectors. While 80% of EPZs employees are in their first job, the figure is 70% for private formal non-EPZs, 59% for the public administration and 54% for public enterprises. Furthermore, potential total work experience of workers in EPZs is the lowest in the

economy: 13.6 years for EPZs, 11.9 years for other industrial sector, 22.4 years for informal sector and 26.2 years for public sector. Those differences provide additional evidence supporting the assessment that “entry barrier” to EPZs is lower than in other formal sectors of the economy, and that this sector is the most likely to absorb poor people in employment.

Table 10: Determinants of sector of employment probabilities (EPZs)
(Marginal effects from multinomial logit model)

Variable	Male		Female	
	Marginal Effect	t-statistic	Marginal Effect	t-statistic
Yrs. Primary school	0.002	3.01 **	0.014	8.05 **
Yrs. Secondary school	0	2.72 **	0.001	2.23 **
Yrs. Post secondary	-0.002	-3.68 **	-0.01	-6.81 **
Age 15 - 24	0.007	4.28 **	0.016	7.65 **
Age 25 - 34	0.005	4.35 **	0.024	9.40 **
Age 51 - 65	-0.003	-4.17 **	-0.013	-8.42 **
Age over 65	-0.003	-3.92 **	-0.014	-8.61 **
Migrant within last 5 yrs	0.001	1.42 **	-0.006	-2.97 **
Year 1996	0.003	1.80 *	0.009	2.54 **
Year 1997	0.004	2.07 **	0.014	4.05 **
Year 1998	0.007	3.29 **	0.019	5.09 **
Year 1999	0.014	5.90 **	0.024	6.33 **
Year 2000	0.025	8.45 **	0.04	9.51 **
Year 2001	0.03	9.31 **	0.047	10.54 **
Married	0.003	3.34 **	0.003	1.72 *
# child. in household < 2	0.002	2.43 *	-0.006	-3.58 **
# child. in household 2- 5	-0.001	-1.39	-0.003	-2.47 **
# child.in household 5 - 9	-0.001	-2.04 **	-0.003	-2.81 **
# males 10 - 20	-0.001	-2.98 **	-0.001	-1.53
# females 10 - 20	0	0.53	-0.002	-2.43 **
# males 21 - 60	0.001	1.67 *	-0.002	-2.81 **
# females 21 - 60	0.001	1.28	0.006	6.78 **
# older than 60	0	-0.14	0	-0.15
Intercept	-0.034	-5.70 **	-0.125	-12.75 **

Source: Glick and Roubaud (2004)

As far as work experience requirement is concerned, we can see from Table 8 that EPZs firms exhibit the highest percentage of workers without prior work experience among formal sectors. While 80% of EPZs employees are in their first job, the figure is 70% for private formal non-EPZs, 59% for the public administration and 54% for public enterprises. Furthermore, potential total work experience of workers in EPZs is the lowest in the economy: 13.6 years for EPZs, 11.9 years for other industrial sector, 22.4 years for informal sector and 26.2 years for public sector. Those differences provide additional evidence supporting the assessment that “entry barrier” to EPZs is lower than in other formal sectors of the economy, and that this sector is the most likely to absorb poor people in employment.

Additional information to support the assessments can be drawn from the characteristics of EPZs employees in Table 11. As one can expect from the information in Table 10, Table 11 displays that the share of unskilled workers in EPZs has risen, implying that this sector has employed increasing proportion of poor people since the latter are those with lower skills.

It is frequently pointed out that export-oriented manufacturing industries are merely short run sources of income and that a worker could not count on as a permanent employment. The information in Table 11 goes against such statement; proportion of temporary employment in EPZs has reduced, EPZs can be expected to be a provider of stable permanent employment.

Interestingly, while the share of poor people hired in EPZs is increasing⁵, the proportion of EPZs workers living below poverty line is falling from 50% in 1997 to 42% in 2001 (Table 11). Such phenomenon implies that export-oriented industries are vigorously contributing to poverty reduction by increasingly employing poor people and lifting them out of poverty. The mechanism inherently originates from the higher income and better work conditions provided in EPZs, as compared to alternative works for the poor, an issue that will be developed later.

