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# Export Processing Zone Expansion in Madagascar: What are the Labor Market and Gender Impacts?

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This paper analyzes part of the controversy over export processing zones—the labor market and gender impacts—using unique time-series labor force survey data from an African setting: urban Madagascar, in which the EPZ (or *Zone Franche*) grew very rapidly during the 1990s. Employment in the *Zone Franche* exhibits some basic patterns seen elsewhere in export processing industries of the developing world, such as the predominance of young, semi-skilled female workers. Taking advantage of microdata availability, we estimate earnings regressions to assess sector and gender wage premia. *Zone Franche* employment is found to represent a significant step up in pay for women who would otherwise be found in poorly remunerated informal sector work. Because it provides relatively high wage opportunities for those with relatively low levels of schooling, export processing development may also eventually have significant impacts on poverty. Further, by disproportionately drawing women from the low-wage sector informal sector (where the gender pay gap is very large) to the relatively well-paid export processing jobs (where pay is not only higher but also similar for men and women with similar qualifications), the EPZ has the potential to contribute to improved overall gender equity in earnings in the urban economy. Along many non-wage dimensions, jobs in the export processing zone are comparable to or even superior to other parts of the formal sector. However, the sector is also marked by very long working hours and high turnover, which may work to prevent it from being a source of long-term employment and economic advancement for women.

**Keywords:** Madagascar, Export Processing Zone, Wage gap, Gender

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## I. Introduction

Promotion of export processing zones—in which (usually foreign) companies enjoy tax holidays, and exemptions from import duties and taxes and other benefits—is one way in which many developing country governments have sought to reap benefits from the global economy. However, EPZs remain controversial. Experiences throughout the developing world suggest that there are potentially large employment and foreign exchange benefits to EPZs, and in many cases wages in them appear to be higher than for the alternatives available to their workers, who typically are mostly low-skilled women. However, the record in areas such as technology transfer, skills upgrading, backward linkages, and overall contribution to growth is at best mixed. Equally unresolved is an important subset of the controversy, which is whether growth of the sector is in particular ultimately beneficial to women and hence to the objective of gender equity.

In Africa, the question of whether EPZs can contribute to the alleviation of poverty, and their effects on women's economic welfare, is an even less close to being answered. With the notable exception of Mauritius<sup>1</sup>, African countries were unsuccessful in their efforts to promote this sector into the decade of the 1990s, despite the fact that the continent has one of the essential ingredients of early EPZ promotion: cheap labor. In the early 90s, however, the government of Madagascar began actively promoting its EPZ, called the Zone Franche. Adding very significantly to the incentives to foreign investors were trade initiatives giving exports from the poorest countries quota- and duty-free access to developed country apparel markets, in particular, the U.S.'s Africa Growth and Opportunity Act (AGOA). Investment responded, with dramatic results. Output in Zone Franche enterprises increased by about 20% annually from 1997-2001, helping to lead the country's economic recovery while significantly shifting the structure of exports away from traditional commodities such as vanilla and coffee. By 2001, Zone Franche firms accounted for about half of all secondary sector employment in the country (IMF 2003).

This study seeks to understand the labor market (employment and earnings) and gender impacts of this dramatic expansion of the EPZ in Madagascar.<sup>2</sup> It is distinguished from earlier empirical analysis of this subject in several significant ways. First, it makes use of detailed micro data, whereas most previous analyses have been limited to studying only industry or sector-level average pay differentials. Second and even more rare, these data, which were collected in the Madagascar's capital city of Antananarivo, consist of annual labor force surveys over the entire 1995-2002 period of rapid export processing manufacturing growth (and subsequent interruption due to the political and economic crisis of 2002). This makes possible an analysis of changes in earnings and employment in a very dynamic environment. Third, these data are from a region where, as noted, EPZs have yet to figure in a significant way. Comparisons of the characteristics of EPZs in an African context with those in other regions may provide clues as to the potential for African countries and in particular, the poor and women in them, to reap benefits from future EPZ investments.

The paper first considers trends in the sectoral allocation of employment in the urban labor market of Antananarivo and in the characteristics of workers in the Zone Franche and other sectors. A primary objective is to see how Madagascar compares to EPZ experiences in other developing countries with regard to the nature of the workforce and the characteristics of employment. Next we consider earnings. We use results from earnings functions to (1) compare hourly compensation in Zone Franche and other sectors controlling for worker characteristics, and measure trends in sectoral pay differences

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<sup>1</sup> Lesotho qualifies as another, partial exception.

<sup>2</sup> In a complementary paper, Cling, Razafindrakoto, and Roubaud (2005) analyze the development and characteristics of the Zone Franche, and discuss its macroeconomic implications.

over time; (2) compare returns to education and experience across sectors and genders; and (3) compare male and female earnings in the Zone Franche and in other sectors, and examine changes in gender wage gaps over time. Finally, the debate over export processing employment involves more than wage levels, but also working conditions and prospects for long-term employment. Therefore we take advantage of the rich detail of our labor force surveys to also consider how Zone Franche employment compares with other sectors with respect to employment conditions and access to a range of non-wage benefits, as well as rates of job promotion and employer provided training. The paper concludes by drawing together the findings and discussing what they imply for the role of export processing zone expansion in reducing poverty and improving gender equity in the labor market in Madagascar.

## 2. Data

We use the urban labor force surveys implemented by the Malagasy national statistical office (Institut National de la Statistics/INSTAT) with the support of the MADIO Project (Madagascar-DIAL-INSTAT-ORSTOM).<sup>3</sup> The surveys have the advantage, in addition to collecting very detailed information on labor force activity, of being fully consistent over time in terms of the structure of the questionnaire. For all but two of the years (2000 and 2001) the surveys were limited to the capital city, Antananarivo. Since the surveys from the other urban areas do not allow us to consider trends, we restrict the analysis to Antananarivo for which we have representative data for the full period. Given our emphasis on export processing, this is not really a disadvantage, since with the exception of one other urban center, Antsirabe, Zone Franche enterprises are found only in the capital.

Tables 1 and 2, using data from the 1-2-3 labor force surveys from 1995-2002, illustrate the impacts of the growth of export processing manufacturing in the Antananarivo economy. For such a relatively short period of time, the transformation of female employment patterns has been fairly remarkable. Women shifted out of private informal wage employment, which declined from 24% to 14% of the female workforce, and into formal employment in Zone Franche enterprises, which rose from 5% to 15% of all female employment. In contrast, there has been no shift to speak of into other private formal employment, defined from the survey questionnaire as employment in an enterprise that is officially registered with the government and issues pay receipts to its employees. The shares for this sector have remained generally constant for both women and men. For men the same kind of reallocation has taken place but in far less dramatic fashion (Table 2), though during this period there was also a sharp reduction in the share of the civil service in men's employment, from 15% to 10%.

Madagascar was gripped by economic and political crisis following the disputed December 2001 presidential election. The crisis lasted throughout the entire first half of the following year. Glick, Randrianasolo, and Roubaud (forthcoming) document lingering effects of the crisis in terms of elevated unemployment and reduced employment rates at the end of 2002. Tables 1 and 2 indicate that there were concomitant reallocations of employed women and men within the urban labor market. Not surprisingly, a large decline relative to other sectors can be seen in the export processing zone, reflecting the disruption of transportation networks around the capital and the withdrawal of foreign investment. In Antananarivo, the share of employed women working in such enterprises fell from 15% to 6%—essentially back to the 1995 share—while self-employment, presumably acting as a refuge for those released from formal employment, increased. There were analogous, if less pronounced, reallocations for the male workforce.