Table 11: Characteristics of EPZs’ employment

	1997	1999	2001
Skilled workers	51%	54%	46%
Unskilled workers	49%	46%	56%
Temporary employment	34%	39%	20%
Workers below poverty line	50%	39%	42%
Average age	36	34	32
Female labor force	76%	75%	80%

⁵ Reflected for instance through the increasing share of unskilled labor.

Table 12: Evolution of structure of employment (Antananarivo, percentage)

Sector	1995	2001
Public administration	11.6	8.1
Public enterprises	2.7	2.6
Formal private (non-EPZs)	23.6	24.4
EPZs	3.1	10.2
Informal Private	57.6	53.1
Associative enterprises	1.4	1.5
Total	100	100

Sources: 1-2-3 Surveys, INSTAT MADIO, Cling *et al.* (2004)

We take the analysis a step further and delve into the evolution of the structure of employment between different sectors during the period 1995 to 2001. Table 12 shows that the share EPZs in total employment has expanded from 3.1% in 1995 to 10.2% in 2001;⁶ and that this increase has drawn labor force mainly from informal private sector that the share reduced from 57.6% to 53.1% over the same period. As we will develop subsequently, the informal private sector has the lowest income in the economy, and is the sector where the poor people are grouped in. Hence, providing employment for people in such sector and offering higher income would improve the situation of the poor.

IV. 2. Wages and Benefits

After putting forward that export-oriented manufacturing industries exhibit the labor demand best fit for the poor, we analyze here the second condition towards poverty reduction: do EPZs provide higher income and better benefits than previous or alternative employment sector?

As explained earlier, particularly through Table 12, workers who join the EPZs were formerly involved in informal activities; and as Table 13 displays, monthly earnings in EPZs firms are higher than that in the informal sector. Hence, it can be assessed that export-oriented firms offer possibility for higher income to the group of people in informal sector, which includes essentially the poor.

⁶ This has also been stated earlier.

Table 13: Earnings and worked hours

	Monthly earnings (US\$)
Public sector	87
Formal private (excl. EPZs)	57
EPZs	38
Informal sector	33

Sources: 1-2-3 Surveys, INSTAT MADIO, Cling *et al.* (2004)

Such assessment is confirmed by the results of a thorough econometric analysis in Table 14, which presents the determinants of earnings. After controlling for various factors, it emerges robustly that there exist differences in earnings across sectors of the economy. Since the regression analysis considers the informal sector as the base sector, the positive sign on the dummy variable related to EPZs implies that export-oriented firms provide higher earnings than informal sector; and the difference is particularly important for female worker.

Moreover, although the level of income provided by EPZs firms is lower than that by other formal sectors of the economy in Madagascar, rate of increase of monthly income is higher in EPZs compared to the average for the entire economy, respectively 9.1% and 7.3% in 2001. For instance, Nicita and Razzaz (2003) computed that median wages in 1997 amounted to 150,000 FMG (200,000 FMG for men and 135,000 FMG for women) and in 1999 those figures increased to 200,000 FMG (300,000 FMG for men and 176,000 FMG for women), pointing to an average growth rate of 33% or 9% in real terms. They added that growth rate of wages was the greatest for workers at the bottom of the wage distribution, implying that the poorest among the workers are benefiting the most from the increase in wages in EPZs firms.

At the international level, Kusago and Tzannatos (1998) compare the income in EPZs and non-EPZs firms in selected countries; they found that no unequivocal assessment can be drawn. The comparison varies across countries. For China (1989), Thailand (1990) and Sri Lanka (1992) export-oriented firms offer higher salary than other sectors; for Taiwan (1988) and Mauritius (1986), wages in EPZs firms are lower than that in non-EPZs firms; and for Korea and Malaysia, earnings in EPZs firms have overtaken that of non-EPZs sectors after 1987 and 1990, respectively for the two countries.

For a general overview, according to OECD (1996) and Romero (1995) among other sources, wages in EPZs are higher on average than wages outside the zones. Karp (1989) finds that wages in EPZs firms in the Caribbean and Central America are 5% to 20% higher than in domestic firms. In Malaysia, wages in EPZs firms were 30% higher than the domestic average wage.