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<sup>3</sup> These surveys are part of the 1-2-3 surveys program implemented in Madagascar since 1995 (see Rakotomana, Ramilison and Roubaud 2003). The three-phase process includes the labor force survey, a survey of household informal enterprise activities, and a survey measuring household consumption and poverty.

However, both the overall economy and the Zone Franche began to recover significantly soon after the crisis ended.<sup>4</sup>

These labor survey data are consistent with other data showing the Zone Franche to be the most dynamic sector of the Malagasy economy since the mid 1990s. The rapid growth of the export processing zone in Madagascar has almost no precedent in Africa. The one major exception, as noted, is the Indian Ocean nation of Mauritius. The value of comparisons are limited by the fact that the initial phase of Mauritius's export processing development occurred in the 1970s, some two decades earlier and in a different era with respect to trade and globalization than Madagascar's. Still, it is noteworthy that whereas it took 10 years for Mauritius to attract a hundred foreign enterprises, Madagascar had 120 enterprises after just five years. Zone Franche employment reached 70,000 within 10 years in Madagascar compared with 20 years for Mauritius (see Razafindrakoto and Roubaud 2002).

Given Madagascar's much larger population, however, this growth has not yet resulted in a major impact on employment in the country as a whole. As indicated, export processing zone employment remains largely insignificant outside of Antananarivo. It directly accounts for about 1% of total employment in Madagascar's overwhelmingly rural and agricultural economy, though indirect effects might account for another 0.7% of total employment (see Cling et. al. 2005). Clearly, any significant impacts on overall poverty (and on gender gaps in earnings) to date have been small; hence it could be said that what our analysis really is considering are the potential impacts if Zone Franche growth continues.

### **3. The sorting of workers among sectors of the urban labor market**

Table 3 shows the characteristics of the Antananarivo workforce in 2001 by sector. Formal sector employment is for the most part strongly dominated by men: women generally make up less than a third of the workforce in public administration, public enterprises, and the non-EPZ private formal sector. In contrast, in the Zone Franche about two-thirds (68%) of the employees are women, repeating a well known pattern in export processing manufacturing throughout the developing world. In light of the under-representation of women in other kinds of formal employment, export processing appears to provide women with opportunities for formal employment not available to them in other sectors.<sup>5</sup> Zone Franche workers average eight years of schooling, significantly less than other formal sector workers but more than private informal wage workers (6 years) and the self-employed (6.6 years). Schooling differences by gender within each sector are not large. As in EPZs elsewhere (see Kusago and Tzannatos 1998) Zone Franche workers are young (26 and 28 years old for male and female employees, respectively) and most are in their first job.

Although employers in export processing zones in some countries have been shown to discriminate against married women (see Seguino 1997; Pearson 1995; Salaf 1981; and Greenhalgh 1985), this does not seem to be the case in Madagascar. Women in the sector are about as likely to be married as women in non-EPZ formal private wage employment (46% vs. 44%) and substantially more likely to be married than their counterparts in informal wage employment (30%). It is also noteworthy

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<sup>4</sup> Nine months after the last survey, there had already been a substantial recovery: by October 2003, the government was reporting that employment in Zone Franche firms was about 80,000, compared with the pre-crisis peak of about 110,000. Trade statistics similarly suggest a resurgence of activity in the sector (Cling et. al. 2005).

<sup>5</sup> Though the corollary to this is also well known and is one of the reasons such employment has generated controversy: employers in export manufacturing prefer female workers because they are more docile than men.

that while in other private wage employment (both formal and informal) male employees are far more likely to be married than female employees, this is not the case for Zone Franche, for which the share married is very similar for men and women.

To better understand the determinants of employment sector, we estimated multinomial logit models of sector of employment for men and women (detailed results are presented in Glick and Roubaud 2004). The estimates confirm the descriptive patterns just described while also indicating that, in contrast to the effect of being married, having young children in the household inhibits employment in the Zone Franche. On the other hand, statistically similar negative marginal effects of the children variables are also found for other formal employment (in the public or private sectors). The negative impacts of children are less strong for private informal wage employment and there is actually a positive association of young children and work in self-employment: both of these types of work are usually more compatible with child care than formal sector jobs. For all types of formal employment, therefore, having young children appears to be a barrier to participation, but there is evidently no particular hiring bias against women with young children by Zone Franche employers. Thus Madagascar conforms to several typical patterns of EPZs in developing countries—the moderate skill levels (proxied by education) and young age of workers, the prevalence of women<sup>6</sup>—but avoids the more egregious patterns of discrimination against married women and mothers reported for some EPZs.

#### **4. An analysis of compensation in Zone Franche and other sectors of the urban labor market**

##### ***Trends in earnings***

Figure 1 shows the evolution of median real hourly compensation (salary plus benefits) by sector for 1995-2002. There are major differences in earnings across the various portions of the urban labor market. Earnings are highest by far in public sector employment, and lowest among the private informal wage employed. Remuneration in Zone Franche employment appears to be lower than in other private formal employment. These differences in mean earnings are not necessarily a sign of labor market inefficiencies, i.e., segmentation of the labor market, since workers in difference sectors also have different levels of schooling and experience. The regression analysis to follow will shed more light on this issue.

The figure shows real hourly earnings in most portions of the labor market rising quite strongly in 1996-2001, the period of renewed economic growth. In the public sector, proportional gains were 50% in administration and even larger in public enterprise. Among private sector workers, real wage growth was 40% in non-EPZ private formal wage and 100% in private informal employment. The latter, to be sure, is a very impressive proportional gain, but it was from a very low base; the absolute FMG increases in private informal wage earnings were well below those in the public sector. Finally, in contrast to other

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<sup>6</sup> As we report elsewhere (Glick and Roubaud 2004) the female share of the Zone Franche workforce fell from .84 to .69 during 1995-2001. Elsewhere a rising male presence in the EPZ workforce has been associated with increasing skill intensity and earnings, which tends to favor men because they are better educated. However, we argue that this is not happening in Madagascar, based on the evidence that mean schooling levels in the sector have *fallen* over time and real wages have been flat, as well as the fact that the Zone Franche is too new to have undergone significant technological upgrading that would have increased the need for higher skilled labor.

sectors of the labor market, real wages in the fastest growing sector—the Zone Franche—grew very slowly, essentially leveling off after 1997. We consider the reasons for this below.<sup>7</sup>

The growth of real earnings in all sectors was halted or reversed in 2002, reflecting the impact of the crisis. Reductions in real earnings were largest in the public sector. Overall, however, the wage impacts were fairly small (since the crisis was felt primarily through reduced employment) and arose from the sharp increases in prices in Antananarivo caused by the crisis rather than through reductions in nominal pay.