Table 14: Determinants of hourly earnings
(Base category: informal sector)

Variable	Men	Women
Yrs. Prim. school	0.041 **	0.054 **
Yrs. Sec. school	0.10 **	0.101 **
Yrs. Post Sec. school	0.152 **	0.142 **
Occupational experience	0.038 **	0.045 **
Experience sq.	-0.001 **	-0.001 **
Migration within last 5 yrs	-0.003	-0.122 **
Public admin.	0.558 **	0.989 **
Public enterprise	0.739 **	1.137 **
Private formal (non-EPZs)	0.384 **	0.737 **
EPZs	0.292 **	0.636 **
Year 1998	0.119 **	0.071 **
Year 1999	0.163 **	0.194 **
Year 2000	0.216 **	0.305 **
Year 2001	0.205 **	0.295 **
Intercept	5.387 **	4.866 **
Number of observations	8,404	6,552

Source: Glick and Roubaud (2004)

In addition to wages, it is equally important to observe other benefits given to workers. Such benefits include paid leave, health care, stability of employment, and hours of work. Table 15 displays such benefits for the various sectors of the economy.

Non-wage benefits given to workers in EPZs are far better than that in private informal sector in which poor are mostly clustered in. Hence, in addition to higher salary, from the view point of work benefits EPZs firms also contribute to poverty reduction. Except the longer working hours, in all aspects of working conditions EPZs provide workers with better treatments than in private formal non-EPZs sector. In general, non-wage benefits in EPZs are comparable to that provided in the public administration and in public enterprises.

Beyond wages and non-wages benefits, we also look at the possibility of promotion in EPZs firms. Accordingly, results of a probit model analysis are presented in Table 16. The marginal effects of each factor on the probability to get promotion are displayed. Since the analysis considers the informal sector as the base category, the positive sign of the coefficient

related to the EPZs-dummy implies that EPZs firms provide larger probability for promotion than the informal sector; equivalently, EPZs firms give higher possibility to move a better and implicitly higher income activity than informal sector. Most importantly, since the coefficient attributed to the EPZs-dummy is the largest among all the sectors of the economy, we can assess that belonging to the EPZs allows the highest probability to get promoted.

After showing that export-oriented manufacturing industries offer to the poor higher income, better work conditions and greater probability for promotion than previous or alternative employment sector(s), we now turn to the issue whether such better conditions can be provided in the long run. Such analysis will focus on the competitiveness of EPZs firms that will allow them to stay on business in the long run.

Table 15: Non-wages benefits

Benefit or Characteristic	Public Admin.	Public Enterprise	Private Formal non-EPZs	EPZs	Private Informal Wage
Entitled to paid leave (%)	85	81	52	79	8
Receives health care benefits (%)	64	78	46	83	12
Has continuous employment (%)	99	93	95	100	81
Has employment contract (%)	97	92	68	93	11
Hours of work per month (mean)	161	172	187	211	180

Source: 1-2-3 Surveys

Table 16: Determinants of promotion (Base category: informal sector)

Variable	Men	Women
Yrs. Prim. school	0.002	0.004
Yrs. Sec. school	0.001	0.001 **
Yrs. Post Sec. school	0.001	0.001
Firm specific experience	0.007 **	0.003 **
Public Admin.	0.040 **	0.013 **
Public Enterprise	0.027 **	0.041 **
Private formal (non-EPZs)	0.013 **	0.011 **
EPZs	0.052 **	0.018 **
Year 1998	0.002	0.001
Year 1999	0.002	0.001
Year 2000	-0.004	0.002
Year 2001	0.001	0.002
Number of observations	5,300	4,833

Source: Glick and Roubaud (2004)

IV. 3. Competitiveness of EPZs firms

The analysis investigates the competitiveness of the Malagasy export-oriented manufacturing industries amidst competing industries in other countries. Competitiveness is looked at through wage level and productivity in the industry. Table 17 provides insights into the nominal wage differences worldwide in the clothing sector. Madagascar figures among the countries with the lowest wage rate. Nominal labor cost in Madagascar is lower than the overwhelming giant competitor China, and is half of that of India. This reflects a long-run valuable international competitiveness of the Malagasy clothing sector, which represents 90% of the EPZs firms.