### *Earnings regressions for 1995-2001*

We turn now to the econometric analysis of the determinants of hourly earnings in the capital region for the period 1995-2001; we exclude the crisis year 2002 because it represents a (presumably) exceptional structural break. We employ two specifications of Mincerian earnings functions. The first is a simple regression of earnings on years of schooling (distinguished by level), occupational experience and its square, institutional sector dummies, and year dummies to capture trends:

$$\ln W_i = \alpha_0 + \alpha_1 S_{1i} + \alpha_2 S_{2i} + \alpha_3 S_{3i} + \alpha_4 E_i + \alpha_5 E_i^2 + \sum_{j=1}^4 \beta_j \text{sector}_{ji} + \sum_{t=1998}^{2001} \delta_t \text{year}_{ti} + e_i$$

where  $\ln W_i$  is the natural log of real hourly earnings for individual  $i$ ,  $S_{1i}$  to  $S_{3i}$  are years of primary, secondary, and post-secondary education,  $E_i$  is occupational experience, and  $e_i$  is a disturbance term. The sector dummies  $j$  are public administration, public enterprise, private formal, and Zone Franche; private informal wage is the base category. Our second model expands this specification to include interactions of sector dummies with year, to capture sector-specific trends in earnings, and sector dummies with schooling and experience, to capture sector differences in returns to these factors. We also explored interactions of sector with year and schooling, and sector with year and experience to allow for sector-specific changes in returns to these factors over time. Since all of these effects may differ by gender, we ran the models separately on men and women. We then used the estimates and data to test for differences in the returns to education and experience across sector and gender, as well as to compare expected wages for men and women in each sector.<sup>8</sup>

We discuss the results of the first specification briefly, to get a general impression of earnings determinants and trends. The estimates are shown in Table 4 for men and women. Returns to years of schooling in each level (primary, secondary, post-secondary) are positive and significant, but the returns

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<sup>7</sup> The implied growth of real income from these earnings data is much higher than the modest improvements suggested by macro statistics. However, the latter data are problematic and probably significantly understate income growth in urban areas, and the labor force survey earnings data are corroborated by other indicators from the related consumption and informal sector surveys (see Razafindrakoto and Roubaud 1999).

<sup>8</sup> The sector dummies and interactions with them are treated as exogenous in these models. An alternative approach would be to estimate separate regressions for each sector and correct for selectivity following the method of Lee (1983). Although in principle this is feasible with our data because of the availability of several variables that could be used to identify the selection terms, it would result in a loss of degrees of freedom since all covariates are in effect interacted with sector in such an approach. This would be a problem for some gender sector subsamples with relatively few observations.

increase markedly with the level of schooling, for both men and women.<sup>9</sup> As in many other studies, experience increases earnings but at a decreasing rate. A perhaps unexpected finding is the large negative effect on women's earnings of being a recent migrant to the city, an effect that is not seen for men. One interpretation is that men tend to migrate only after they have secured a promise of decent work, perhaps through the help of a relative, and thus can avoid the migrant's inherent disadvantages of being a newcomer in the urban job market. Women migrants, in contrast, may be more likely to be accompanying their spouses. They are thus more likely to face these disadvantages when they do seek work and hence are forced to settle for poorly paid employment compared with non-migrants.

The coefficients on the sector dummies in this regression are large, positive and highly significant for men and women, indicating that work in each of the formal portions of the economy pays better than informal wage employment, the base category, controlling for differences in education and experience among workers. The premia to formal sector employment seem especially large for women, an issue that we examine in detail below. As we would expect based on Figure 1, the coefficients on the year dummies indicate substantial overall growth in real wages over the period. Further, real earnings growth has been substantially higher for women, particularly since 1997—35% vs 25% for men.<sup>10</sup>

The extended model results are shown in Table 5. Initial estimations revealed no time trends in returns to experience overall or by sector, so these interactions were dropped from the model. Even without these terms, ascertaining sector differences in time trends in earnings from the estimates requires that we account for both the year\*sector interactions and the year\*sector\*schooling interactions.<sup>11</sup> The appropriate statistical tests of year effects indicate that after 1996, real wages in the private informal sector (the base category in the model) grew faster than in any of the formal sectors (including the Zone Franche) for both men and women with the single exception of public enterprise for men, for which we could not reject equality with informal wage growth. This pattern is consistent with the trends graphed in Figure 1 for the pooled male and female sample. Thus there is a similar pattern in sector trends for men and women, but we should also note that the proportional gains in informal earnings relative to formal sector earnings have overall been greater for women.

For the same 1997-2001 period, additional tests confirm that for men, real wage growth has been slower in the Zone Franche than in all other segments of the labor market. For women, Zone Franche wage growth has been lower than in the informal sector, as already indicated, but equality with the other

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<sup>9</sup>A number of recent African studies find a similar pattern in returns by education level (Moll 1995; Appleton, Hoddinott, and Knight 1999; Appleton, Hoddinott, Krishnan and Max 1995), including a previous analysis of Madagascar (Glick 1999, using 1993-94 household survey data). This pattern contradicts the long-standing conventional wisdom that returns are highest at the primary level. However, several of these authors argue that falling primary school quality, together with an increase in the numbers of primary school graduates in a period of slow formal sector employment growth, led to significant declines in the returns to primary education over the past several decades.

<sup>10</sup>In a regression where the dependent variable is in the log of the wage, the proportional increase in the FMG wage resulting from the dummy variable changing from zero to 1 is  $\exp(\beta)-1$ , where  $\beta$  is the coefficient on the dummy variable.

<sup>11</sup> Still, to help in interpretation, note that for the interactions, the base is private informal wage employment in 1995. If we ignore the generally small sector\*year\*schooling interactions (which our formal tests do not do), the coefficient for a given sector and year indicates the proportional increase in real earnings in that sector since 1995 relative to the increase in informal wage employment (though one would also need to make the adjustment described in the previous note).

formal wage sectors could not be rejected (the relatively small sample sizes for women at the sector\*year level may make difficult to distinguish trends statistically). One might instead have expected to find wages in the booming export processing sector to be increasing relative to other sectors of the economy. However, the Zone Franche is unique in that it is largely de-linked from the local economy—indeed this is a standard criticism of export processing zones—with both output prices and the demand for labor determined by competitive international markets rather than domestic factors.<sup>12</sup> Domestic conditions would more strongly affect labor demand and earnings in sectors supplying the domestic market. This would explain the sharp proportional increases in informal sector wages (and self-employment earnings—see Figure 1) after 1996, since urban incomes and hence demand for goods and services produced in this sector were rising. In addition, public sector workers were able to use political pressure to secure large nominal wage increases in the mid-90s to compensate for real losses due to devaluation of the Malagasy Franc; this would have increased their earnings relative to Zone Franche workers. Finally, the Zone Franche does connect to the rest of the economy, if indirectly, through the labor market. Particularly for women, the large shift of semi-skilled labor from informal wage work to export processing employment may have both insured an elastic supply of labor to the latter and put upward pressure on wages in the former.

With respect to the faster overall growth of earnings for women compared with men that we first saw in the year coefficients in the simple earnings models, the relatively large shift within the female workforce from a low wage sector (private informal wage) to a higher wage sector (Zone Franche) would have raised women's average earnings relative to men's. At the same time, women remained disproportionately involved in the informal sector, so the rise of earnings in that sector also benefited women relative to men. In sum, the expansion of the EPZ has likely benefited semi-skilled women both directly and through indirect effects on informal sector wage levels.

### *Sector and gender differences in the returns to schooling and experience*

To permit a consideration of whether the returns to schooling differ across sectors of the labor market, the regressions in Table 5 include interactions of sector and schooling. In order to avoid having an enormous number of parameters, the model interacts sector with linear years of education rather than separately with years for different levels of schooling. The returns to schooling in a given sector thus depend on the base schooling coefficients, the interaction of schooling with sector, and the interactions of schooling and year by sector. The sector-specific returns then are a function of the years of schooling as well as the calendar year. To calculate the derivatives and associated standard errors of predicted log hourly wages with respect to years of schooling, we set the years of schooling at the sample means for men and women and set the year equal to the last pre-crisis year (2001).

Tables 6 and 7 present for men and women matrices of sector-by-sector differences in the estimated marginal effects of schooling together with the p-value of the differences. For men (Table 6), several sector differences are statistically significant. The main finding is that the incremental impacts of schooling on hourly earnings are low in public administration: statistically (at 10%) the impact of additional schooling is lower in this sector than all others except for the informal wage sector. A similar pattern is seen for women (Table 7). This pattern reflects, at least in part, the government's policy from 1993 to 1999 of increasing equity in pay in the public sector by raising wages disproportionately in lower employment grades (see Razafindrakoto and Roubaud 2001). With respect specifically to the Zone Franche, for women the estimated returns to schooling are lower here than in each of the other sectors

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<sup>12</sup> Moreover, the rise in the exchange rate in the second half of 2000 would have further limited EPZ employers' ability to increase wage offers in step with employers in other sectors of the Malagasy economy.

except for public administration. Analogous calculations for occupational experience indicate that for both women and men, there are not many differences in returns to occupational experience across sectors (See Glick and Roubaud 2004 for details). However, returns to experience seem to be low in public administration, possibly for the same reason suggested above for the low returns to schooling there.

How do the impacts of education and experience compare for men and women within specific labor market sectors? We calculated within sector, across gender comparisons in the same manner as above. As Table 8 shows, there are few differences that are significant—and those that are significant favor females. Returns to education are higher for women than men in informal wage work and (at 10%) in non-Zone Franche private formal employment. Women gain more than men from an additional year of occupational experience in both the public sector (administration and public enterprises) and non-EPZ private formal employment. Within Zone Franche enterprises, the point estimate for schooling marginal effects is larger for men but the difference is not significant at conventional levels. Occupational experience in these enterprises is rewarded equally for both genders. In sum, conditional on entry into specific sectors, increments to women's human capital tend to be rewarded similarly or even better than men's. These findings are consistent with Schultz's (2001) observation that most studies of wage structure in developing countries find the returns to education as high or higher for women as for men.

### *Wage premia to sector?*

Even when the returns to schooling and occupation are equivalent in two sectors of the labor market, this comparison refers to increments to earnings and does not mean that the level of earnings will be the same for workers with the same schooling and other characteristics. If labor markets are segmented, pay will differ even controlling for background. We investigate this by statistically comparing expected earnings across sectors. To control for differences in worker characteristics across sectors, we calculate predicted 2001 earnings for each sector using the same set of values for these characteristics, which for variables other than schooling and year (and interactions involving these variables) are the mean characteristics of the total male or female working sample. For schooling, we calculated expected earnings for two levels of schooling: completed primary (equivalent in Madagascar to 5 years of schooling) and completed secondary (12 years). To save space we only present the primary school results; calculations for secondary completers are generally quite similar.

Remuneration in the informal sector indeed tends to be lower than elsewhere, even after controlling for worker background. For men with a primary education and mean values of other characteristics (Table 9) expected hourly earnings in informal wage employment are inferior to those in public administration, public enterprises, and private formal non-EPZ employment. On the other hand, they are not statistically different from earnings in the Zone Franche. Considering just formal employment, public administration and public enterprise jobs pay better than jobs in the private sector for men, whether non-EPZ private formal sector or the Zone Franche. Zone Franche pay is similar to that for other private formal employment. It may be noticed that in contrast to these calculations, the basic model estimates for men in Table 4 suggest a premium to work in the Zone Franche relative to informal work. The difference is that those estimates were for the overall 1995-2001 period, while the current calculations use estimates that allow time trends to vary by sector. By 2001, the year we are considering here, the premium over informal wage work apparently had essentially disappeared due to the slow growth of Zone Franche wages relative to informal wages.<sup>13</sup>

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<sup>13</sup> It should be noted, however, that Zone Franche workers typically receive many non-wage benefits that informal sector wage workers do not, as demonstrated below. The questionnaires attempted to include monetary values of these benefits but it is possible that some benefits were not included, hence are not incorporated into our hourly

This is far from the case for women, in spite of similar overall trends in relative wages. For primary schooled women in 2001 (Table 10), hourly Zone Franche pay still exceeded private informal pay by a very wide margin. By a smaller margin it also exceeded private non-ZF formal sector earnings (significant at 10%), though for female secondary completers, private non-ZF formal wages were higher. As with men, women in public employment enjoy a large advantage over similarly qualified workers in the private formal sector, in or outside of the Zone Franche, and even more so over those in the informal sector.

Calculation of absolute predicted wages in Table 11 shows that for both genders, the differences in pay across sectors can be very large in proportional terms. Informal wage work is particularly poorly remunerated, and public administration work is particularly well compensated. For women and for the purposes of this study, the gap of most interest is the very large one between Zone Franche employment and informal wage work for those with a primary education—664 vs. 375 FMG, a 77% premium. This difference reinforces the idea that EPZ employment represent a significant step up economically for the women in this sector, whose modest levels of schooling (and possibly, the presence of discrimination by other formal sector employers) are likely to otherwise restrict them to low-paid informal employment.

A more general conclusion one can draw from the large gaps in pay between formal and informal work for both genders as well as between different portions of the formal sector is that the urban labor market is inefficient, that is, segmented (see Glick 1999 and Cogneau 1999 for earlier analyses of Madagascar with similar findings). Some caution in interpretation is called for here since the regressions do not control for unobserved heterogeneity in worker abilities or preferences for different types of employment. However, the magnitude of many of the premia observed make it unlikely that accounting for these factors would alter our inferences in a qualitative sense.

### *Premia to gender*

In a given labor market sector, differences in the hourly earnings of men and women with similar backgrounds may occur because of differences in the types of occupations that they choose—or are allowed—to enter, or simply because of gender discrimination in pay for the same type of job. We investigate gender differences in earnings in Table 11 by comparing female and male predicted hourly pay in each sector of the labor market, distinguishing primary and secondary completers and using the same covariate values for all other regressors for both genders (the means of the pooled male and female employed sample). There are only a few cases where gender differences are significant. We cannot reject equality of male and female wages in either public administration or public enterprise, and the point estimates for men and women are usually quite similar. However, in private informal wage employment, men are paid substantially more than women with the same education and experience. The gap is especially large among workers with just a primary education: the expected hourly wage for men is close to 50% higher (545 vs. 375 Fmg). Men also enjoy a (smaller) advantage over women in non-EPZ private formal wage employment, but at higher schooling levels this advantage is eliminated.