Nominal wage solely might be misleading, accurate investigation of competitiveness calls for adjustment using productivity. As Table 18 shows, productivity of Malagasy workers in the garment industry can be considered as being among the average compared to other countries; a machine operator in Madagascar can produce 14 to 15 shirts in a workday; the performance of a worker in China can reach 22 shirts while that of a worker in Mozambique is as low as 10 shirts. However, considering the productivity-adjusted wage, the unit labor cost in Madagascar is among the lowest. Hence, we can state that export manufacturing industries in Madagascar exhibit sturdy international competitiveness that would allow them to stay on business and to be a mean of poverty reduction in the long run.

Table 17: Hourly wage rate in the clothing sector (current US\$, 1998)

Country	Wage Rate
Korea	3.63
Tunisia	1.76
Dominican Republic	1.62
Mauritius	1.41
Mexico	1.08
China	0.62
Sri Lanka	0.49
Bangladesh	0.43
Madagascar	0.4
Indonesia	0.24
Haiti	0.05

Source: Werner International

Table 18: Competitiveness of Malagasy EPZs

	Productivity*	Unit Labor cost
Madagascar	14-15	0.023
Kenya	12-15	0.026
Ghana	12	0.022
Mozambique	10-11	0.029
Lesotho	18	0.035
South-Africa	15	0.05
India	16	0.027
China	18-22	0.04

*average number of shirts that a machine operator can produce in a workday

Briefly, the analysis of the observed facts at the household or microeconomic level leads to the statements that employment creation from EPZs firms are essentially targeting the poor, that those firms provide workers with higher income and larger work benefits than previous or alternative sector and that those firms are sturdily competitive at the international level. Hence, it can be assessed that export-oriented manufacturing industries in Madagascar play important role in reducing poverty, and this also in the long run. After a “past and present” horizon or an analysis of the observed facts, we adopt in the following chapter a “future” horizon and present results of simulation forecasting the effects of EPZs firms on poverty reduction at the household level, assuming policy changes or other exogenous shocks onto the economy.

CHAPTER V: MICROECONOMIC SIMULATION

The analysis aims at forecasting the effects expansion of EPZs on households and particularly on poor households. A prediction of the pattern and extent of the role of EPZs on poverty reduction is delved into. The procedures and findings presented here are based on Nicita and Razzaz (2003) and Nicita (2004).

V. 1. Methodology

The study is based on econometric modeling combining two procedures: the matching technique and the industry wage premium technique. The matching technique is used to identify the type of labor of individuals that are likely to move into the expanding sector, *i.e.* the export-oriented manufacturing industry (Heckman, Ichimura and Todd, 1997). The wage premium technique attempts to quantify the gains of the individuals that move into the expanding sector (Krueger and Summers, 1988; Helwege, 1992; Haisken-DeNew and Schmidt, 1997).

The matching technique starts by dividing labor force into four sectors: informal, services, textiles or EPZs and others. Informal sector includes agriculture, small commerce and other marginal sectors; it is considered as the source of surplus labor in the economy. Then, the probability for a specific individual to be hired in the EPZs sector, given her/his characteristics is computed from the following logit model:

$$L_i = \beta_0 + \beta_1 X_i + \beta_2 H_i + \varepsilon_i$$

where L is the logit of dichotomous variable taking the value 1 if individual i is employed in textile industry, and 0 otherwise; X is a vector of individual characteristics including gender, age and level of education; H is a vector of household characteristics including marital status, type of head of household, regional location (urban or rural), number of households' members and presence of other households' member working in EPZs. Such probability can also be named "propensity scores".

Then wage differentials across sectors are estimated based on the regression equation, taking a Mincerian form:

$$\ln W_i = \beta_0 + \beta_1 X_i + \beta_2 I_i + \varepsilon_i$$

where W is wage, X is a vector of individual characteristics including gender, age and level of education, I is a dummy variable capturing wage differential across industries. Such equation is also called "industry wage premium" equation.

The analysis is a partial equilibrium model, assuming that the EPZs sector expands at a rate higher than the other sectors, which grow at an equal rate.

From combining the two techniques, the analysis identifies the type of individuals that would

be the most fit candidate to move into the EPZs if this sector expands, and subsequently computed the income gains accruing to those individuals from comparing their expected income to their previous earnings. Hence, the impact on real income of a specific individual *i* at time *t* can be computed through:

$$\Delta Income_{it} = Income_{i0} \left[(1 + \Delta Dw_t)(1 + W_t)^t - 1 \right] \times R_t$$

where ΔDw_t is the wage differential for individual *i*, W_t is the increase in the wage for individual *i* between 1997 and 1999, and R_t is a dichotomous variable taking the value of 1 for individuals employed in the EPZs sector or individuals with the characteristics best matching for employment in the EPZs sector.

V. 2. Results

Results of the first step of the procedure, estimation of propensity scores are given in Table 19. It appears from the gender and marital status variables that women and single persons have higher probability to be employed in EPZs. Living in urban area and being employed in other textile sector increases such probability. In contrast, having a secondary income, having a relatively high level of education and being relatively aged reduces the probability.

Table 19: Propensity scores

Variable	Coefficient
Gender	-2.717***
Age	0.149***
Age2	-0.002***
Gender-Age	0.031
Education	0.812***
Education2	-0.035***
Gender-Education	-0.069
Household Head	0.204
Marital Status	-0.488*
Region 1	-8.036***
Region 2	-11.6***
Region 3	-10.007***
Region 4	-11.510***
Region 5	-10.856***
Region 6	-10.455***
Urban/Rural	1.003***
Other Textile	3.967***
Secondary Income	-0.124
Household Members	-0.164***
Number of observations	19,524

Subsequently, the procedure assumes an expansion of 20% of employment in the textile EPZs sector, and attempts to identify the workers that would be drawn into the sector accordingly.⁷ Such expansion is equivalent to 170,000 employment creation in the EPZs sector; hence, the top 170,000 individuals with highest propensity scores as estimated in the previous equation are selected. The characteristics of those individuals are summarized in Table 20. Strikingly, 52% of individuals likely to be employed in EPZs sector were previously household employed or unemployed, 45% did not indicate their sector of employment or were unemployed. Since unemployed people are the most likely to be in poverty situation, it can be assessed that expansion of EPZs sector provides important employment opportunity for the poor. Indeed, and most important finding for our focus, such assessment is supported by the prediction that 44% of the individuals likely to be employed in EPZs were formerly living below poverty line.

The second step of the procedures estimates wage equation and computes the expected gains from the new employment in EPZs. Results of the estimation of the wage equation are displayed in Table 21. It appears that men are better paid than women. After controlling for various main determinants of wages, the inference shows that wages in the textile sector are higher than that in the informal sector since the latter is used as base category in the estimation.⁸ From the knowledge of the wage difference between sectors, the income and welfare gains are calculated for the individuals who would be drawn in the EPZs sector, *i.e.* the 170,000 individuals from the propensity scores estimation. Results of the welfare simulation are given in Table 22. The scenario predicts a total increase of over 200% in income after five years. Each household would benefit from an enhancement of total expenditures by 25%. At the social level, a total of 1 million people would benefit directly or indirectly from the expansion of the EPZs sector. And strikingly, a total of 150,000 individuals would be lifted out of their current poverty situation, benefiting mostly the urban areas.

⁷ The rate of expansion refers to the employment growth in the sector for the second half of the 1990s, and assumes that the trend will continue.

⁸ The finding confirms the assessment earlier.

Table 20: Characteristics of new entrants into EPZs

Characteristics	Magnitude
Employment indicators	
<i>Total new jobs</i>	
Number of individuals moving	170,702
<i>Former type of employment</i>	
Permanent	14%
Temporary	34%
HH employed or unemployed	52%
<i>Former sector of employment</i>	
Agriculture	20%
Informal sector	23%
Services	10%
Other industries	2%
Not indicated or unemployed	45%
<i>Benefits in previous employment</i>	
No benefits	74%
Some benefits	26%
Income indicators	
Average monthly per capita expenditure	\$52.20
Poverty headcount index	44%
Individual characteristics	
Age 18 - 25	24%
Age 26 - 35	39%
Unskilled workers	71%
Skilled workers	29%
Household head	13%
Spouse of household head	52%
Urban Antananarivo	65%
Rural Antananarivo	34%