Therefore there is evidence of possible gender discrimination in pay (or in access to specific jobs) in portions of the private sector in the urban labor market, but not in public sector employment. We can say only that discrimination is ‘possible’ because gender pay gaps may instead or in part reflect the occupational choices of men and women, as noted. For the Zone Franche, which is part of private formal employment, the point estimates of predicted earnings are lower for men than women at the primary

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earnings variable. If this is the case, there may still be a positive (though falling) premium to Zone Franche work relative to informal wage work for men.

school level and larger for men at the secondary level, but in neither case are the differences statistically significant.<sup>14</sup> With a large gender pay gap in informal sector jobs but no such gap in export processing jobs, a shift of the labor force from the former to the latter implies an improvement in overall gender earnings equity.

## 5. Sector differences in non-pecuniary aspects of employment

Jobs are distinguished from each other by more than pay. In particular, formal or ‘modern’ sector firms in developing countries tend to offer non-salary benefits not available in the informal sector. In this section we consider whether this is true for export processing firms in Madagascar as well as ranking the Zone Franche and other sectors on the basis of several other measures of job ‘quality’. Means by sector for a number of indicators for 2001 are shown in Table 12. The high levels of benefits in Zone Franche employment is noteworthy: 79% of such workers, for example, enjoy paid leave and 83% receive health care coverage from their employers. This is on par with the public sector, and substantially higher than in the non-EPZ private sector, even among those in formal employment. Very few informal private wage workers enjoy these benefits. As for the nature of employment, almost all public workers have a formal employment contract. The share is smaller for non-Zone Franche private formal employment (68%) but very high for Zone-Franche workers (93%).

Only a small minority of wage earners in Antananarivo are members of a union: only in public enterprises is more than a quarter of the workforce unionized. Here again, the EPZ resembles the public sector more than other private formal employment and especially private informal wage employment. Some 13% percent of Zone Franche workers belong to a union (out of 42% who say there is a union in their place of work) compared with 18 percent in public administration (49% reporting the presence of a union) and 8% for other formal private employment (16% reporting presence of a union).<sup>15</sup>

Further, the export processing sector appears to compare favorably with other formal employment in terms of promotion and employer-provided training. Glick and Roubaud (2004) report estimates from probits for whether a worker had recently (in the last five years)<sup>16</sup> been promoted or had received training provided by their employers. The models included sector dummies as well as controls for worker characteristics that might affect an employee’s access to training or promotion. The share of such workers receiving training is not very high—between 21% and 22% in public administration, public

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<sup>14</sup> Consistent with our results, Nicita and Razzaz (2003), using 1997 and 1999 household survey data, find a large wage premium to employment in textiles (which overlaps with the EPZ) relative to informal sector pay, but unlike us they find that males earn substantially more than women even after controlling for worker characteristics at all but high levels of schooling. However, our regression coefficients indicate that over time Zone Franche wages have risen proportionately more for women than men, and in fact comparisons of predicted wages for 1997 rather than 2001 indicate a large male advantage for primary completers. Thus it appears that there was a gender gap in pay in the sector but that it has largely closed since the period covered by Nicita and Razzaz.

<sup>15</sup> We are not arguing that this indicates that EPZ employers are receptive to unions in the workplace—many clearly are not, as documented in ICFTU (2004)—but merely that on balance they do not seem less receptive than employers elsewhere in the formal economy.

<sup>16</sup> Since on the job experience is necessarily low in Zone Franche employment—most firms were no more than several years old even by the time of the 2001 survey—we restrict the sample for comparison to workers in all sectors with 5 or fewer years of experience in their current firm. Therefore we are comparing promotion and training probabilities for relatively new workers, which is the best we can do given the data.

enterprise, and Zone Franche employment, only 10% in non-EPZ private formal employment and almost non-existent in the informal wage sector. Even fewer individuals have received promotions, though this is not unexpected since we are considering only relatively recent arrivals in these enterprises.

The probit results indicate that controlling for worker education and experience, for both men and women the likelihood of training is lower in informal jobs than elsewhere but is statistically similar for Zone Franche employment, public administration and public enterprise employment. It is greater in the Zone Franche than in other private formal employment. Additional estimations indicate that there are no gender differences in training propensities controlling for differences in male and female worker characteristics in the export processing sector or in other formal employment. Probit estimates for the determinants of promotion indicate that for women as well as men, recent employees in Zone Franche firms are more likely to be promoted than those in other private formal employment. However, in both Zone Franche and public administration, men are statistically more likely than women with similar qualifications to have received a promotion. This is somewhat at odds with the lack of any statistical gender difference in the wage returns to experience noted above.

Thus with respect to a number of non-wage aspects of employment as well as employer investments in worker training and promotion of relatively recent hires, Zone Franche firms rank comparably to or even above employers in other portions of the formal economy, in particular other formal sector private firms. However, several other characteristics are less favorable. Subject to international competition, Zone Franche firms obligate their employees to work substantially longer hours than other workers. As shown in Table 12, Zone Franche employees work on average of 211 hours per month, compared with 187 in the rest of the private formal sector and just 161 in public administration. For women specifically the differences are even larger: 209 hours in Zone Franche, 168 in the non-EPZ private formal sector, and 147 in public administration. In addition, job turnover is high among Zone Franche workers. Using the same data, Cling, Razafindrakoto, and Roubaud (2005) infer that about one in five employees leave their jobs each year compared with one in ten in the private formal sector, a difference that is undoubtedly related to the longer hours (and likely also, greater intensity of work) required by Zone Franche employers. It is well recognized that for women especially, these aspects of EPZ employment can interfere with the ability to balance home and work responsibilities as well as being potentially detrimental to health.

Further, with respect to the apparently positive findings for on the job training, one should take note of Kusago and Tzannatos's (1998) observation that training in export processing manufacturing tends to be task-specific and may be of little use to the employee if she does not stay in the industry. In view of this and the evidence on hours and job turnover, it would be premature, despite the documented wage and non-wage benefits, to dismiss as inapplicable to Madagascar the stereotypical negative picture of export processing zones as offering only short term 'dead end' jobs providing few transferable skills. Ultimately, however, it remains too early in the development of export processing manufacturing in Madagascar to fairly assess this hypothesis.

## **Summary and conclusions**

Whether export processing zones are beneficial for development, and are beneficial for women in particular, remains a subject of controversy. We have attempted to analyze part of the question—the labor market impacts—using unique time-series labor force survey data from urban Madagascar, which has experienced one of the very rare cases of successful EPZ development in Africa. Employment in Madagascar's Zone Franche exhibits some of the same basic patterns seen in the early stages of export processing industries elsewhere in the developing world: the workforce is predominantly female, semi-skilled in terms of education background, and young. In contrast to at least some of these other contexts,

being married is not a barrier to women's employment in this sector, and while having young children is negatively associated with entry, the impact is similar to that for other types of formal wage employment, including in the public sector.

Also as seen in other cases, export processing employment represents a significant step up in pay for women (those with low but not zero levels of schooling) who would otherwise be likely to be found in very poorly remunerated informal sector work. This conclusion is strengthened by our use of micro data and earnings regressions to establish these sector wage premia, in contrast to most earlier studies of EPZs, which have not been able to control for sector differences in the characteristics of workers. For men, smaller premia over informal sector wages as well as an advantage relative to women within the Zone Franche existed at the start of the period but appear to have eroded over time. Growth of the Zone Franche may have significant impacts on urban, and possibly overall, poverty and inequality because it provides (at least for women) relatively high wage opportunities for those with fairly low levels of schooling, who are more likely to be poor and otherwise relegated to the informal sector. Further, by disproportionately drawing women from the low wage informal sector (where the gender pay gap is very large) to relatively well-paid export processing jobs (where pay is not only higher but also similar for men and women with similar qualifications), Zone Franche growth, if it is able to continue, has the potential to contribute substantially to improved overall gender equity in earnings in the urban economy.

Moreover, along many non-wage dimensions such as availability of paid leave and health care, access to union membership, and rates of employer provided training and promotions, jobs in the export processing zone are comparable to or even superior to those elsewhere in the formal sector. Additions to schooling and experience are rewarded with higher pay at rates comparable to other formal employment, with the partial exception of schooling for women, which is several cases better rewarded than for men. However, there are some troubling signs as well. Hours of work are very long in Zone Franche firms and turnover is high, traits held in common with export processing manufacturing in many other countries. This raises the question, for women especially, of whether the sector will prove to be a source of long term employment characterized by continued investments in worker human capital and pay advancement. Our data cover a fairly long period (1995-2002), but one that essentially corresponds to the start and early growth of the export processing zone in Madagascar. Because of this, we are unable to firmly assess this important question.

Nor, given the time frame of our data, can we address the related concern of whether firms will upgrade to more sophisticated technology while providing the appropriate training for employees for skill upgrading. These changes in other countries have tended to benefit men more than women. Longer term observation will be required to assess these outcomes. It is appropriate as well to add the reminder that export processing zone expansion has broader potential impacts that, while important, are well beyond the scope of this paper to investigate. These include the spillover effects on other sectors of the economy, whether positive (e.g., through backward industrial linkages) or negative (e.g., through competition for labor and other resources or by increasing the tax pressure on domestic enterprises that do not enjoy the exemptions of firms in the EPZ). As noted in the Introduction, experiences throughout the developing world suggest that while there are potentially large employment and foreign exchange benefits to EPZs, the record on issues such as technology transfer, backward linkages, and overall contribution to growth is at best mixed (see Kusago and Tzannatos 1998; Cling and Letilly 2001). What we have been able to show in this paper is that in the labor market, at least so far, the expansion of the export processing zone has had favorable impacts on economic opportunities, especially for those without high levels of schooling and for women.

Also beyond the focus of this analysis is a consideration of the potential constraints to Madagascar's export processing sector development. Nevertheless, it is important in closing to point out that even with the apparent recovery from the 2002 crisis, the sector faces both internal constraints related

to infrastructure and business environment (see Cadot and Nasir 2001 and Africa Private Sector Group 2005) and external constraints relating to trade opportunities. The latter loom especially large with the removal in January 2005 of remaining quotas imposed under the Multi-Fiber Agreement. By widening the developed country market for more advanced Asian apparel exporters (above all China) this has removed a key source of competitive advantage of poorer African exporters like Madagascar. Some advantages, such as duty-free access to U.S. markets under AGOA, will remain in place at least temporarily, but it is widely predicted that Madagascar and similar exporters will be hurt. Indeed, early reports from Madagascar suggest a large initial negative employment impact.<sup>17</sup> It is not clear if these will be permanent, or if they are, whether the country is ready to adopt a strategy that could mitigate these impacts, for example by moving (as more advanced competitors have) beyond cutting and sewing to a more integrated production structure for textiles. These uncertainties highlight the obvious but important point that the magnitude of the labor market impacts discussed in this paper (and of other impacts, positive or negative) will depend fundamentally on factors affecting the growth of the sector.

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<sup>17</sup> As reported in newspaper accounts in mid-2005, the Groupement des Entreprises Franches et Partenaires (Zone Franche entrepreneurs' organization) reported a decline of 25,000 to 30,000 jobs in the Zone Franche (out of roughly 100,000 initially).

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**Table 1 - Antananarivo: Allocation of male labor force by institutional sector, 1995-2002 (percent)**

Sector	1995	1996	1997	1998	1999	2000	2001	2002
Public administration	15.0	15.5	11.1	11.5	11.3	10.1	9.9	10.2
Public enterprises	3.6	3.9	5.2	5.4	5.4	3.4	3.4	3.7
Private formal (non-Zone Fr.)	24.0	23.1	22.6	23.8	23.1	24.5	25.9	22.3
Zone Franche	1.0	1.5	1.4	2.0	3.3	5.1	6.1	2.2
Private informal wage	14.4	12.0	14.6	14.6	14.2	12.4	10.8	13.4
Association/NGO	1.6	1.2	1.6	1.9	1.7	1.5	1.5	2.2
Patron	4.7	5.7	7.8	5.7	5.3	7.1	6.7	6.2
Independent/family enterprise	35.8	37.1	35.7	35.1	35.7	35.8	35.8	39.7

Source: 1-2-3 surveys, phase 1, 1995-2002, Antananarivo, MADIO/INSTAT, authors' calculations.

**Table 2 - Antananarivo: Allocation of female labor force by institutional sector, 1995-2002 (percent)**

Sector	1995	1996	1997	1998	1999	2000	2001	2002
Public administration	7.3	7.4	6.7	7.4	7.0	6.2	6.2	6.4
Public enterprises	1.4	1.5	2.4	2.0	1.9	1.0	1.5	1.8
Private formal (non-Zone Fr.)	12.0	11.5	10.8	11.9	12.8	11.6	12.5	10.6
Zone Franche	5.5	7.3	8.3	9.0	10.9	12.9	14.7	6.1
Private informal wage	23.6	18.0	20.7	19.1	18.0	18.0	14.9	15.1
Association/NGO	0.8	0.5	0.7	1.8	1.5	1.0	1.2	1.8
Patron	2.5	4.0	4.1	3.8	2.2	2.7	4.2	3.2
Independent/family enterprise	46.9	49.9	46.4	45.1	45.7	46.7	44.8	55.0

Source: 1-2-3 surveys, phase 1, 1995-2002, Antananarivo, MADIO/INSTAT, authors' calculations

**Table 3 - Antananarivo: Characteristics of the labor force by institutional sector, 2001**

Characteristic	Public administration	Public enterprises	Private formal (non-Zone Fr.)	Zone Franche	Private informal wage	Independent/family enterprise
<i>All</i>						
Female	0.36	0.28	0.30	0.69	0.55	0.53
Age	44.4	40.8	35.2	27.4	31.3	34.7
Years of schooling	11.7	10.2	9.3	7.8	5.7	6.6
Married	0.82	0.71	0.60	0.46	0.39	0.61
Migrant (within last 5 yrs)	0.09	0.05	0.05	0.08	0.11	0.06
Secondary activity in past yr <sup>a</sup>	0.17	0.12	0.12	0.03	0.14	0.15
First job	0.59	0.54	0.70	0.80	0.72	0.87
<i>Male</i>						
Age	43.9	41.8	35.5	26.3	31.4	34.1
Years of schooling	11.4	10.4	8.9	8.1	6.2	6.7
Married	0.87	0.78	0.67	0.45	0.49	0.59
Migrant (within last 5 yrs)	0.09	0.06	0.05	0.10	0.07	0.06
Secondary activity in past yr <sup>a</sup>	0.21	0.14	0.11	0.03	0.19	0.15
First job	0.56	0.50	0.67	0.81	0.76	0.85
<i>Female</i>						
Age	45.3	38.1	34.4	28.0	31.3	35.2
Years of schooling	12.0	9.7	10.3	7.7	5.3	6.4
Married	0.75	0.52	0.44	0.46	0.30	0.63
Migrant (within last 5 yrs)	0.09	0.03	0.06	0.07	0.15	0.05
Secondary activity in past yr <sup>a</sup>	0.11	0.07	0.13	0.03	0.10	0.14
First job	0.63	0.63	0.77	0.79	0.69	0.88

<sup>a</sup> engaged in a work activity in addition to the indicated employment in the past year.