Table 21: Wage equation

Variable	Coefficient
Gender	0.217***
Age	0.057***
Age2	-0.001***
Households members	0.001
Marital status	0.229***
Urban/rural	0.239***
Education	0.068***
Education2	0.001
Industry	0.648***
Services	0.340***
Textiles	0.468***
Industry Textile female	-0.098
Salary Type	0.104*
Antananarivo	-0.061
Households head	-0.008
Household gender	-0.080
Constant	9.629***
Number of observations	1996

Table 22: Welfare simulation results
(from a hypothetical expansion of 20% of the EPZs sector)

Welfare indicators	Total
<i>Income indicators of workers</i>	
Average monthly income	97.3 US\$
Average increase in income after 5 years	212%
<i>Expenditures indicators of households</i>	
Percentage increase in households expenditures	26.56%
Monthly per capita gains of each household member	14.2 US\$
Monthly per capita gains as a % of per capita expenditure	24.29%
<i>Social indicators</i>	
<i>Number of individuals directly or indirectly affected</i>	
<i>From all workers</i>	
Number of individuals	1,020,318
Number of individuals per worker	4.2
<i>From workers already in the textile and apparel industry</i>	
Number of individuals	461,445
Number of individuals per worker	3.8
<i>From workers not in the textile and apparel industry yet</i>	
Number of individuals	713,177
Number of individuals per worker	4.5
<i>People out of poverty</i>	
<i>From all workers</i>	
Number of individuals	158,282
Number of individuals per worker	0.5
<i>From workers already in the textile and apparel industry</i>	
Number of individuals	35,043
Number of individuals per worker	0.3
<i>From workers not in the textile and apparel industry yet</i>	
Number of individuals	123,239
Number of individuals per worker	0.7

Source: Nicita and Razzaz (2003)

CHAPTER VI: CONCLUDING REMARKS

Worldwide, it is agreed that poverty is one of the most serious scourge of humanity; it is still overwhelming at this dawn of the third millennium. The international community has set up a plan of actions to tackle this scourge, presented as the Millennium Development Goals. The donor community and domestic policy makers have conceived and designed various policies accordingly. The economic component of such policies would target new sources of wealth creation and appropriate distribution of the additional wealth to the poor. Promotion of export-oriented manufacturing industries, or export processing zones (EPZs) has been considered as a potential policy tool towards those objectives.

The strategy has been increasingly been implemented in various countries, particularly in developing countries. Controversies have arisen regarding the beneficial effects of such sector onto the economy and onto poverty reduction. We analyzed such effects for the case of particular developing country: Madagascar. The contributions of the sector at the both macroeconomic and microeconomic level are considered. At the macroeconomic level, it is shown that EPZs are new sources of substantial wealth creation, directly and indirectly. The findings emerged from the analysis of the observed facts (employment creation, export expansion and diversification, backward linkages and FDI inflows), and from a simulation exercise attempting to predict the impact of the sector on the entire economy following a hypothetical expansion. At the microeconomic level, it is explained that the additional wealth created through EPZs benefit the poor. The conclusions were also drawn from an analysis of observed facts (employment for the poor, wages and benefits and competitiveness of EPZ firms) and a simulation exercise.

A continuous expansion of the EPZs sector would contribute substantially to poverty reduction in Madagascar; and as Cling and Letilly (2001) praised, only two less developed countries Madagascar and to a lesser extent Bangladesh have launch successful EPZs. Hence, domestic as well as international policy makers ought to pay special attention to this sector.

In order to improve the performance of the sector in terms of its contribution to the domestic economy and to poverty reduction, the followings issues are pointed at: weakness of backward linkages as compared to domestic firms, reduction of poverty confined to urban areas or rural areas in the periphery of large cities and income bias to the detriment of women. Finally, we note that currently the magnitude of contribution of EPZs towards poverty reduction is still rather small given the limited share of the sector in total employment. However, such share is rapidly increasing, despite the dominant agricultural characteristic of the Malagasy economy. Leveraging through EPZs can lead the way to industrialization, and ultimately to a larger and faster poverty reduction.

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LIST OF MAJOR WORKS

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