Source: 1-2-3 survey, phase 1, 2001, Antananarivo, MADIO/INSTAT, authors' calculations.

**Table 4 - Antananarivo: Determinants of log hourly earnings of men and women**

Variable	Men		Women	
	Coefficient	t-statistic	Coefficient	t-statistic
Years of primary school	0.053	5.19 **	0.063	6.23 **
Years of secondary school	0.096	30.32 **	0.102	24.94 **
Years of post-secondary	0.163	29.68 **	0.158	20.80 **
Occupational experience	0.038	14.98 **	0.043	12.49 **
Experience <sup>2</sup>	-0.001	-7.33 **	-0.001	-7.69 **
Migrant within last 5 yrs	0.032	1.13	-0.127	-4.09 **
Public administration	0.575	24.21 **	0.975	30.52 **
Public enterprise	0.730	24.51 **	1.075	23.04 **
Private (non-Zone Fr.) formal	0.378	19.30 **	0.666	25.60 **
Zone Franche	0.262	8.00 **	0.610	26.70 **
Year=1996	0.054	2.17 **	0.088	2.79 **
Year=1997	0.211	8.21 **	0.217	6.85 **
Year=1998	0.350	13.89 **	0.308	9.88 **
Year=1999	0.385	15.01 **	0.425	13.61 **
Year=2000	0.450	17.99 **	0.554	18.07 **
Year=2001	0.435	16.18 **	0.529	16.16 **
Intercept	5.106	105.31 **	4.620	96.77 **
Number of observations	11,807		9,066	

Note: base sector category is informal private wage employment. Base year is 1995.

\*significant at 10% level; \*\*significant at 5% level or better

**Table 5 - Antananarivo: Determinants of log hourly earnings of men and women: model with interactions**

Variable	Men		Women	
	Coefficient	t-statistic	Coefficient	t-statistic
Years of primary school	0.054	5.17 **	0.057	5.59 **
Years of secondary school	0.098	16.56 **	0.130	17.03 **
Years of post-secondary	0.176	20.29 **	0.188	15.98 **
Occupational experience	0.035	9.86 **	0.039	8.84 **
Experience <sup>2</sup>	-0.001	-6.12 **	-0.001	-7.36 **
Migrant within last 5 yrs	0.034	1.19	-0.127	-4.15 **
Public administration	0.685	5.96 **	1.178	5.65 **
Public enterprise	0.538	2.78 **	1.430	4.74 **
Private (non-Zone Fr.) formal	0.130	1.50	0.380	3.15 **
Zone Franche	-0.140	-0.16	1.012	6.73 **
Year=1996	-0.207	-3.10 **	-0.137	-2.34 **
Year=1997	0.024	0.40	-0.017	-0.32
Year=1998	0.222	3.73 **	0.125	2.21 **
Year=1999	0.279	4.62 **	0.288	4.78 **
Year=2000	0.371	6.55 **	0.558	9.93 **
Year=2001	0.430	7.26 **	0.530	8.46 **
<i>Sector*year interactions:</i>				
pubadmin*1996	0.361	2.56 **	0.500	2.07 **
pubadmin*1997	0.293	2.02 **	0.402	1.46
pubadmin*1998	0.276	1.81 *	0.206	0.70
pubadmin*1999	0.203	1.30	0.145	0.53
pubadmin*2000	0.248	1.65 *	-0.138	-0.49
pubadmin*2001	0.050	0.32	0.098	0.29
pub enterp.*1996	0.436	1.54	-0.242	-0.64
pub enterp.*1997	0.408	1.60	0.582	1.15
pub enterp.*1998	0.396	1.70 *	0.296	0.64
pub enterp.*1999	0.036	0.14	-0.471	-1.07
pub enterp.*2000	0.160	0.67	-0.353	-0.70
pub enterp.*2001	-0.088	-0.32	-0.805	-1.54
prvt. formal*1996	0.423	3.74 **	0.690	4.10 **
prvt. formal*1997	0.265	2.33 **	0.296	1.74 *
prvt. formal*1998	0.240	2.23 **	0.337	2.09 **
prvt. formal*1999	0.157	1.39	0.326	2.03 **
prvt. formal*2000	0.194	1.80 *	0.134	0.83
prvt. formal*2001	-0.050	-0.42	-0.106	-0.56
Zone Fr.*1996	1.252	1.35	0.455	2.39 **
Zone Fr.*1997	1.853	1.98 **	0.359	1.93 *
Zone Fr.*1998	0.749	0.81	0.176	0.94
Zone Fr.*1999	0.790	0.87	0.199	1.12
Zone Fr.*2000	0.572	0.63	-0.080	-0.49
Zone Fr.*2001	-0.054	-0.06	-0.171	-0.95
<i>Sector*schooling interactions:</i>				
yrs. school*pubadmin	-0.019	-1.74 *	-0.044	-2.15 **
yrs. school*pub enterp.	-0.001	-0.07	-0.062	-2.23 **
yrs. school*prvt. formal	0.011	1.14	-0.010	-0.81
yrs. school*Zone Fr.	0.015	0.18	-0.073	-4.52 **
<i>Sector*experience interactions:</i>				
experience*pubadmin	-0.007	-2.20	0.003	0.86
experience*pub enterp.	-0.003	-0.69	0.010	1.66 *
experience*prvt. formal	0.005	1.44 *	0.010	2.59 **
experience*Zone Fr.	0.016	1.67	0.002	0.32
Intercept	5.214	81.91 **	4.717	109.42 **
Number of observations	11,807		9,066	

Note: base sector category is informal private wage employment. Base year is 1995.

Model also includes sector\*schooling\*year interactions.

\*significant at 10% level; \*\*significant at 5% level or better

**Table 6 - Men's earnings: sector differences in returns to schooling**

<i>Sector</i>	<i>Sector</i>				
	Private informal wage	Public administration	Public enterprise	Private (non-ZF) formal	Zone Franche
Private informal wage	—	0.0176	-0.0212	-0.0142	-0.0255
<i>p-value</i>	—	0.120	0.241	0.151	0.278
Public administration	-0.0176	—	-0.0389	-0.0318	-0.0432
<i>p-value</i>	0.120	—	0.048	0.014	0.081
Public enterprise	0.0212	0.0389	—	0.0070	-0.0043
<i>p-value</i>	0.241	0.048	—	0.713	0.880
Private (non-ZF) formal	0.0142	0.0318	-0.0070	—	-0.0113
<i>p-value</i>	0.151	0.014	0.713	—	0.640
Zone Franche	0.0255	0.0432	0.0043	0.0113	—
<i>p-value</i>	0.278	0.081	0.880	0.640	—

Guide to table: Reading across the row for a sector, the cells show the difference in the marginal effect of schooling (the proportional increase in earnings from an additional year of schooling) for that sector and the indicated column sector.

Notes: based on earnings regression in Table 5. Calculations assume sample mean years of schooling and year=2001

**Table 7 - Women's earnings: sector differences in returns to schooling**

<i>Sector</i>	<i>Sector</i>				
	Private informal wage	Public administration	Public enterprise	Private (non-ZF) formal	Zone Franche
Private informal wage	—	0.0481	-0.0151	-0.0032	0.0559
<i>p-value</i>	—	0.000	0.405	0.745	0.018
Public administration	-0.0481	—	-0.0632	-0.0513	0.0077
<i>p-value</i>	0.000	—	0.001	0.000	0.755
Public enterprise	0.0151	0.0632	—	0.0119	0.0710
<i>p-value</i>	0.405	0.001	—	0.535	0.013
Private (non-ZF) formal	0.0032	0.0513	-0.0119	—	0.0591
<i>p-value</i>	0.745	0.000	0.535	—	0.015
Zone Franche	-0.0559	-0.0077	-0.0710	-0.0591	—
<i>p-value</i>	0.018	0.755	0.013	0.015	—

Notes: See notes to Table 6

**Table 8 - Male-Female differences in returns to schooling and experience, by sector**

	Private informal wage	Public administration	Public enterprise	Private (non- ZF) formal	Zone Franche
<i>schooling</i>					
Difference (male-female)	-0.0318	-0.0013	-0.0256	-0.0208	0.0496
<i>chi-square</i>	14.4	0.0	1.1	2.8	2.4
<i>p-value</i>	0.000	0.929	0.297	0.095	0.123
<i>experience</i>					
Difference (male-female)	-0.0005	-0.0109	-0.0136	-0.0060	0.0137
<i>chi-square</i>	0.0	12.9	8.2	4.8	1.2
<i>p-value</i>	0.909	0.000	0.004	0.029	0.283

Based on earnings regressions in Table 5. Calculations assume sample mean years of schooling or experience and year=2001

**Table 9 - Men: Sector differences in predicted hourly earnings for primary school completers (in 1995 fmg)**

<i>Sector</i>	<i>Sector</i>				
	Private informal wage	Public administration	Public enterprise	Private (non-ZF) formal	Zone Franche
Private informal wage	--	-455.0	-390.0	-105.5	-13.5
<i>p-value</i>	--	0.000	0.001	0.003	0.841
Public administration	455.0	--	65.0	349.5	441.6
<i>p-value</i>	0.000	--	0.623	0.000	0.000
Public enterprise	390.0	-65.0	--	284.4	376.5
<i>p-value</i>	0.001	0.623	--	0.016	0.004
Private (non-ZF) formal	105.5	-349.5	-284.4	--	92.1
<i>p-value</i>	0.003	0.000	0.016	--	0.182
Zone Franche	13.5	-441.6	-376.5	-92.1	--
<i>p-value</i>	0.841	0.000	0.004	0.182	--

Guide to table: Reading across the row for a sector, the cells show the difference in the marginal effect of schooling (the proportional increase in earnings from an additional year of schooling) for that sector and the indicated column sector.

Based on earnings regressions in Table 5 and calculated at the pooled (male and female) sample means and for year=2001. Fmg earnings are calculated from the predicted natural log of earnings as  $\exp(s^2)/2 \cdot \exp(bx)$ , where  $bx$  is predicted log earnings and  $s$  is the standard deviation of the residual in the regression.

**Table 10 - Women: Sector differences in predicted hourly earnings for primary school completers (in 1995 fmg)**

<i>Sector</i>	<i>Sector</i>				
	Private informal wage	Public administration	Public enterprise	Private (non-ZF) formal	Zone Franche
Private informal wage	--	-701.4	-425.7	-156.0	-289.4
<i>p-value</i>	--	0.000	0.000	0.000	0.000
Public administration	701.4	--	275.7	545.4	412.0
<i>p-value</i>	0.000	--	0.023	0.000	0.000
Public enterprise	425.7	-275.7	--	269.8	136.4
<i>p-value</i>	0.000	0.023	--	0.008	0.272
Private (non-ZF) formal	156.0	-545.4	-269.8	--	-133.4
<i>p-value</i>	0.000	0.000	0.008	--	0.089
Zone Franche	289.4	-412.0	-136.4	133.4	--
<i>p-value</i>	0.000	0.000	0.272	0.089	--

Notes: See notes to Table 9

**Table 11 - Male-Female differences in predicted hourly earnings by sector and level of education (1995 Fmg)**

	Private informal wage	Public administration	Public enterprise	Private (non-ZF) formal	Zone Franche
<i>Completed primary schooling</i>					
Predicted male hourly earnings	544.6	999.7	934.6	650.2	558.1
Predicted female hourly earnings	375.0	1076.4	800.7	530.9	664.4
Difference in earnings	169.6	-76.7	133.9	119.2	-106.3
<i>chi-square</i>	37.0	0.6	0.8	10.4	1.2
<i>p-value</i>	0.000	0.434	0.379	0.001	0.278
<i>Completed secondary schooling</i>					
Predicted male hourly earnings	1082.7	1756.5	2155.7	1427.6	1326.8
Predicted female hourly earnings	931.2	1908.4	2209.9	1348.5	1115.8
Difference in earnings	151.5	-151.9	-54.3	79.1	210.9
<i>chi-square</i>	4.5	2.1	0.1	0.9	1.9
<i>p-value</i>	0.034	0.144	0.785	0.349	0.168

Notes: Based on earnings regressions in Table 5. Calculations assume sample mean years of schooling or experience and year=2001.

**Table 12 - Antananarivo: Job benefits/characteristics by sector, 2001**

Benefit or characteristic	Public administration	Public enterprises	Private formal (non-Zone Fr.)	Zone Franche	Private informal wage
<i>Share of employees..</i>					
Entitled to paid leave	0.85	0.81	0.52	0.79	0.08
Receiving health care benefits	0.64	0.78	0.46	0.83	0.12
Reporting union present in workplace	0.44	0.59	0.16	0.42	0.00
Belonging to union	0.18	0.39	0.08	0.13	0.00
Having 'continuous' employment	0.99	0.93	0.95	1.00	0.81
Having employment contract	0.97	0.92	0.68	0.93	0.11
Hours of work per month ( <i>mean</i> )	161	172	187	211	180

Source: 1-2-3 surveys, phase 1, 1997-2001, Antananarivo, MADIO/INSTAT, authors' calculations.

**Fig. 1 - Antananarivo: Evolution of Median Real Hourly Earnings by Sector, 1995-2002 (in 1995 Fmg)**

